

# AWAKENING DIALOGUES

Advancing Science Education Research, Practices & Policies

**NARST**  
**2014**

**March** 30th–  
**April** 2nd

Wynndham Grand Pittsburgh Downtown | Pittsburgh, PA, USA

**NARST**

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# Science Education

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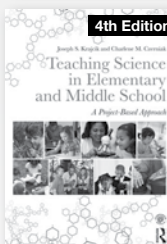
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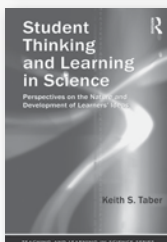
Handbook of Research on Science Education, Volume II

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Student Thinking and Learning in Science

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By Michael R. Matthews

# NARST 2014

Annual International Conference  
Wyndham Grand Pittsburgh Downtown  
Pittsburgh, PA USA  
March 30<sup>th</sup> – April 2<sup>nd</sup>

Advancing Science Education Research, Practices and Policies

## **ACKNOWLEDGMENTS**

The following members of the Program Committee helped in preparing and editing the 2014 NARST Annual International Conference Program Book.

Lynn A. Bryan, President and Program  
Committee Co-Chair

Valarie L. Akerson, President-Elect and Program  
Committee Co-Chair

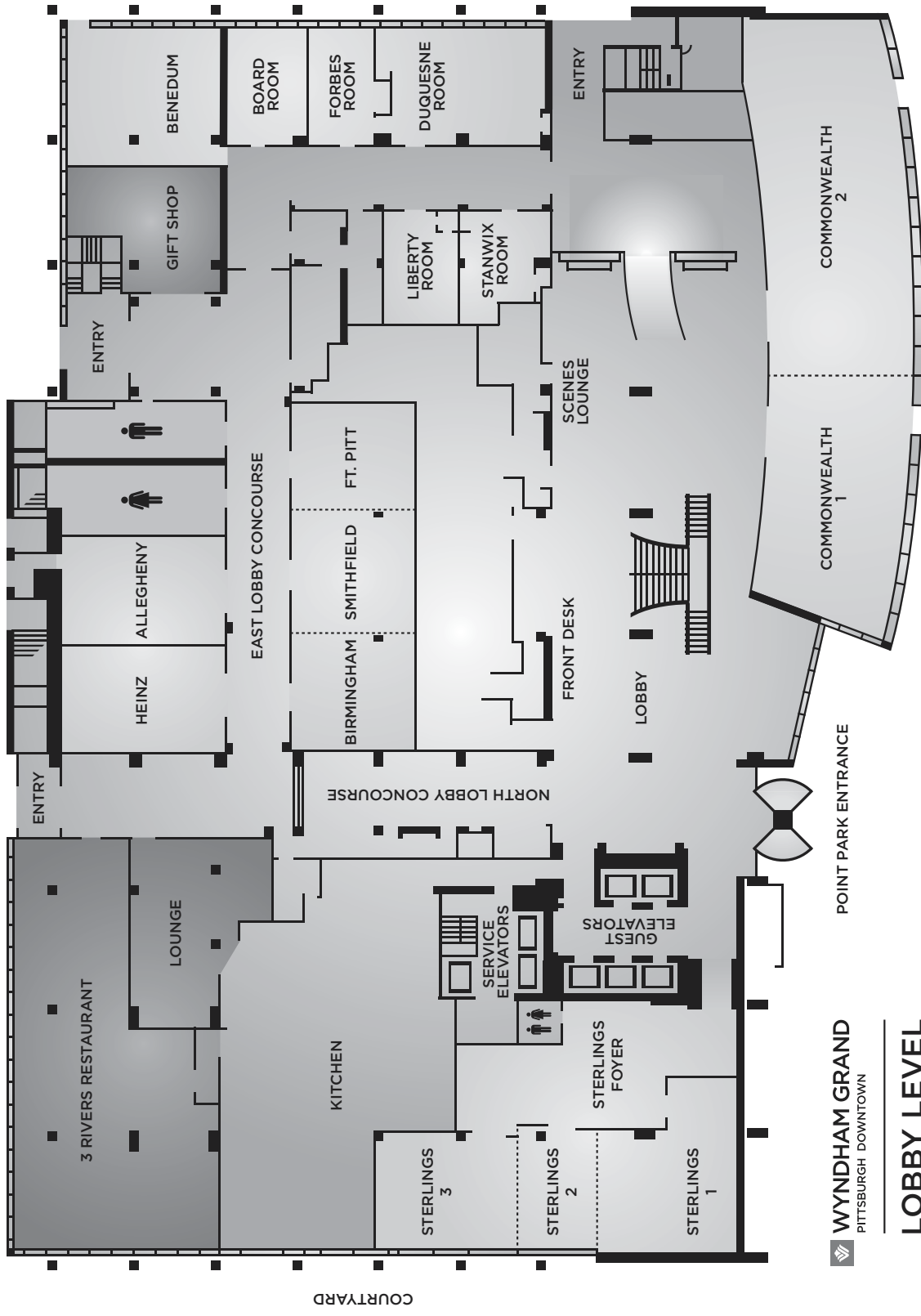
William C. Kyle, Jr., Executive Director

Toni A. Sondergeld, NARST Scheduling Coordinator



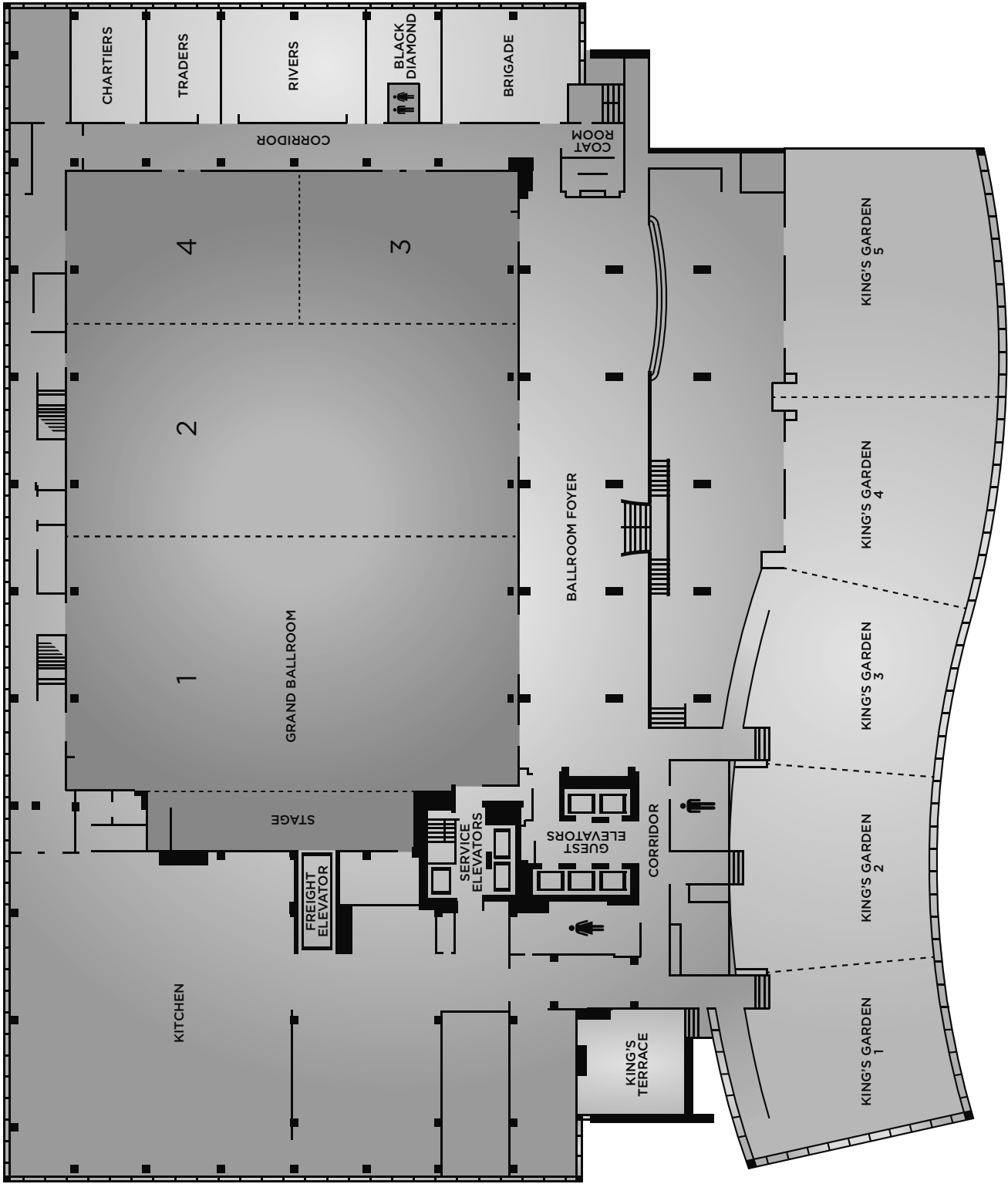
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# General Information

## Information about NARST

The National Association for Research in Science Teaching was founded in 1928 for the purpose of promoting research in science education at all educational levels and disseminating the findings of this research in such ways as to improve science teaching and learning. The Association is incorporated as a non-profit corporation in the State of Minnesota. The official publication is the Journal of Research in Science Teaching. NARST encourages presentations of a wide variety of investigations in all aspects of science education, including action, historical, philosophical, ethnographic, experimental, and evaluative research studies. Reports of empirical research, critical reviews, and theoretical works are encouraged. In October 2010, to reflect the Association's growing international focus and membership, the Board approved referring to the Association by its acronym only. At the April 2011 Board Meeting, the tagline for the Association was approved by the Board. Thus, the Association's name and tagline is: NARST - A worldwide organization for improving science teaching and learning through research.

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

## NARST Mission Statement

NARST is a worldwide organization of professionals committed to the improvement of science teaching and learning through research. Since its inception in 1928, NARST has promoted research in science education and the communication of knowledge generated by the research. The ultimate goal of NARST is to help all learners achieve science literacy. NARST promotes this goal by: 1) encouraging and supporting the application of diverse research methods and theoretical perspectives from multiple disciplines to the investigation of teaching and learning in science; 2) communicating science education research findings to researchers, practitioners, and policy makers; and 3) cooperating with other educational and scientific societies to influence educational policies. To learn more about NARST you may visit the Association's website at <http://narst.org/> and read the Bylaws approved by the membership in October 2008 at [http://www.narst.org/about/NARST\\_bylaws.pdf](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 CD is distributed at the Annual International Conference. CD includes a compiled list of abstracts (on CD-ROM) for the current Annual International Conference, plus copies of accepted papers submitted voluntarily by authors prior to the conference. Members attending the conference receive a copy on-site and the cost is included in their registration fee.
- Members have access to E-NARST News, which is published twice a year and available on the NARST website.
- Website and Listserv, allowing access to further information about the Association. You may access this site at the following URL: <http://www.narst.org>. There is further information about subscribing to the listserv on this site.

## Explanation of Program Session Formats

### Paper Sessions Organized by the Program Committee

In a paper session, the presider introduces the presenters and monitors the time used for each presentation. All papers will be allotted 15 minutes for presentation, followed by approximately 5 minutes of questions or discussion. The presider and audience will use any time remaining in the session for additional discussion, general review, and suggestions for further research. Each presenter is expected to disseminate a paper during or immediately following the session, unless the paper is on the NARST 2014 CD, distributed as part of the program.

### 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 during or immediately following the session, unless a summary of the symposium is on the NARST 2014 CD.

## 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 disseminate a paper during or immediately following the session, unless a summary of the related paper set is on the NARST 2014 CD.

## Interactive Poster Sessions

This format offers presenters the opportunity to display their work graphically in a traditional poster session format. Displays should fit on the 48" (long) x 36" (high) tri-fold boards provided and should include a brief abstract in large typescript. Each presenter must set up the display prior to the start of the Poster Session and then remove it promptly at the end of the Poster Session. Each presenter is expected to disseminate a paper during the session, unless a summary of the poster is on the 2014 CD.

## 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

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Carolyn S. Wallace, Indiana State University  
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### Association Management

Robin Turner, Drohan Management Group

# 2015 NARST Annual International Conference

The Program Chair invites NARST members and others to participate in the 2015 NARST Annual International Conference, and start planning next year's program proposals during the 2014 conference.

## VENUE:

**NARST 2015 Annual International Conference**

**Hyatt Regency Chicago, Chicago, IL, USA**

**April 11 - 14**

## THEME:

### **Becoming Next Generation Science Educators in an Era of Global Science Education Reform**

One consistent pattern in science education is change. Our vision of what science education should look like has changed over time through research. Early conceptions of science learning as simple and unproblematic mastery of facts have evolved into more sophisticated pedagogical understandings that also take into consideration other important dimensions such as social, cultural, epistemological, ontological, linguistic, personal, and moral. With the advent of the Next Generation Science Standards (NGSS) (Achieve, 2013) in the United States it seems we are once again in an era of change in how science education is envisioned by practitioners, researchers, policy makers and society. This new shift in our vision for science education is of vast proportion as it entails an associated shift in our personal and professional identities as science educators. It seems timely to pause and reflect on questions such as: What do the NGSS mean in terms of Global Science Education? What does it now mean to "teach the reforms?" What has changed as a result of the NGSS, what should still change? What does it mean to be a next generation science educator for college science teachers, K-12 teachers, preschool teachers, informal educators, and preservice and inservice teacher educators such as ourselves? What does the document mean in terms of teacher preparation—and is it different depending on grade level or subject matter? How might/should teaching practice change in preK-16 education to help students attain next generation standards? What does it mean for assessment practices? What does it mean in terms of subject matter integration? How might we include engineering practices in methods courses, science courses, and across all grade levels? How are those of us who are not engineers going to improve our own knowledge to the level required to teach engineering and help others teach engineering practices? How might equitable practices need to be considered, or reconsidered, and how will we meet the needs of diverse learners? What policy changes might occur, or need to occur? What differs among those who adopt the use of the NGSS and those who don't? Come and share your ideas and research regarding some of these questions and others with colleagues at NARST 2015.

**SUBMISSION DEADLINE:** The Program Chair or designate must receive your program proposals for the 2015 Annual International Conference by August 15, 2014. The deadline allows sufficient time for processing, reviewing and evaluating the many proposals. In June 2014, the call for program proposals will appear on the NARST website.

Conference Chair: Valarie L. Akerson, President-Elect

## Future Meeting Dates for NARST, NSTA, and AERA

### 2014

NSTA Boston, MA, April 3 – 6

AERA Philadelphia, PA, April 3 – 7

### 2015

NARST Chicago, IL, April 11 - 14

NSTA Chicago, IL, March 26 – 29

AERA Chicago, IL, April 16 – 20

# 2014-2015 Strand Coordinators

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

Shulamit Kapon, John Shemwell

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

Leah Bricker, Megan Bang

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

Deborah Smith, Cassie Quigly

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

Hayat Hokayem, Kevin White

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

April Nelms, Joseph Covert

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

David Kanter, Jennifer DeWitt

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

Asli Sezen, Lucy Avraamidou

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

Heba EL-Deghaidy, Aaron Sickel

## **Strand 9: Reflective Practice**

Femi Otulaja, Line Augustine Saint-Hilaire

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

Cari Herrmann Abell, Knut Neumann

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

Anna Lewis, Michelle Fleming

## **Strand 12: Educational Technology**

Kent Crippen, Pavlo Antonenko

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

Judy Lederman, Ian Binns

## **Strand 14: Environmental Education**

Erica Blatt, Deborah Tippins

## **Strand 15: Policy**

Erin Peters-Burton, Todd Hutner, Carla Johnson

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Hwang, Seyoung	Kremer, Kerstin	Marulcu, Ismail	Nolan, Margaret
Ilgaz, Gökhan	Kröger, Jochen	Matthews, Michael	Nordine, Jeffrey
Jackson, Phoebe	Kubarek-Sandor, Joy	McClain, Lucy	Nyaema, Mary
Jang, Nak Han	Kubitskey, Beth	McClelland, J	Nzewi, Uchenna
Jang, Syh-Jong	Kulbago, Lucy	McCormack, Stacy	Ogunniyi, Meshach
Jeffery, Tonya	Kumlu, Gökhan	McDonald, Christine	Ohana, Chris
Jensen, Betty	Kuo, Che-Yu	McDonald, James	Okebukola, Peter
Jeranyama, Letina	Lachapelle, Cathy	McDyre, Alicia	Oktay, Özlem
Jetty, Lauren	Lam, Diane	McGinnis, J. Randall	Olson, Mark
Jimenez, Juan	Lamb, Richard	McGinty, Megan	Ong, Yann Shiou
Jimenez-Aleixandre, Maria	Lan, YiChin	McGregor, Deb	Onuczko, Tracy
Jin, Hui	Lardy, Corinne	McNeill, Katherine	Opara, Felicia
Johnson, Andy	Larkin, Douglas	Melki, Christina	Oqunsola-Bandele, Mercy
Johnson, Heather	LeBlanc, Jennifer	Menekse, Muhsin	Ortega, Irasema
Juang, Jack	Lederman, Norman	Menon, Preetha	Otulaja, Femi
Judson, Eugene	Lee, Hyunju	Mercan, Fatih	Oversby, John
Jurkiewicz, Melissa	Lee, Michele	Mesci, Gunkut	Owolabi, Olatunde
Kademian, Sylvie	Lee, Min-Hsien	Metcalf, Shari	Oyao, Sheila
Kalman, Calvin	Lewis, Anna	Meyer, Helen	Ozcan, Hasan

Ozdem, Yasemin	Schen, Melissa	Tolbert, Sara	Zaidi, Sania
Ozgelen, Sinan	Schindel Dimick, Alexandra	Topcu, Mustafa	Zhai, Junqing
Pabuccu, Aybuke	Schunn, Christian	Toraman, Sinem	Zhang, Lin
Pacheco, Heather	Schwartz, Renee	Trauth-Nare, Amy	Zimmerman, Heather
Page, Heather	Schwichow, Martin	Tretter, Thomas	Zisk, Robert
Palma, Christopher	Scipio, Déana	Trujillo, Caleb	Zoellick, Bill
Park, Soonhye	Scott, Catherine	Tscholl, Michael	
Parker, Carolyn	Seiler, Gale	Tugurian, Linda	
Patrick, Patricia	Seo, Kyungwoon	Tuncay, Busra	
Patterson, Melissa	Sevgi, Sevim	Tutwiler, Michael	
Pegg, Jerine	Sevian, Hannah	Uygun, Nazli	
Peters-Burton, Erin	Sezen-Barrie, Asli	Vallett, David	
Philipp, Stephanie	Shady, Ashraf	Van De Kerkhof, Mary	
Piecka, Debra C. Burkey	Shaikh, Kamran	Van Der Hoeven Kraft, Katrien	
Pinney, Brian	Shama, Ajay	Van Horne, Katie	
Plummer, Julia	Shea, Nicole	Van Rooy, Wilhelmina	
Polman, Joseph	Shehab, Saadeddine	Vedder-Weiss, Dana	
Powell, Wardell	Shelton, Angela	Vergara, Claudia	
Prevost, Luanna	Shen, Ji	Verma, Geeta	
Price, Aaron	Sherwood, Carrie-Anne	Vezero, Beau	
Price, Jeremy	Shimek, Christine	Wagstaff, Iris	
Proctor, Niels	Shin, Myunghwan	Waight, Noemi	
Raven, Sara	Siatras, Anastasios	Waldrup, Bruce	
Rebello, Carina	Sickel, Aaron	Wall, Steven	
Rebello, N. Sanjay	Siry, Christina	Wallon, Robert	
Rees, Carol	Skaza, Heather	Walter, Emily	
Reeves, Marion	Smetana, Lara	Wan, Zhi Hong	
Rennie, Leonie	Smith, Deborah	Wang, Ting	
Richmond, Gail	Smith, Leigh	Ward, Annmarie	
Riedinger, Kelly	Smith, Mike	Warfa, Abdi	
Rivera Maulucci, Maria	Snodgrass Rangel, Virginia	Webb, Angela	
Rivet, Ann	Solis, Jorge	Weible, Jennifer	
Roehrig, Gillian	Sondergeld, Toni	Weinburgh, Molly	
Rollnick, Marissa	Song, Youngjin	Wengrowicz, Niva	
Romine, William	Songer, Nancy	Wessnigk, Susanne	
Rosales, Walter	Soylu, Firat	West, Sandra	
Roseler, Katrina	Stains, Marilyne	Wiebe, Eric	
Ross, Danielle	Staus, Nancy	Wiebke, Heidi	
Rowe, Shawn	Stender, Anita	Williams, Grant	
Ruggeri, Nancy	Stephenson, Jessica	Wilson, Christopher	
Ruggirello, Rachel	Stewart, Morgan	Wilson, Rachel	
Ruppert, John	Stofer, Kathryn	Wiseman, Skyler	
Ryu, Minjung	Stromholt, Shelley	Witzig, Stephen	
Sabel, Jaime	Stuart, Parker	Wizner, Francine	
Sadler, Troy	Stuessy, Carol	Wong, Chee Leong	
Sahin, Alpaslan	Stuhlsatz, Molly	Wood, Krista	
Saint-Hilaire, Line	Stylinski, Cathlyn	Wright, Ann	
Salloum, Sara	Subramaniam, Karthigeyan	Wyner, Yael	
Samuels, Natan	Summers, Ryan	Yacoubian, Hagop	
San Antonio, Chris	Sun, Daner	Yalaki, Yalcin	
Sanchez-Tapia, Ingrid	Sung, Shannon	Yang, Eunmi	
Sanford, Camellia	Swanson, Lauren	Yarema, Sandra	
Sanni, Rasheed	Swenson, Sandra	Yarker, Morgan	
Santau, Alexandra	Szyjka, Sebastian	Yerdelen Damar, Sevda	
Sato, Takumi	Talanquer, Vicente	Yin, Xinying	
Sawtelle, Vashti	Telli, Sibel	Yip, Wing Yan Valerie	
Saxman, Laura	Thompson, Stephen	Yoon, Sae Yeol	
Schaffer, Dannah	Thummaphan, Phonraphee	You, Hye Sun	
Schaub, Elsa	Tippett, Christine	Yu, Shu-Mey	



## NARST Presidents

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

## NARST Executive Directors

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

Paul Joslin 1975 – 1980  
Bill Holliday 1980 – 1985  
Glenn Markle 1985 – 1990  
John Staver 1990 – 1995  
Art White 1995 – 2000  
David Haury 2000 – 2002  
John Tillotson 2002 – 2007  
William C. Kyle, Jr. 2007 – 2017

## JRST Editors

J. Stanley Marshall 1963 – 1966  
H. Craig Sipe 1976 – 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  
Ron Good 1990 – 1993  
William C. Kyle, Jr. 1994 – May 1999  
Charles A. 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 Krajcik and Angela Calabrese Barton 2011 – 2015

## NARST Emeritus Members

Agin, Michael	Gilmer, Penny	Lunetta, Vincent	Rowell, Patricia
Aikenhead, Glen	Glynn, Shawn	Mallinson, Jacqueline	Schmidt, Donald
Andersen, Hans	Good, Ron	Mason, Cheryl	Schmidt, Hans-Jurgen
Anderson, Ronald	Gorodetsky, Malka	McCormack, Alan	Schwedes, Hannelore
Appleton, Ken	Gunstone, Richard	McFadden, Charles	Segal, Lea
Bartlett, Guilford	Guo, Chorong-Jee	McRobbie, Campbell	Sequeira, Manuel
Berkheimer, Glenn	Haney, Richard	Merzyn, Gottfried	Shaw, Terry
Black, Paul	Hann, Ann-Chin	Nous, Albert	Sidenstick, William
Christopher, John	Hassard, Jack	Novak, Joseph	Simonis, Doris
Clement, John	Heikkinen, Henry	Olstad, Roger	Skoog, Gerald
Dahncke, Helmut	Helgeson, Stanley	Padilla, Michael	Stewart, Martin
De Jong, Onno	Hofstein, Avi	Piburn, Michael	Sutman, Frank
Dehaan, Robert	Holbrook, Jack	Poel, Robert	Swift, J.
Doran, Rodney	Howe, Ann	Pomeroy, Deborah	Tamir, Pinchas
Feher, Elsa	Jaffarian, Bill	Poth, James	Thier, Marlene
Fensham, Peter	Joslin, Paul	Prather, J.	Thier, Herbert
Ferguson-Hessler, Monica	Kahle, Jane	Reif, Frederick	Voss, Burton
Fisher, Kathleen	Kennedy, David	Riechard, Donald	Welch, Wayne
Gabel, Dorothy	Krockover, Gerald	Ritz, William	Yager, Robert
Ganiel, Uri	Lazarowitz, Reuven	Roberts, Douglas	Yeotis, Catherine
Gilbert, John	Lindauer, Ivo	Rose, Ryda	Zoller, Uri

## NARST Award Winners

### Distinguished Contributions to Science Education through Research Award

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

<b>Year</b>	<b>Awardee</b>	<b>Year</b>	<b>Awardee</b>	<b>Year</b>	<b>Awardee</b>
1986	Anton E. Lawson	1998	James J. Gallagher	2009	Peter W. Hewson
1987	Paul DeHart Hurd	1999	Peter J. Fensham		Léonie Jean Rennie
1988	John W. Renner	2000	Jane Butler Kahle		Wolff-Michael Roth
1989	Willard Jacobson	2001	John K. Gilbert	2010	Reinders Duit
1990	Joseph D. Novak	2002	Audrey B. Champagne		Joseph Krajcik
1991	Robert L. Shrigley	2003	Barry J. Fraser	2011	Norman Lederman
1992	Pinchas Tamir	2004	Robert E. Yager	2012	Charles W. (Andy) Anderson
1993	Jack Easley, Jr.		Paul Black		Larry Yore
1994	Marcia C. Linn	2005	John C. Clement	2013	Dale R. Baker
1995	Wayne W. Welch	2006	David Treagust	2014	Glen Aikenhead
1996	Carl F. Berger	2007	Kenneth Tobin		Richard Gunstone
1997	Rosalind Driver	2008	Dorothy Gabel		Frances Lawrenz

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

The JRST Award is given annually to the author or authors of the Journal of Research in Science Teaching article that is judged the most significant publication for that year.

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

# The NARST Outstanding Paper Award

The NARST Outstanding Paper Award is given annually for the paper or research report presented at the NARST Annual International Conference that is judged to have the greatest significance and potential in the field of science education.

<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	Jrène 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

## 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.

<b>Year</b>	<b>Awardee</b>	<b>Major Professor</b>
1992	René 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

## 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.

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

## 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	Reneé 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(s)</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 Benn 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

## 2013-2014

### Officers

<b>President</b>	(15) Lynn Bryan	Purdue University	labryan@purdue.edu
<b>President-elect</b>	(16) Valarie Akerson	Indiana University	vakerson@indiana.edu
<b>Past-President</b>	(14) Sharon Lynch	The George Washington University	slynch@gwu.edu

### Directors -at-large

(14) Bryan A. Brown	Stanford University	brbrown@stanford.edu
(14) Felicia Moore Mensah	Teachers College, Columbia University	moorefe@exchange.tc.columbia.edu
(14) Carolyn S. Wallace	Indiana State University	carolyn.wallace@indstate.edu
(15) John Settlage	University of Connecticut	john.settlage@uconn.edu
(15) Maria Varelas	University of Illinois at Chicago	mvarelas@uic.edu
(15) Patricia Friedrichsen	University of Missouri-Columbia	friedrichsenp@missouri.edu
(16) Pauline Chinn	University of Hawaii – Manoa	chinn@hawaii.edu
(16) Gillian Roehrig	University of Minnesota	roehr013@umn.edu
(16) Jerome Shaw	University of California - Santa Cruz	jmlshaw@ucsc.edu

<b>Executive Director</b>	(17) Bill Kyle	University of Missouri- St. Louis	bill_kyle@umsl.edu
<b>International Coordinator</b>	(16) Hsiao-Lin Tuan	National Changhua University Of Education	suhl Tuan@cc.ncue.edu.tw
<b>NARST Liaison to NSTA</b>	(15) Deborah Hanuscin	University of Missouri - Columbia	hanuscind@missouri.edu
<b>NSTA Representative</b>	(14) Kate Scantlebury	University of Delaware	kscantle@udel.edu
<b>JRST Co-Editor</b>	(15) Angela Calabrese Barton	Michigan State University	acb@msu.edu
<b>JRST Co-Editor</b>	(15) Joseph Krajcik	Michigan State University	krajcik@msu.edu
<b>Graduate Student Representative</b>	(15) Jodi Devonshire	University of Missouri - St. Louis	jodidevonshire@gmail.com

### Support Team:

<b>Annual Meeting Coordinator</b>	Robin Turner	Drohan Management	rturner@drohanmgmt.com
<b>Program/Scheduling Coordinator</b>	Toni Sondergeld	Bowling Green State University	tonis519@aol.com

## Equity and Ethics Committee

### Co-Chairs:

(14) Felicia Moore Mensah	Teachers College, Columbia University	moorefe@exchange.tc.columbia.edu
(16) Jerome Shaw	University of California Santa Cruz	jmlshaw@ucsc.edu

### Members:

(14) Rola Khishfe	American University of Beirut	rk19@aub.edu.lb
(14) Regina Wragg	University of South Carolina	wragg@biol.sc.edu
(14) Deborah Roberts-Harris	University of New Mexico	drobert1@umd.edu
(14) Seema Rivera	University at Albany	emailseema@gmail.com
(15) Irene Osisioma	CSU / DH, California	iosisioma@csudh.edu
(15) Jacqueline Samuel	University of Southern Mississippi	jacqueline.samuel@eagles.usm.edu
(15) Cassie Quigley	Clemson University	cassieq@clemson.edu
(16) Brian Fortney	The Univeristy of Texas at Austin	bfortney@austin.utexas.edu
(16) Deb Morrison	University of Colorado-Boulder	2debmorrison@gmail.com
(16) Leon Walls	University of Vermont	lwalls@uvm.edu

### Ex-Officio:

<b>President</b>	Lynn Bryan	Purdue University	labryan@purdue.edu
<b>Executive Director</b>	Bill Kyle	University of Missouri- St. Louis	bill_kyle@umsl.edu

# External Policy and Relations Committee

## Chair:

(15) John Settlage      University of Connecticut      john.settlage@uconn.edu

## Members:

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(16) Heidi Carlone	University of North Carolina at Greensboro	hbcarlon@uncg.edu
(16) Anne Pfitzner	Merrimack College	gatlinga@merrimack.edu
(16) Alec Bodzin	Lehigh University	amb4@lehigh.edu

## Ex-Officio:

<b>President</b>	Lynn Bryan	Purdue University	labryan@purdue.edu
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# International Committee

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# NARST Annual International Conference

## Schedule at a Glance - 2014

Wyndham Grand Pittsburgh Downtown

Pittsburgh, PA USA

Date/Time	Event	Room
<b>Saturday, March 29</b>		
7:30 AM – 5:00 PM	<b>NARST Executive Board Meeting #1</b>	Commonwealth 1
2:00 PM - 5:00 PM	<b>Conference Registration</b>	Ballroom Foyer
<b>Sunday, March 30</b>		
7:30 AM – 12:00 PM	<b>NARST Executive Board Meeting #2</b>	Commonwealth 1
7:00 AM – 5:00 PM	<b>Registration</b>	Ballroom Foyer
<i>Please note: You must register for the Pre-conference Workshops with your Advance Conference Registration. You may only register for one workshop.</i>		
8:00 AM – 12:00 PM	<b>Pre-Conference Workshop #1: Equity and Ethics Committee</b> Free Maximum registration - 60	King's Garden 4
<b>Title:</b> Awakening Dialogues: Advancing Science Education Research, Practices, and Policies as Equity Researchers		
<b>Organizers:</b> Felicia Moore Mensah, Jerome Shaw, Deborah Roberts-Harris, Deborah Morrison, and Leon Walls		
8:00 AM – 12:00 PM	<b>Pre-Conference Workshop #2: Publications Advisory Committee</b> Free Maximum registration - 50	Commonwealth 2
<b>Title:</b> Developing High Quality Reviews for the Journal of Research in Science Teaching		
<b>Presenters:</b> Joseph Krajcik and Angie Calabrese Barton		
8:00 AM – 12:00 PM	<b>Pre-Conference Workshop #3: Research Committee</b> Free Maximum registration - 50	Rivers
<b>Title:</b> Writing Competitive Proposals for Programs in NSF's Division of Research on Learning in Formal and Informal Settings		
<b>Presenters:</b> David L. Haury, Celestine H. Pea, and Ellen McCallie		
8:00 AM – 12:00 PM	<b>Pre-Conference Workshop #4: Research Committee</b> Free Maximum registration - 50	King's Garden 3
<b>Title:</b> Developing and Validating Learning-Progression-Based Written Assessments		
<b>Presenters:</b> Karen Draney, Jennifer H. Doherty, and Charles W. (Andy) Anderson		
8:00 AM – 12:00 PM	<b>Pre-Conference Workshop #5: Research Committee</b> Free Maximum registration - 50	King's Garden 1
<b>Title:</b> Toward Coherence in Quantitative Research Practices in Science Education		
<b>Presenters:</b> Joseph Taylor, Susan Kowalski, Molly Stuhlsatz, and Christopher Wilson		
8:00 AM – 12:00 PM	<b>Pre-Conference Workshop #6: Research Committee</b> \$25 Maximum registration - 30	King's Garden 2
<b>Title:</b> Building a Knowledge Base for NGSS by Fostering Partnerships between Research and Practice		
<b>Presenters:</b> Bill Penuel, Ted Willard, Dan Gallagher, Kevin Crowley, Jennifer Russell, Christian Schunn, Philip Bell, Deborah L. Hanuscin, Seattle Area Teachers and Pittsburgh Area Practitioners Spanning Formal and Informal Sectors		

Date/Time	Event	Room
8:00 AM – 12:00 PM	<b>Pre-Conference Workshop #7: NSTA and NARST</b> Free Maximum registration - 40 <b>Title:</b> Communicating Research to Teachers, Administrators, and Policy Makers <b>Presenters:</b> Deborah Hanuscin, Kate Scantlebury, David Beacom, and Al Byers	King's Garden 5
12:00 PM – 1:00 PM	<b>Lunch</b>	On your own
1:00 PM – 2:30 PM	<b>Concurrent Session # 1</b>	
2:45 PM – 4:15 PM	<b>Concurrent Session # 2</b>	
4:30 PM – 5:50 PM	<b>Plenary Session # 1</b> Speaker - Susan Robertson, University of Bristol, United Kingdom <b>Title:</b> Confronting the Contradictions of Globalization for Science Education and Educators	Ballroom 1
6:00 PM – 7:00 PM	<b>Mentor-Mentee Nexus</b>	Commonwealth 2
6:00 PM - 7:00 PM	<b>Research Interest Groups (RIGs) Meetings</b> <b>Continental and Diasporic Africa in Science Education (CADASE)</b> <b>Engineering Education</b> <b>Latino/a RIG (LARIG)</b> <b>Contemporary Methods for Science Education Research</b>	King's Garden 1 King's Garden 2 King's Garden 3 King's Garden 4
7:00 PM – 9:30 PM	<b>Presidential / Welcome Reception (Appetizers served and cash bar)</b>	Ballroom 2, 3, and 4

## Monday, March 31

6:00AM - 7:15AM	<b>Mind and Sole (Off-site)*</b> <i>*This event is not sponsored nor endorsed by NARST</i>	Wyndham Lobby
7:30 AM – 8:15 AM	<b>Committee Meetings</b>	
7:00 AM – 5:00 PM	<b>Registration</b>	Ballroom Foyer
8:30 AM – 10:00 AM	<b>Concurrent Session # 3</b>	
10:15 AM – 11:45 AM	<b>Concurrent Session # 4</b>	
12:00 – 1:00 PM	<b>NARST Business Meeting</b> (Box lunch provided for 1st 100 attendees who sign up)	King's Garden 5
12:00 PM – 1:00 PM	<b>Lunch</b>	On your own
1:15 PM – 2:45 PM	<b>Concurrent Session # 5</b>	
2:45 PM - 3:15 PM	<b>Break</b>	Ballroom Foyer
3:15 PM - 4:15 PM	<b>Concurrent Session # 6A: Poster Session</b>	Ballroom 2, 3, and 4
4:15 PM - 5:15 PM	<b>Concurrent Session # 6B: Poster Session</b>	Ballroom 2, 3, and 4
5:30 PM - 7:00 PM	<b>Graduate Student Forum</b>	King's Garden 4
5:30 PM - 7:00 PM	<b>Graduate Student Forum</b>	King's Garden 5
5:30 PM - 7:00 PM	<b>Early Career Faculty Forum</b>	King's Garden 3
6:00 PM – 8:30 PM	<b>JRST Editorial Board Meeting and Reception</b> Sponsored by Wiley-Blackwell (By invitation only)	Sterlings 1, 2, and 3
6:00 PM – 7:30 PM	<b>Reception: Celebrating the 10th year of EURASIA J Math Sci &amp; Tech Ed</b> Sponsored by iSER –Int'l Society of Educational Research (By invitation only)	King's Garden 1
6:00 PM – 8:00 PM	<b>Reception: International Journal of Science and Mathematics Education</b> Sponsored by Springer (By invitation only)	Commonwealth 1
7:00 PM - 8:00 PM	<b>Graduate Student and Early Career Scholars Social*</b> <i>*Informal social - on your own; this event is not sponsored by NARST</i>	Off-site: Perle' 25 Market Square



Date/Time	Event	Room
<b>Tuesday, April 1</b>		
7:00 AM – 8:15 AM	<b>Committee Meetings</b>	
7:00 AM – 5:00 PM	<b>Registration</b>	Ballroom Foyer
8:30 AM – 10:00 AM	<p><b>Plenary Session #2:</b></p> <p><b>Panelists:</b>  Ana M. Bercerra, Program Manager for School and Family Programs, Just Communities/Comunidades Justas (co-sponsored with Equity and Ethics Committee)</p> <p>Timothy Knight, Indianapolis Metropolitan Police Department, Founder of O.K. Program of Indianapolis (co-sponsored with CADASE RIG)</p> <p>H. Richard Milner IV, Dr. Helen Faison Chair in Urban Education, Center for Urban Education, University of Pittsburgh</p> <p>Shirley Steinberg, Professor, Director and Chair of The Werklund Foundation Centre for Youth Leadership Education, University of Calgary; Editor and Author, Thirteen Questions: Reframing Education’s Conversation</p> <p><b>Discussant:</b>  Kenneth Tobin, Distinguished Professor at The Graduate Center at the City University of New York</p> <p><b>Title:</b> Thirteen Questions about Science Education</p>	Ballroom 1
10:00 AM - 10:30 AM	<b>Break</b>	Ballroom Foyer
10:30 AM – 12:00 PM	<b>Concurrent Session # 7</b>	
12:15 PM – 2:15 PM	<b>Awards Luncheon</b>	Ballroom 1, 2, 3, and 4
2:30 PM – 4:00 PM	<b>Concurrent Session # 8</b>	
4:15 PM - 5:45 PM	<b>Concurrent Session # 9</b>	
7:00 PM – 10:00 PM	<p><b>Equity Dinner</b></p> <p>Savoy Restaurant  2623 Penn Avenue  - a 2.1 mile walk or short shared cab ride from the Wyndham  (Maximum attendance: 85)  Dinner, including tax and gratuity, is \$35.  Please note: You must register for this event with your Advance Conference Registration. A business casual dress code is enforced at the Savoy Restaurant. Tickets purchased for this event are not refundable.</p>	Off-site: Savoy Restaurant 2623 Penn Avenue
<b>Wednesday, April 2</b>		
7:00 AM – 8:15 AM	<b>Strand Meetings</b>	
7:00 AM – 12:00 PM	<b>Registration</b>	Ballroom Foyer
8:30 AM – 10:00 AM	<b>Concurrent Session # 10</b>	
10:15 AM - 11:45 AM	<b>Concurrent Session # 11</b>	
12:00 PM – 1:00 PM	<b>Lunch</b>	On your own
1:00 PM – 2:30 PM	<b>Concurrent Session # 12</b>	
2:45 PM - 4:15 PM	<b>Concurrent Session # 13</b>	
5:00 PM - 10:00 PM	<b>NARST Executive Board Meeting #3</b>	Commonwealth 1



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# **PROGRAM**

**Saturday, March 29, 2014**



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

7:30am – 5:00pm, Commonwealth 1

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## **Conference Registration**

2:00pm – 5:00pm, Ballroom Foyer

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# VISTA

VIRGINIA INITIATIVE FOR SCIENCE TEACHING AND ACHIEVEMENT



## Pioneering Science Education Research

The Virginia Initiative for Science Teaching and Achievement (VISTA) is a multi-year scale-up program to validate prior research on elementary, secondary and programmatic supports for science education (Sterling and Frazier 2010; Frazier and Sterling 2009). Funded by a U.S. Department of Education Investing in Innovation grant, VISTA works with K-12 teachers to help them harness the potential of every student through hands-on, problem-based learning (PBL).

The professional development programs VISTA employs are empowering hundreds of science educators to use a more active style of teaching to engage students in the classroom and beyond. This innovative PBL approach to science teaching shows teachers how to create “real world” student scientists. Students work to solve issues that are relevant not only to their communities but to the future of our world - issues like how to create a more energy independent state or clean up a local river.

### VISTA Works!

VISTA has already made measurable impact in Virginia schools. When researchers from the external evaluation team at the University of Virginia's Curry School and Oregon State University analyzed student achievement data, the results showed that economically disadvantaged students of teachers who participated in VISTA professional development achieved a 14-point increase in scaled test scores as compared to students in the control group whose teachers did not receive VISTA professional development.

Other research showed that VISTA impacts teachers' beliefs and classroom practices. Further, teachers' science content knowledge and confidence for teaching science increases by doing hands-on science, inquiry-based teaching, and problem-based learning. Teachers reported that the content and strategies they learned from VISTA were directly relevant to their classroom instruction and would help them improve instruction in the upcoming year.



**Visit the VISTA booth at NARST today or  
[vista.gmu.edu](http://vista.gmu.edu) for more information!**

**Sunday, March 30, 2014**





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## Conference Registration

7:00am – 5:00pm, Ballroom Foyer

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## NARST Executive Board Meeting Session #2

7:30am – 12:00pm, Commonwealth 1

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## Pre-Conference Workshops 8:00am – 12:00pm

**Pre-Conference Workshop—Equity and Ethics  
Committee Sponsored (Free – 60 participants max)**  
*Awakening Dialogues: Advancing Science Education,  
Research, Practices and Policies as Equity Researchers*

8:00am – 12:00pm, King's Garden 4

**Organizers:**

Felicia Moore Mensah, Teachers College, Columbia University  
Jerome Shaw, University of California, Santa Cruz  
Deborah Roberts-Harris, University of New Mexico  
Deborah Morrison, University of Colorado at Boulder  
Leon Walls, University of Vermont

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**Pre-Conference Workshop—Publications Advisory  
Committee (Free – 50 participants max)**  
*Developing High Quality Reviews for the Journal of  
Research in Science Teaching*

8:00am – 12:00pm, Commonwealth 2

**Presenters:**

Joseph S. Krajcik, Michigan State University  
Angela M. Calabrese Barton, Michigan State University

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**Pre-Conference Workshop—Research Committee  
(Free – 50 participants max)**

*Writing Competitive Proposals for Programs in NSR's Division  
on Research on Learning in Formal and Informal Settings*

8:00am – 12:00pm, Rivers

**Presenters:**

David L. Haury, National Science Foundation  
Celestine H. Pea, National Science Foundation  
Ellen McCallie, National Science Foundation

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**Pre-Conference Workshop—Research Committee  
(Free – 50 participants max)**

*Developing and Validating Learning-Progression-Based  
Written Assessments*

8:00am – 12:00pm, King's Garden 3

**Presenters:**

Karen Draney, University of California, Berkeley  
Jennifer H. Doherty, Michigan State University  
Charles W. Anderson, Michigan State University

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**Pre-Conference Workshop—Research Committee  
(Free – 50 participants max)**

*Toward Coherence in Quantitative Research Practices  
in Science Education*

8:00am – 12:00pm, King's Garden 1

**Presenters:**

Joesph Taylor, BSCS  
Susan Kowalski, BSCS  
Molly Stuhlsatz, BSCS  
Christopher Wilson, BSCS

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**Pre-Conference Workshop—Research Committee  
(\$50 – 30 participants max)**

*Building Knowledge Base for NGSS by Fostering  
Partnerships between Research and Practice*

8:00am – 12:00pm, King's Garden 2

**Presenters:**

Bill Penuel, University of Colorado Boulder  
Ted Willard, National Science Teachers Association  
Dan Gallagher, Seattle Public Schools  
Kevin Crowley, University of Pittsburgh  
Jennifer Russell, University of Pittsburgh  
Tana J. B. Peterman, University of Washington  
Philip Bell, University of Washington  
Deborah L. Hanuscin, University of Missouri-Columbia  
Seattle Area Teachers and Pittsburgh Area Practitioners  
Spanning Formal and Informal Sectors

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**Pre-Conference Workshop—NSTA and NARST  
(Free – 40 participants max)**

*Communicating Research to Teachers, Administrators,  
and Policy Makers*

8:00am – 12:00pm, King's Garden 2

**Presenters:**

Deborah L. Hanuscin, University of Missouri-Columbia  
Kate Scantlebury, University of Delaware  
David Beacom, National Science Teachers Association  
Al Byers, National Science Teachers Association

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**Lunch—On Your Own****12:00pm – 1:00pm**

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**Concurrent Session #1****1:00pm – 2:30pm**

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**External Policy and Relations Committee Sponsored Session*****Symposium – Bridging the Policy-Research Divide: Practical Strategies for Science Education Researchers***

1:00pm-2:30pm, Commonwealth 2

***Presider:***

Todd Hutner

***Discussants:***

John Settlage, University of Connecticut, john.settlage@uconn.edu

Darleen Opfer, RAND Education

Karen Lionberger, The College Board

Michelle D. Young, University of Virginia

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**Strand 2: Science Learning: Contexts, Characteristics and Interactions*****Affect, Identity, and Creativity***

1:00pm-2:30pm, Heinz

***Presider:***

Tirupalavanam G. Ganesh

***What Not To Do? Identifying Classroom Experiences Associated to Student Disaffection with Physics***

Geoff Potvin, Clemson University, gpotvin@clemson.edu

Zahra Hazari, Clemson University

Allison Godwin, Clemson University

***Longitudinal Study of Effects of Inquiry-based Science Camp on Underachieving Children's Affective Perceptions of Learning Science and Positive Thinking***

Zuway-R Hong, National Sun Yat-Sen University,

a3803429@ms49.hinet.net

Huann-Shyang Lin, National Sun Yat-Sen University

Hsiang-Ting Chen, National SunYat-sen University

Hsin-Hui Wang, National SunYat-sen University

***Interdisciplinary Thinking and Physics Identity***

Tyler Scott, Clemson University, tdscott@clemson.edu

Zahra Hazari, Clemson University

Geoff Potvin, Clemson University

***When Do Small Groups Work during Inquiry-Based Science Laboratory Activities?***Martina Nieswandt, University of Massachusetts Amherst,  
mnieswan@educ.umass.edu

Elizabeth H. McEneaney, University of Massachusetts Amherst

Renee Affolter, University of Massachusetts Amherst

***Implications of Gifted Student Selection Techniques for Supporting Scientific Creativity in Young Children***

Lisa M. Martin-Hansen, California State University Long Beach,

l.martinhansen@csulb.edu

Erin E. Peters-Burton, George Mason University

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**Strand 2: Science Learning: Contexts, Characteristics and Interactions*****Online, Blended, Game-Enhanced, and Tutor-Supported Science Learning***

1:00pm-2:30pm, Fort Pitt

***Presider:***

David L. Fortus

***Assessing Student Learning in Summer Online Graduate Science Courses***

Sanghee Choi, University of North Georgia, schoi@ung.edu

April Nelms, University of North Georgia

Chantelle Renaud-Grant, University of North Georgia

***Analyzing Actions and Interactions in a Game-Like Approach to Curriculum Based on Video Game Research***

Carol A. Rees, Thompson Rivers University, Crees@tru.ca

***Motivational Support and Student Inquiry Engagement: A Self-Determination Theory Perspective on Online Scientist-Mentoring***

Stephen C. Scogin, Texas A&amp;M University,

stephen.scogin@icloud.com

***Investigating the Tutor-Learning Effect: Identification of Predictors of Tutors' Productive Behaviors***

Jonathan B. Velasco, University of Nebraska -

Lincoln, jon.velasco@huskers.unl.edu

Marilyne Stains, University of Nebraska Lincoln

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

### ***Scientific Inquiry, PBL, Instrumentation, and Issues of Scale***

1:00pm-2:30pm, Sterlings 2 & 3

### ***Relative Magnitude Estimations for the Durations of Geoscience Processes by 11-13-yr.-old Indonesian Learners***

Kim Cheek, University of North Florida, k.cheek@unf.edu

### ***Promoting Productive Disciplinary Engagement in Instrumented Investigations***

Chandan Dasgupta, University of Illinois at Chicago, cdasgu2@uic.edu

Tom Moher, University of Illinois at Chicago

Tia Shelley, University of Illinois at Chicago

Alexandra Silva, University of Illinois at Chicago

Leilah Lyons, University of Illinois at Chicago

Brenda Lopez, University of Illinois at Chicago

### ***Examining the Roles of Instructor Pedagogy and Student Motivation and Self-Regulation on Student Learning***

Katrien van der Hoeven Kraft, Mesa Community College, vanderhoeven@mesacc.edu

Lisa A. Gilbert, Williams College at Mystic Seaport

Megan H. Jones, North Hennepin Community College

Jonathan C. Hilpert, Georgia Southern University

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

### ***Investigating Curriculum and Assessment***

1:00pm-2:30pm, Smithfield

#### **President:**

Sara P. Raven

### ***Investigating Ways Prospective and Practicing Science Teachers Co-Plan and Co-Implement Curricular Reform***

Lauren H. Swanson, Whittier College, lswanson@whittier.edu

Lorelei R. Coddington, Claremont Graduate University

David Bourgaize, Whittier College

## ***Teachers' Perceptions of High-Stakes Testing and Accountability in Elementary Science***

Georgina O. Lindskoog, University of Miami, glindskoog@umiami.edu

Jaime Maerten-Rivera, University of Miami

Soyeon Ahn, University of Miami

Brandon S. Diamond, University of Miami

Okhee Lee, New York University

## ***A Framework for Assessing Cognitive Demand of Instructional Tasks in the NGSS Era***

Miray Tekkumru Kisa, University of Pittsburgh Learning Research and Development Center, miraytekkumru@yahoo.com

Mary Kay Stein, University of Pittsburgh

Christian Schunn, University of Pittsburgh

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

### ***Related Paper Set – Peer Teachers in Large STEM***

### ***Courses: Comparison of Three Models from North America***

1:00pm-2:30pm, Rivers

### ***Strategic Alliances and Allies in University Education: Peer Teachers/Educators***

Meredith M. Thompson, Boston University, mtknight@bu.edu

Kate Popejoy, University of North Carolina at Charlotte

### ***A Team Approach to Successful Learning (TASL): Developing Learning Coaches in Large Lecture STEM Courses***

Kate Popejoy, University of North Carolina at Charlotte,

kate.popejoy@uncc.edu

Kathryn Asala, University of North Carolina at Charlotte

### ***Insight into Involvement: Perspectives from Peer Educators***

Meredith M. Thompson, Boston University, mtknight@bu.edu

Peter S. Garik, Boston University

Kathryn Spilios, Boston University

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

### ***Translating the STEM Experience***

1:00pm-2:30pm, Sterlings 1

#### **President:**

Saouma B. Boujaoude

### ***The Positive Impact of the SETGO Program on Confidence and Attitudes of STEM Majors***

Tracy L. Huziak-Clark, Bowling Green State University, thuziak@bgsu.edu

Toni A. Sondergeld, Bowling Green State University

Christine Knaggs, Lourdes University

Moira van Staaden, Bowling Green State University

**Abstraction Thresholds in Undergraduate STEM Curricula**

Hannah Sevian, University of Massachusetts Boston,  
hannah.sevian@umb.edu

Gabriela A. Szeinberg, University of Massachusetts Boston  
Lance C. Pérez, University of Nebraska-Lincoln

**Assessing the Development of Undergraduate Researchers' Scientific Thinking Skills Using Performance Data**

Joseph A. Harsh, Indiana University, jharsh@indiana.edu

John Esteb, Butler University

Adam V. Maltese, Indiana University

Mikaela L. Schmitt-Harsh, Carleton College

**Measuring University Students' Science Communication Efficacy in Middle and High Schools**

Xiufeng Liu, State University of New York at Buffalo (SUNY),  
xliu5@buffalo.edu

Fu Lei, State University of New York at Buffalo (SUNY)

**Strand 6: Science Learning in Informal Contexts Symposium – Building a Compelling Case for Informal Science Education: Are We on the Right Track?**

1:00pm-2:30pm, King's Garden 2

**Discussants:**

David Kanter, Kanter Learning Design and Research

Jennifer DeWitt, King's College London, jennifer.dewitt@kcl.ac.uk

Kevin Crowley, University of Pittsburgh

Martin Storksdieck, The National Academies

Philip Bell, University of Washington

James Bell, Association of Science and Technology Centers

Bronwyn Bevan, Exploratorium

**Strand 7: Pre-service Science Teacher Education Symposium – Rigorous and Responsive Science Learning by Design: Transforming Classrooms and Practice-Based Teacher Education**

1:00pm-2:30pm, Duquesne

**Discussants:**

Jennifer L. Cartier, University of Pittsburgh

Jessica J. Thompson, University of Washington

Hosun Kang, University of California Irvine

David Stroupe, Michigan State University

Sara Hagenah, University of Washington

Melissa Braaten, University of Wisconsin

Scott McDonald, Pennsylvania State University

Douglas B. Larkin, Montclair State University

**Strand 8: In-service Science Teacher Education****The Role of Mentoring in Inservice Teacher Education**

1:00pm-2:30pm, Benedum

**President:**

Julie C. Brown

**Culturally Responsive Mentoring Conversations as Reflective Practice for Secondary Science Teachers of Minoritized Students**

Sara E. Tolbert, University of Arizona, saratolbert@email.arizona.edu

**Face-To-Face, Online, and Hybrid Designs for Mentoring**

Ya-Wen Cheng, University Of Missouri, yck86@mizzou.edu

Mark J. Volkmann, University of Missouri

Deborah L. Hanuscin, University of Missouri

**How Mentoring Helps to Develop Nature of Science Teaching**

Kader Bilican, Ataturk University, kader.bilican@gmail.com

Valarie L. Akerson, Indiana University

Vanashri J. Nargund-Joshi, New Jersey City University

**"Those Experiences have Made Me Who I Am!" Narratives of Novice Science Mentors About Their Mentoring Practices**

Samina Naseem, Michigan State University, naseemsa@msu.edu

Gail Richmond, Michigan State University

**Connecting with Colleagues: Influences of Social and Technical Systems in Online Communities of Practice for Science Educators**

Susan G. Straus, RAND Corporation

Albert Byers, National Science Teachers Association

Rita Karam, RAND Corporation

Mathew Lewis, RAND Corporation

**Strand 8: In-service Science Teacher Education Symposium – Voices of Transformation: Changing School and Collaborating to Build STEAM Education**

1:00pm-2:30pm, King's Garden 3

**President:**

Kara Coffino

**Discussants:**

Bhaskar Upadhyay, University of Minnesota

Kara Coffino, University of Minnesota

John Alberts, Austin School District, Minnesota

Jean McDermott, Austin School District, Minnesota

Andrew Rummel, University of Minnesota

Nate Swayer, University of Minnesota

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

1:00pm-2:30pm, Birmingham

**Presider:**

Sevim Sevgi, Middle East Technical University

**Contextualizing Instruction as an NGSS "Effective Classroom Strategy:" Translation between Curricular Materials and Teacher Enactment**

Kathryn Frances Drago, East Carolina University, dragok@ecu.edu

**Culturally Relevant Science Education for Mexican Nahua Students: Design Principles for Curricular Contextualization**

Ingrid M. Sanchez-Tapia, University of Michigan, ingridsa@umich.edu

Joseph S. Krajcik, Michigan State University

**Trailing Students Conceptual Understanding of the Law of Conservation of Matter through Curriculum**

Channa N. Barrett, Texas Christian University, channa.barrett@tcu.edu

**Developing a Standardised Categorisation of the Science Curriculum**

Per Morten Kind, Durham University, p.m.kind@durham.ac.uk

**Sixth Graders' Engagement with, and the Accessibility of, Science Texts: Considering Prose-Graphic Considerateness**

Mary Heitzman van de Kerkhof, University of Michigan, mheitzma@umich.edu

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

**Access to Teaching and Learning**

1:00pm-2:30pm, King's Garden 5

**Presider:**

Mary Hoelscher

**Sustaining an Underrepresented STEM Preservice Teachers Collaborative Community: Two Years of Benefits and Tensions**

Reynee Kachur, University of Wisconsin Oshkosh, kachurr@uwosh.edu

Michelle A. Fleming, Wright State University

**Examining Barriers for Underrepresented Racial/Ethnic Minorities in Biomedical Research and Medical Programs**

Devasmita Chakraverty, University of Virginia, dc5na@virginia.edu

Dorothy Andriole, Washington University in St. Louis

Donna Jeffe, Washington University in St. Louis

Heather Wathington, University of Virginia

Robert H. Tai, University of Virginia

**Chafing Borderlands: Obstacles for Science Teaching and Learning in Teacher Education**

Kristina Andersson, Uppsala University,

kristina.andersson@gender.uu.se

Anita Hussenius, Uppsala University

Annica Gullberg, University of Gävle

Anna T. Danielsson, Uppsala University

Kathryn Scantlebury, University of Delaware

**Can Material Feminism Make Gender Matter in 21st Science Education Research?**

Kathryn Scantlebury, University of Delaware, kscantle@udel.edu

Anita Hussenius, Uppsala University

Kristina Andersson, Uppsala University

Annica Gullberg, University of Gävle

Anna T. Danielsson, Uppsala University

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**Strand 12: Educational Technology**

**Informal Science Learning with Technology**

1:00pm-2:30pm, King's Garden 1

**Presider:**

Janell Nicole Catlin

**Summer Learning in a Digital Sandbox**

Sumi Hagiwara, Montclair State University,

hagiwaras@mail.montclair.edu

**After-School and Informal STEM Projects: Self-Selecting or Self-Defeating?**

David B. Vallett, University of Nevada Las Vegas,

david.vallett@unlv.edu

Richard L. Lamb, Washington State University

Len Annetta, George Mason University

Rebecca Cheng, George Mason University

Karen Peterman, Karen Peterman Consulting

**The Character of Parent-Child Conversations at an Interactive Science Simulation Experience**

Michael Tscholl, University of Illinois, Urbana-Champaign,

mtscholl@cs.ucl.ac.uk

Robb Lindgren, University of Illinois, Urbana-Champaign

**Challenging Students' Conceptions of Scientists:****Development of the Scientists in Context Checklist**

Paul Baldwin, University of North Georgia, paul.baldwin@ung.edu

Joseph S. Covert, University of North Georgia

**Strand 13: History, Philosophy, and Sociology of Science****Symposium – Awakening a Dialogue between Science Education and EcoJustice**

1:00pm-2:30pm, Brigade

**Presider:**

Deborah J. Tippins, The University of Georgia

**Presenters:**

Logan M. Leslie, University of Georgia, lleslie@uga.edu

Deborah J. Tippins, The University of Georgia

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

Debra Mitchell, University of Georgia

Giuliano Reis, University of Ottawa

**Strand 15: Policy****Symposium – What is a STEM school?**

1:00pm-2:30pm, King's Garden 4

**Presider:**

Carla C. Johnson, Purdue University

**Discussants:**

Margaret Ashida, STEMx™ Network, Battelle

Carla C. Johnson, Purdue University

Susan R. Bodary, Education First

Wesley Hall, Tennessee STEM Innovation Network

Steve Zipkes, Manor New Technology High School

**Concurrent Session #2****2:45pm – 4:15pm****International Committee Sponsored Session****Symposium – Addressing Critical Features of Context-Based Science Curricula**

2:45pm-4:15pm, King's Garden 1

**Presider:**

Hsiao-Lin Tuan, National Changhu University of Education

**Discussants:**

Koos Kortland, University of Utrecht, The Netherlands

Manuela Welzel-Breuer, University of Education Heidelberg, Germany

Suzanne Vrancken, Utrecht University

Sabine Fechner, Leibniz University of Hannover

Patrick Löffler, University of Koblenz-Landau

Karolina Broman, Umea University, Sweden

**Strand 1: Science Learning, Understanding and Conceptual Change****Metacognition and Processing Scientific Information**

2:45pm-4:15pm, Commonwealth 2

**Presider:**

Mehmet F. Tasar

**Ninth Grade Student Knowledge Construction through a Critique-based Recursive Writing Activity in Argument-based Inquiry Approach**

Sae Yeol Yoon, University of Iowa, saeyeol-yoon@uiowa.edu

Claudia Patricia Aguirre Mendez, The University of Iowa

Nurcan Keles, University of Iowa

Brian M. Hand, University of Iowa

**Thinking about Graphs: the Semiotics of Visual and Textual Representations**

Michelle Whitacre, University of Missouri-St. Louis,

michelle.phillips77@gmail.com

Rose Davidson, University of Missouri-St. Louis

**The Effect of 5E Learning Cycle Model Supported with Metaconceptual Processes on 7th Grade Students' Understanding of Moon Phases**

Ebru Ezberci, Kastamonu University, ebru.ezb@gmail.com

Nejla Yuruk, Gazi University

Gulfem Dilek Yurttas, Gazi University

**A Review of Research on Metacognition in Science Education: How is Metacognition Defined and Taught?**

Anat Zohar, Hebrew University, anat.zohar1@mail.huji.ac.il

Sarit Barzilai, University of Haifa

**Investigating the Role of Integrated Knowledge and Declarative Knowledge in Preparing Students for Future Energy-Related Learning**

Jeffrey Nordine, Trinity University

**Strand 2: Science Learning: Contexts, Characteristics and Interactions****Engaging Students in Authentic Scientific Practice and Motivation**

2:45pm-4:15pm, Fort Pitt

**Presider:**

Eduardo F. Mortimer

**Elementary Students Engaged in Science Practices through a Planetarium Fieldtrip**

Julia Plummer, Pennsylvania State University, jdp17@psu.edu

Kim J. Small, Upper Dublin School District

***Investigating Student Interest in the Context of Engaging in Authentic Science Practices***

Laura B. Schneider, University of Georgia, laurasch@uga.edu  
 Barbara A. Crawford, The University of Georgia  
 Ayelet Baram-Tsabari, Technion  
 Daniel K. Capps, University of Maine  
 Jaclyn Murray, University of Georgia  
 Dongmei Zhang, The University of Georgia

***The Role of Motivational Factors in Science-Related Career Aspirations and Expectations***

Wondimu Ahmed, University of Akron wahmed@uakron.edu

***The Regional Science Fair: Students' Motivation for and Perception of their Participation***

Kathleen A. Fadigan, Pennsylvania State University, kxf24@psu.edu  
 Penny L. Hammrich, Drexel University  
 David M. Majerich, Georgia Institute of Technology  
 Ashanti Obamwanyi, Pennsylvania State University

***Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies******Integrating Science with Other Disciplines in Middle and High School***

2:45pm-4:15pm, Duquesne

***President:***

Tirupalavanam G. Ganesh

***Using Mathematics in Physics Lessons in Upper Secondary Class***

Stephanie Trump, RWTH University,  
 trump@physik.rwth-aachen.de  
 Andreas Borowski, University of Potsdam

***Impacts of a Middle School Mathematics-Science Integration Program***

Luisa McHugh, Stony Brook University, luisamchugh@mac.com  
 Angela M. Kelly, Stony Brook University

***The Wicked Problem of Integration of Curriculum Materials with Embedded Multimedia Simulations: Recognizing Teacher Professionalism***

Catherine E. Milne, New York University, cem4@nyu.edu  
 Ruth N. Schwartz, Quinnipiac University  
 Steve Yavner, New York University  
 Tzuchi Tsai, New York University  
 Jan Plass, New York University  
 Bruce Homer, CUNY Graduate Center  
 Trace Jordan, New York University  
 Anna G. Brady, New York University

***The Meme-ing of STEM at a STEM-centric Middle School***

Meena M. Balgopal, Colorado State University,  
 Meena.Balgopal@colostate.edu  
 Laura B. Sample McMeeking, Colorado State University  
 John Howe, Preston Middle School, Fort Collins, CO  
 Scott Nielsen, Preston Middle School, Fort Collins, CO  
 Tracey Winey, Preston Middle School, Fort Collins, CO

***Strand 5: College Science Teaching and Learning (Grades 13-20)******Identity Development in College Science Teacher***

2:45pm-4:15pm, Heinz

***President:***

Erica Blatt, College of Staten Island, CUNY

***Exploring a Professional Meeting for Undergraduate Female Physics Majors: Can One Weekend Make a Difference?***

Gayle Buck, Indiana University, gabuck@indiana.edu  
 Mary Mills, Indiana University  
 Jianlan Wang, Indiana University  
 Xinying Yin, Indiana University

***Are Career Aspirations in Alignment with Career Attainment Patterns Among Science and Engineering Doctoral Recipients?***

Deborah S. Barry, University of Virginia, dsb9u@virginia.edu  
 Amy K. Swan, University of Virginia  
 John W. Tillotson, Syracuse University

***Female Science Education Graduate Students' Conceptual Ecologies: A Collective Case Study of Multiculturalism and Urbanity***

Phillip A. Boda, Columbia University, pab2148@tc.columbia.edu

***Strand 6: Science Learning in Informal Contexts******Designing Science Competitions to Promote 21st Century Student Outcomes***

2:45pm-4:15pm, King's Garden 3

***President:***

Kathryn Stofer

***Can a National Project-based Competition Enhance Students' Motivation to Learn Chemistry?***

Yael Shwartz, Weizmann Institute of Science,  
 yael.shwartz@weizmann.ac.il  
 Yamit Sharaabi-Naor, Weizmann Institute of Science  
 Miri Kesner, Davidson center of Science Education



**Success on a Losing Robotics Team**

Nathan R. Dolenc, University of Virginia, nrd3fp@virginia.edu  
 Xiaoqing Kong, University of Virginia  
 Robert H. Tai, University of Virginia

**Fostering and Characterizing Young Talents in Science - Design and Evaluation of a Competition Day**

Janet S. Blankenburg, Leibniz-Institute, blankenburg@ipn.uni-kiel.de  
 Tim N. Höffler, Leibniz-Institute for Science and Mathematics Education  
 Heide Peters, Leibniz-Institute for Science and Mathematics Education  
 Ilka Parchmann, Leibniz-Institute for Science and Mathematics Education

**Strand 7: Pre-service Science Teacher Education Preservice Teachers' Self-efficacy and Attitudes**

2:45pm-4:15pm, Sterlings 1

**President:**

Sarah Michaels

**A Case Study of a Pre-Service Teacher with Positive Science Attitude and Science Teaching Self-Efficacy**

Mahsa Kazempour, Penn State Berks, muk30@psu.edu

**Identifying the Sources of Self-efficacy in a Science Content Course for Preservice Elementary Teachers**

Deepika Menon, University of Missouri, dm2qc@mail.missouri.edu  
 Troy Sadler, University of Missouri

**Developing Self-Efficacy Through the Use of Cloud-Based Collaboration in an Elementary Science Methods Course**

Gregory M. Benedis-Grab, Teachers College, gbenedisgrab@theschool.columbia.edu  
 Felicia Moore Mensah, Teachers College, Columbia University

**Pre-service Teachers' Self-efficacy and Attitudes toward Learning and Teaching Science in a Content-based Biology Course**

Cindi Smith-Walters, Middle Tennessee State University, cindi.smith-walters@mtsu.edu  
 Heather L. Barker, Middle Tennessee State University  
 Thomas Brinthaup, Middle Tennessee State University  
 Brent J. Linville, Middle Tennessee State University

**Strand 8: In-service Science Teacher Education Related Paper Set – If We Support Them Will They Stay? Studying Online Mentoring for Beginning Science Teachers**

2:45pm-4:15pm, Birmingham

**Discussant:**

Julie A. Luft, University of Georgia

**Online Mentoring Program and Beginning Secondary Science Teachers**

EunJin Bang, Iowa State University, ejbang@iastate.edu  
 Sissy S. Wong, University of Houston  
 Jonah B. Firestone, Washington State University-Tricities  
 Julie A. Luft, University of Georgia

**Development of an Online Induction Program**

Joshua A. Ellis, University of Minnesota, ellis228@umn.edu  
 Gillian Roehrig, University of Minnesota  
 Justin McFadden, University of Minnesota  
 Tasneem Anwar, University of Minnesota

**Exploring Transformation of Beginning Science Teachers' Reflective Practices**

Tasneem Anwar, University of Minnesota, anwar013@umn.edu  
 Gillian Roehrig, University of Minnesota  
 Joshua A. Ellis, University of Minnesota  
 Justin McFadden, University of Minnesota

**Developing Teacher Leaders Using Adopted Personas in an Online Induction Support System**

Samuel J. Pollizi, Kennesaw State University, sjpollizzi@gmail.com  
 Greg Rushton, Kennesaw State University  
 Michelle Dean, Kennesaw State University  
 Donna J. Barrett, Georgia State University

**Strand 8: In-service Science Teacher Education Professional Development and Teacher Classroom Practice**

2:45pm-4:15pm, King's Garden 5

**President:**

Irene U. Osisoma

**Statewide Implementation of the Critical Features of Professional Development and Impact on Teacher Outcomes**

Carla C. Johnson, Purdue University, carlacjohnson@purdue.edu  
 Toni A. Sondergeld, Bowling Green State University

***Changes in Teachers' Classroom Practices and Students' Perceptions of Science Resulting from Participating in Continuous Professional Development Program***

Saouma B. Boujaoude, American University of Beirut,  
boujaoud@aub.edu.lb  
Rola Khishfe, American University of Beirut  
Sahar K. Alameh, American University of Beirut

***Effects of an NGSS-focused Professional Development on Elementary Teachers' Self-Efficacy and Teaching Practice***

Emily J.S. Kang, Adelphi University, emilykang2@gmail.com  
Corinne Donovan, Adelphi University  
Mary Jean McCarthy, Adelphi University

***Effects of Formal and Informal Support Relationships on Experiences and Practices of First-year Science Teachers***

Lori M. Ihrig, Iowa State University, lihrig@iastate.edu  
Michael P. Clough, Iowa State University  
Joanne K. Olson, Iowa State University

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**Strand 10: Curriculum, Evaluation, and Assessment**  
***Development and Validation of Concept Inventories***

2:45pm-4:15pm, Smithfield

**President:**

Per Morten Kind

***Improving upon the Chemical Concepts Inventory: Towards a State-of-the-Art Summative Assessment Instrument in Chemistry***

Emily J. Borda, Western Washington University, bordae@wwwu.edu  
Mihwa Park, University at Buffalo  
Xiufeng Liu, State University of New York at Buffalo (SUNY)

***The Population Thinking Concept Inventory (PTCI): Measuring Introductory Biology Student Understanding of Selected Evolution Concepts***

Mike U. Smith, Mercer University, smith\_mu@mercer.edu  
Ryan M. Walker, Mississippi State University  
Randolph S. Devereaux, Mercer University  
Rebecca M. Price, University of Washington, Bothell  
Kathryn E. Perez, University of Wisconsin at La Crosse

***Efficacy of Two Types of Multiple-Choice Items to Diagnose Year 8 Students' Understanding of Heat and Temperature Concepts in the Classroom***

Hye-Eun Chu, Nanyang Technological University,  
hyeeun.chu@gmail.com

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**Strand 10: Curriculum, Evaluation, and Assessment**  
***Innovative Approaches to Assessment***

2:45pm-4:15pm, Brigade

**President:**

Christina S. Melki

***Assessing Student Learning Through Scientific Humor: The Views and Practices of a College Biology Instructor***

Francine Wizner, Albany University, imnotfran@hvc.rr.com  
Alandeom W. Oliveira, University at Albany, SUNY

***Development and Validation of a Three-tier Water Cycle Diagnostic Test for Pre-service Teachers***

Dannah L. Schaffer, University of Missouri - Columbia,  
dlszh3@mail.missouri.edu  
Lloyd H. Barrow, University of Missouri - Columbia

***Evaluation of Clicker Use and Student Success***

Christina S. Melki, Indiana University, csmelki@indiana.edu  
Meredith A. Park Rogers, Indiana University

***Physics Teachers' Diagnostic Accuracy in the Use of Concept Maps to Diagnose Students' Difficulties***

Heiko Krabbe, University Duisburg-Essen,  
heiko.krabbe@uni-due.de  
Siv Ling Ley, University of Duisburg-Essen  
Hans Ernst Fischer, University Duisburg-Essen

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**Strand 10: Curriculum, Evaluation, and Assessment**  
***Related Paper Set – Using the Framework to Guide Evaluation of Curriculum Materials in Diverse Urban Middle Schools***

2:45pm-4:15pm, Rivers

**President:**

Christopher J. Harris

**Discussant:** Richard A. Duschl, Penn State University

***Using the Framework to Guide Evaluation of Curriculum Materials in Diverse Urban Middle Schools***

Christopher J. Harris, SRI International, christopher.harris@sri.com

***Using the Framework to Design Assessments of Modeling in Physical and Earth Science***

Angela H. DeBarger, SRI International, angela.haydel@sri.com  
Joseph S. Krajcik, Michigan State University  
Christopher J. Harris, SRI International

***The Role of Productive Talk in Supporting Student Participation in Scientific Modeling***

Savitha Moorthy, SRI International, savitha.moorthy@sri.com  
Cynthia M. D'Angelo, SRI International  
Christopher J. Harris, SRI International  
Carrie-Anne Sherwood, University of Michigan  
Carrie Allen Bemis, University of Colorado - Boulder  
Tina M. Stanford, SRI International

***Using Log Data to Analyze Teacher Implementation of Framework-aligned Curriculum***

Cynthia M. D'Angelo, SRI International, cynthia.dangelo@sri.com  
Savitha Moorthy, SRI International  
Carrie Allen Bemis, University of Colorado – Boulder  
Carrie-Anne Sherwood, University of Michigan

***Evaluating Teacher Professional Development for Implementation: Teacher Sensemaking and Impacts on Practice***

Carrie Allen Bemis, University of Colorado – Boulder,  
carrie.bemis@colorado.edu  
Cynthia M. D'Angelo, SRI International  
William R. Penuel, University of Colorado  
Samuel Severance, University of Colorado

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

***Examining Cultural Tensions***

2:45pm-4:15pm, Benedum

***President:***

Bryan Shao-Chang Wee

***YPAR and Peer Teaching to Subvert Systemic Racism in Science Learning***

Takumi C. Sato, Virginia Polytechnic Institute and State University,  
takumi@vt.edu

***In Critical Solidarity: Decolonizing Science Education Research***

Jean R. Aguilar-Valdez, St. Olaf College, aguilarv@stolaf.edu

***African American Boys as Science Scholars: Prospectives from Teachers of Boys of Color***

Shari Watkins, University of Delaware, swatkins@udel.edu

***Influence of a STEM camp on Underrepresented High School Students: Using Exploratory Factor Analysis***

Geeta Verma, University of Colorado Denver,  
geeta.verma@ucdenver.edu  
Anton Puvirajah, Georgia State University  
Lisa Martin-Hansen, California State University, Long Beach

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**Strand 12: Educational Technology**

***Spatial Thinking and Affect in Science Education***

2:45pm-4:15pm, King's Garden 2

***President:***

Bridget T. Miller

***Examining the Enactment of Web GIS on Students' Geospatial Thinking and Reasoning and Tectonics Understandings***

Alec M. Bodzin, Lehigh University, amb4@lehigh.edu  
Qiong Fu, Lehigh University  
Denise M. Bressler, Lehigh University  
Farah L. Vallera, Lehigh University

***Fully Iterative versus Partially Iterative Visuo-Spatial External Representations of Abstract Physics Concepts***

Satyugjit Virk, Teachers College, suthbills@hotmail.com  
John B. Black, Columbia University

***Changes in High School Science Student Affect Through Serious Educational Game Design and Development***

Len Annetta, George Mason University, lannetta@gmu.edu  
Richard L. Lamb, Washington State University  
David B. Vallett, University of Nevada Las Vegas  
Rebecca Cheng, George Mason University

***Assessment of Student 21st Century Skills Using Science Based Serious Educational Games***

Richard L. Lamb, Washington State University,  
Richard.Lamb@wsu.edu  
David B. Vallett, University of Nevada Las Vegas  
Len Annetta, George Mason University  
Rebecca Cheng, George Mason University

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**Strand 13: History, Philosophy, and Sociology of Science  
Symposium – Indigenous Knowledge, Nature of Science,  
and Scientific Inquiry: Can the Three Coexist in the  
Science Classroom?**

2:45pm-4:15pm, Sterlings 2 & 3

**Presider:**

Ian Binns

**Discussants:**

Judith S. Lederman, Illinois Institute of Technology,  
Ledermanj@iit.edu

Ian Binns, University of North Carolina, Charlotte

Eleanor Abrams, University of New Hampshire

Meshach Ogunniyi, University of the Western Cape, South Africa

Larry D. Yore, University of Victoria, Canada

Chilung-Fen Yen, Providence University, Taichung Taiwan

Bryan Brayboy, Arizona State University

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**Strand 14: Environmental Education**

**Symposium – Climate Change Education: Policies and  
Practices**

2:45pm-4:15pm, King's Garden 4

**Presider:**

Sarah J. Carrier

**Presenters:**

Charles W. Anderson, Michigan State University

J. Randy McGinnis, University of Maryland

Barry Golden, University of Tennessee

Elizabeth Walsh, San Jose State University

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**Plenary Session #1**

**Confronting the Contradictions of Globalization for  
Science Education and Educators**

4:30pm – 5:50pm, Ballroom 1

**Presider:**

Lynn A. Bryan, Purdue University

**Keynote Presenter:**

Susan Robertson, University of Bristol, United Kingdom

## Evening/Social Events

### Membership and Elections Committee Sponsored Session

#### ***Mentor-Mentee Nexus***

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

6:00pm – 7:00pm, Commonwealth 2

#### ***Presiders:***

Dale Baker, Arizona State University

Mike Smith, Mercer University

### Research Interest Groups (RIGs) Meetings

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

The mission of CADASE is to support research in science education that will have a positive impact on the lives of 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 2014 business meeting, four major discussion items will include the special issue sponsored by CADASE, the initial planning for 2015 CADASE proposal to NARST, update of the Executive Board's decisions about the RIGs, and initial budget discussion about the expenditure of funds donated by NARST members to CADASE.

6:00pm – 7:00pm, King's Garden 1

#### ***Presiders:***

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, King's Garden 2

#### ***Presiders:***

Şenay Purzer, Purdue University

#### ***Latino/a RIG (LARIG)***

The Latino/a research interest group supports social networks that further research agendas regarding Latino/a science learners. LARIG also serves as a support and mentoring *alcoba* (space) for Latin@s/Latino science educators and others interested in Latin@ science education. 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, King's Garden 3

#### ***Presiders:***

Regina Suriel, Valdosta State University

#### ***Contemporary Methods for Science Education Research***

The broad purpose of this RIG is to advance the mission of NARST by maintaining the rigor of science education studies, as well as promoting more standardized research practices across the organization such that we are better able to learn from and synthesize each other's work. The intent is that these outcomes will, in turn, allow us to keep advancing the field and maintain the relevance of our research to improving science teaching and learning. At the 2014 Business Meeting, the RIG members will engage in a series of exploratory planning discussions. The intended outcome of these discussions is to elaborate and clarify the RIG's mission, as well as identifying future speakers, future subcommittees, and interest in RIG leadership positions.

6:00pm – 7:00pm, King's Garden 4

#### ***Presiders:***

Joe Taylor, BSCS

## Presidential/Welcome Reception

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

7:00pm – 9:30pm, Ballroom 2, 3, and 4

**Monday, March 31, 2014**



**Mind and Sole (Off-Site)***\*This event is not sponsored nor endorsed by NARST.*

6:00am-7:15am, Wyndham Lobby

**Conference Registration**

7:00am – 5:00pm, Ballroom Foyer

**Committee Meetings****7:30am – 8:15am****Awards Committee Chairs & Co-Chairs Meeting**

7:30am – 8:15am, Heinz

**Equity and Ethics Committee Meeting**

7:30am – 8:15am, King's Garden 1

**External Policy and Relations Committee Meeting**

7:30am – 8:15am, King's Garden 2

**Research Committee Meeting**

7:30am – 8:15am, King's Garden 3

**Membership and Election Committee Meeting**

7:30am – 8:15am, King's Garden 4

**International Committee Meeting**

7:30am – 8:15am, King's Garden 5

**Program Committee Meeting**

7:30am – 8:15am, Brigade

**Publications Advisory Committee Meeting**

7:30am – 8:15am, Rivers

**Concurrent Session #3****8:30am – 10:00am****Equity and Ethics Committee Sponsored Session*****Jhumki Basu and Hedy Moscovici Scholars Symposium – Curriculum, Assessment and Learning Environments to Enhance Science Teaching and Learning***

8:30am-10:00am, Commonwealth 2

**President:**

Felicia M Mensah, Columbia University

**Presenters:**

Deborah Roberts-Harris, University of New Mexico

Deb Morrison, University of Colorado at Boulder

Julie C. Brown, University of Florida

Emily A. Dare, University of Minnesota

Vanessa Dodo Seriki, University of Houston-Clear Lake

Christopher G. Wright, University of Tennessee

**Strand 1: Science Learning, Understanding and Conceptual Change*****Reasoning Patterns in Learners' Scientific Explanations***

8:30am-10:00am, Benedum

**President:**

John R. Ruppert

***Profiles of Relationships between Content and Systems Reasoning***

Cheryl Lyons, Columbia University, cal2154@tc.columbia.edu

Ann E. Rivet, Teachers College Columbia University

***The Role of Perspective Taking Skills in Children's Explanations of Astronomical Phenomena***

Cori Bower, The Pennsylvania State University, cbower@psu.edu

Julia Plummer, The Pennsylvania State University

Lynn Liben, The Pennsylvania State University

***A Framework for Analyzing High School Students' Understanding of Complex Human Body Systems***

Zohar Snapir, Ben Gurion University of The Negev, Israel, zohar.

snapir@gmail.com

Catherine Eberbach, Rutgers University

Orit Ben Zvi Assaraf, Ben-Gurion University of the Negev ISRAEL

Cindy E. Hmelo-Silver, Rutgers University

Jaklin Tripto, Ben Gurion University of the Negev Beer Sheva, Israel

Miriam Amit, Ben Gurion University of the Negev Beer Sheva, Israel



***Reasoning Patterns of Nigerian Students in Explaining Biological Phenomena***

Uchenna M. Nzewi, University of Nigeria-Nsukka,  
starnzewi@yahoo.com  
Nnenna Ezechi, Rnugu State College of Education, Enugu  
Apollonia A. Nwosu, University of Nigeria, Nsukka, Enugu State.

***Analysis of Students' Models of Electric Interactions and Atomic Structure***

Kristin Mayer, Michigan State University, mayerkri@msu.edu  
Joseph S. Krajcik, Michigan State University

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

***Symposium – New Models of Professional Learning to Support Teachers in Realizing NGSS in Classroom Teaching***

8:30am-10:00am, King's Garden 4

***Presenter:***

Brian J. Reiser

***Discussant:***

Elizabeth A. Davis, University of Michigan

***Presenters:***

Jean Moon, Tidemark Institute  
Sarah Michaels, Clark University  
Abraham Lo, Northwestern University  
Christina Krist, Northwestern University  
Michael Novak, Park View School, Morton Grove, IL and Northwestern University  
Maria C. Simani, University of California Riverside  
Katie Van Horne, University of Washington  
Tana Peterman, University of Washington  
Philip L. Bell, University of Washington

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

***Science |Environment |Health – Towards a Reconceptualization of Three Critical and Inter-linked Areas of Education***

8:30am-10:00am, Fort Pitt

***Presenter:***

Justin Dillon

***Presenters:***

Alla Keselman, National Library of Medicine  
Justin Dillon, Kings College London  
Marcus Grace, University of Southampton, UK  
Cláudia Faria, University of Lisbon, Portugal  
Francine Pinhão, Universidade Federal do Rio de Janeiro, Brazil

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

***Scientific Drawings, Infographics, and Other Representations***

8:30am-10:00am, Heinz

***Students' Interpretations of Evolutionary Trees: When Relationships Contradict Prior Knowledge***

Laura R. Novick, Vanderbilt University, laura.novick@vanderbilt.edu  
Kefyn Catley, Western Carolina University

***Early Learners' Multiple Representation in the Context of the Science Writing Heuristic Approach***

Claudia P. Aguirre-Mendez, The University of Iowa,  
claudiapatriciana-aguirre-mendez@uiowa.edu  
Sae Yeol Yoon, University of Iowa  
Nurcan Keles, University of Iowa  
Deborah L. Linebarger, University of Iowa  
Brian M. Hand, University of Iowa

***Aspects of Quality Science Infographics: Experts' Perspective***

Engida Gebre, University of Colorado Boulder,  
engida.gebre@colorado.edu  
Joseph L. Polman, University of Colorado Boulder

***Contextualizing Science in Life through Science News Infographic Design and Publication***

Joseph L. Polman, University of Colorado Boulder,  
joseph.polman@colorado.edu  
Engida Gebre, University of Colorado Boulder  
Cynthia Graville Smith, Saint Louis University

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

***Investigating the Effect of Various Inquiry Approaches on Student Learning***

8:30am-10:00am, King's Garden 5

***Presenter:***

Shelly Micham

***Use of Physics Simulations in Whole Class and Small Group Settings: Comparative Case Studies***

A. Lynn Stephens, University of Massachusetts,  
lstephens@educ.umass.edu  
John J. Clement, University of Massachusetts

***Improving Students' Chemical Literacy Level on Thermochemical and Thermodynamics Concepts through Context-Based Approach***

Ceyhan Cigdemoglu, Atilim University, ccigdemoglu@atilim.edu.tr  
Omer Geban, Middle East Technical University

***Implementing Project-Based Learning in a New STEM-Focused Secondary School***

Tamara Holmlund Nelson, Washington State University  
Vancouver, tnelson1@vancouver.wsu.edu  
David Slavit, Washington State University Vancouver

***Effects of Science Inquiry Practices on Diverse Seventh Grade Students' Science Achievement and Attitudes***

Hanna Kim, Northeastern IL University, h-kim17@neiu.edu

***Strand 6: Science Learning in Informal Contexts  
Making a Difference? Impact of Out-of-School Learning Experiences on Interest in STEM***

8:30am-10:00am, Rivers

***President:***

Kathleen A. Fadigan

***Out-of-School STEM Learning in Germany: Can We Catch and Hold Students' Interest?***

Burkhard Priemer, Humboldt-University,  
priemer@physik.hu-berlin.de  
Christoph Pawek, German Aerospace Center Berlin

***Authentic Experience in an Industrial Out-of-School Lab: Impacting the Image of Physics and Career Orientation***

Susanne Wessnig, IPN Kiel, s.wessnig@ipn.uni-kiel.de  
Manfred Euler

***Research on Impacts of University-Based Biotechnology Teaching Laboratories on Teacher Professional Development and Student Outcomes***

Joan Kiely, Stony Brook University, joan.kiely@stonybrook.edu  
Angela M. Kelly, Stony Brook University  
Kristen La Magna, Stony Brook University  
Daniel Moloney, Stony Brook University  
R. D. Bynum, Stony Brook University

***Using Self-Determination Theory to Understand Students' Experiences at an Informal Science Learning Center***

Kendra J. Michaud, University of Maine,  
kendra.michaud@maine.edu  
Daniel Capps, University of Maine

***Teacher Involvement in Field Trips and Its Impact on Learning Outcomes***

Nirit Lavie Alon, Technion, nirita@spni.org.il  
Tali Tal, Technion

***Strand 7: Pre-service Science Teacher Education  
Learning and Teaching with Scientific Practices***

8:30am-10:00am, King's Garden 3

***President:***

Mark Olson, Oakland University

***Developing the Next Generation of Science Teachers: Examining Self-efficacy Development for Teaching Engineering Practices***

Amanda M. Gunning, Mercy College, agunning@mercy.edu  
Meghan E. Marrero, Mercy College  
Jessica Riccio, Columbia University

***Preservice Elementary Teachers' Ideas about Scientific Practices***

Amy R. Ricketts, Penn State University, arr217@psu.edu

***The Effects of Explicit Instruction on Modeling on Pre-service Science Teachers' Understanding of Scientific Models***

Mehmet Aydeniz, The University of Tennessee,  
maydeniz@utk.edu  
Serhat Onur Ekiz, Mugla Sitki Kocman University  
Mustafa Sami Topcu, Yildiz Technical University  
Nejla Atabay, Mugla Sitki Kocman University

***Strand 8: In-service Science Teacher Education  
Science Teacher Leadership and Reform***

8:30am-10:00am, Sterlings 2 & 3

***President:***

Matty Lau, New York Hall of Science

***A Grounded Conceptual Model of High School Science Chairs' Instructional Leadership***

Jeremy S. Peacock, Monroe Area High School,  
peacock.jeremy@gmail.com

***A Longitudinal, District-wide Social Network Analysis of the Impact of Science Teacher Leaders***

Matthew M. Schroyer, University of Illinois, schroye2@illinois.edu  
Fouad Abd-El-Khalick, University of Illinois at Urbana-Champaign  
Anita M. Martin, University of Illinois  
Caroline Haythornthwaite, University of British Columbia

***Science Teacher Leadership: Learning From a Three-year Leadership Program***

Julie A. Luft, University of Georgia, jaluft@uga.edu  
 Janey Kaufmann, Scottsdale Unified School District  
 Larry R. Plank, Hillsborough County Public Schools  
 Susan Koba, Science education consultant  
 Shannon Dubois, The University of Georgia

***Strand 8: In-service Science Teacher Education  
Teachers Noticing and Impacting Student Learning***

8:30am-10:00am, Brigade

***Presider:***

Jeffrey Nordine

***Working with Teachers to Observe What Four Year Olds Know and Can Do in Science***

Mary E. Hobbs, University of Texas at Austin,  
 maryhobbs@utexas.edu  
 Robert Williams, University of Texas at Austin  
 James P. Barufaldi, University of Texas at Austin

***Science Teachers' Modeling of Teaching Based on Their Own Interpretations of Student Thinking***

Nam-Hwa Kang, Korea National University of Education,  
 nama.kang@knue.ac.kr

***Examining How Professional Development Builds Secondary Science Teachers' and Their Students' Understanding of Secondary Research***

Jamie N. Mikeska, ETS, jamiemik@yahoo.com  
 Suzanne M. Wilson, Michigan State University  
 James Short, American Museum of Natural History  
 Suzanne Elgendy, American Museum of Natural History

***Science Teacher Noticing: Evaluating Secondary Science Teachers Attention to Student Learning***

Meredith Houle Vaughn, San Diego State University,  
 mhoule@mail.sdsu.edu  
 Donna L. Ross, San Diego State University

***Strand 9: Reflective Practice******Reflective Practices in Pre- and/or In-Service Science Teaching***

8:30am-10:00am, Duquesne

***Presider:***

Shirley A. Simon

***Developing Preservice Teachers' Reflective Capacity to Analyze their Teaching Practice***

Kimberly A. Lebak, The Richard Stockton College, kimberly.lebak@stockton.edu

***Awakening Science Teachers/Educators' Awareness of the Cultural Values of Indigenous***

Meshach Mobolaji Ogunniyi, University of the Western Cape,  
 mogunniyi@uwc.ac.za

***Transition to Science Teacher Educator: Tensions Experienced while Learning to Teach Lesson Sequencing***

Heidi L. Wiebke, Indiana University, hwiebke@indiana.edu  
 Meredith A. Park Rogers, Indiana University

***Strand 10: Curriculum, Evaluation, and Assessment  
Assessing Science Proficiency***

8:30am-10:00am, King's Garden 2

***Presider:***

Cari F. Herrmann Abell

***Evaluating the Promise of an Intervention that Helps Students Understand Chemical Reactions in Living Systems***

Cari F. Herrmann Abell, AAAS/Project 2061, cabell@aaas.org  
 Jean C. Flanagan, AAAS Project 2061  
 Caitlin Klein, AAAS Project 2061  
 Jo Ellen Roseman, American Association for the Advancement of Science

***Validation of New Chemistry Instruments that Assess Three Aspects of Science Proficiency***

Patrick J. Enderle, Florida State University,  
 patrick.enderleadi@gmail.com  
 Anna M. Strimaitis, Florida State University  
 Jonathon Grooms, Florida State University  
 Victor D. Sampson, Florida State University

***Two Perspectives of Reading Adapted Scientific Articles: Cognitive and Practical Versus Metacognitive***

Zehavit Kohen, Technion, zehavitk@tx.technion.ac.il  
 Liora Saar, Technion-Israel Institute of Technology  
 Yehudit Judy Dori, Technion-Israel Institute of Technology

***Multimodal Representations in Senior Biology Assessments: Twelve Years of Public Examinations in NSW Australia***

Wilhelmina Van Rooy, Australian Catholic University,  
 Wilhelmina.VanRooy@acu.edu.au  
 Eveline Chan, University of New England, NSW Australia

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

8:30am-10:00am, Sterlings 1

**President:**

Lynn D. Dierking

***Harnessing Affinity towards Biology to Support Diversity in Physics***Vashti Sawtelle, University of Maryland, College Park,  
davisvas@gmail.comJulia Svoboda Gouvea, University of California, Davis  
Chandra Turpen, University of Maryland, College Park***Differences Within: A Comparative Analysis of Women in the Physical Sciences***Katherine P. Dabney, Virginia Commonwealth University,  
kdabney@vcu.edu

Robert H. Tai, University of Virginia

***Making it Better for Students through LGBTQ-Inclusive Science Teacher Education: A Programmatic Case Study***

Mary Hoelscher, University of Minnesota, hoel0039@umn.edu

***Awaken a Dialogue: Race and the Experiences of Black Faculty in the Science Education Community***Eileen R. C. Parsons, University of North Carolina at Chapel Hill,  
rparsons@email.unc.edu

Domonique Bulls, University of North Carolina at Chapel Hill

Mary M. Atwater, The University of Georgia

Malcolm B. Butler, University of Central Florida

Tonjua B. Freeman, The University of Georgia

**Strand 12: Educational Technology*****Scaffolding Frameworks and Strategies***

8:30am-10:00am, Smithfield

**President:**

Janice L. Anderson

***Assessing the Implicit Scaffolding Design Framework: Effectiveness of the Build a Molecule Simulation***

Emily B. Moore, University of Colorado Boulder, emily.moore@colorado.edu

Katherine Perkins, University of Colorado Boulder

***The Effect of Scaffolded Strategies on Content Learning in a Designed Science Cyberlearning Environment***

Cindy L. Kern, University of New Haven, ckern@newhaven.edu

Kent J. Crippen, University of Florida

Alice J. Corkill, University of Nevada, Las Vegas

***The Next Generation of Inquiry: Examining a Teacher's Scaffolding of Collaborative Technology during Inquiry Learning***

Baki Cavlazoglu, Texas A&amp;M University, baticav@tamu.edu

Jennifer K. LeBlanc, Texas A&amp;M University

Cheryl Ann Peterson, Texas A&amp;M University

Carol L. Stuessy, Texas A&amp;M University

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

8:30am-10:00am, Birmingham

**President:**

Jonathan Francis Osborne

***Scientific Question Generation in Secondary Chemistry Classrooms: An Empirically-Based Framework for Exploring Novelty***

Allison Antink Meyer, Illinois State University, aameyer@ilstu.edu

Daniel Z. Meyer, Illinois College

***How They Look and What They Do?: Chilean Students' Perceptions of Scientists and Scientific Work.***

Hernan L. Cofre, Pontificia Universidad Católica de Valparaíso, Chile, hcofrem@hotmail.com

Paulina Bravo González, Pontificia Universidad Católica de Valparaíso

Corina Gonzalez-Weil, Pontificia Universidad Católica de Valparaíso, Chile

***The Status of "The Scientific Method": Why We Should Kill It; Why It's Not Dead Yet***

Daniel Z. Meyer, Illinois College, daniel.meyer@mail.ic.edu

***A Comparison of Scientists' and Preservice Teachers' Ideas about Justification and Anomalous Data in Science***

Renee S. Schwartz, Western Michigan University,

r.schwartz@wmich.edu

**Strand 14: Environmental Education*****Community Contexts for Environmental Education***

8:30am-10:00am, King's Garden 1

**President:**

Cassie Quigley, Clemson University

***Broadening the Dialogue: Environmental Perspectives of Kenyan Teachers and Community Members***

Cassie Quigley, Clemson University, cassieq@clemson.edu

James Dogbey, Clemson University

Megan Che, Clemson University

Jeff Hallo, Clemson University

***Linking School Science to Communities: A Systematic Literature Review***

Xavier Fazio, Brock University, xavier.fazio@brocku.ca

**Concurrent Session #4**  
**10:15am – 11:45am****Awards Committee Sponsored Session**  
***Symposium – Reflections on Career Trajectories: 2013 NARST Award Recipients***

10:15am-11:45am, Smithfield

***Presider:***

Patricia Friedrichsen

***Discussants:***Patricia Friedrichsen, University of Missouri,  
FriedrichsenP@missouri.eduLori A. Fulton, University of Hawaii at Manoa  
Alandeom Oliveira, University at Albany, SUNY  
Dale Baker, Arizona State University**Strand 1: Science Learning, Understanding and Conceptual Change*****Elementary Level Modeling and Assessment***

10:15am-11:45am, Sterlings 2 &amp; 3

***Presider:***

Per Morten Kind

***Analyzing Fifth-Grade Students' Engagement in Scientific Modeling: Changes in Students' Epistemologies-in-Practice over Time***

May Lee, Michigan State University, leemay1@msu.edu

Christina V. Schwarz, Michigan State University

Li Ke, Michigan State University

Joshua M. Rosenberg, Michigan State University

***Examining Elementary Students' Attention to Mechanism as They Engage in Scientific Modeling across Content Areas***

Li Ke, Michigan State University, keli1@msu.edu

Christina V. Schwarz, Michigan State University

May Lee, Michigan State University

Joshua M. Rosenberg, Michigan State University

***Mapping Concepts to Systems: Fostering 3<sup>rd</sup> Grade Students' Use of Models to Explain Hydrologic Phenomena***Cory T. Forbes, University of Nebraska-Lincoln,  
cory-forbes@uiowa.edu

Laura Zangori, University of Nebraska-Lincoln

Christina V. Schwarz, Michigan State University

**Strand 1: Science Learning, Understanding and Conceptual Change*****Symposium – Integrating Crosscutting Themes, Practices, and Core Ideas: Learning Progressions in Earth and Space Sciences***

10:15am-11:45am, Rivers

***Discussants:***

Charles W. Anderson, Michigan State University

Scott McDonald, Pennsylvania State University

Julia Plummer, Pennsylvania State University

Ann E. Rivet, Teachers College Columbia University

Cesar Delgado, University of Texas at Austin

Kim Kastens, Education Development Center, Inc.

Alice Flarend, The Pennsylvania State University

KeriAnn Rubin, The Pennsylvania State University

Megan Pickard, The Pennsylvania State University

Meredith Bembenic, The Pennsylvania State University

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

10:15am-11:45am, King's Garden 2

***Presider:***

Jeremy S. Peacock, Monroe Area High School

***Science Learning and Levels of Contextualization***

Michael Giamellaro, Oregon State University - Cascades,

michael.giamellaro@osucascades.edu

***Why Study? Emphasizing Mastery Goals in the Science Classroom***Dana Vedder-Weiss, Weizmann Institute of Science,  
weissda@gmail.com

David L. Fortus, Weizmann Institute of Science

***A Practical Measure of Motivation in Middle School******Science: Validity Evidence for the E-V-C Scale***

Chris Hulleman, James Madison University, hullemc@jmu.edu  
 Kenn Barron, James Madison University  
 Jeff Kosovich, James Madison University  
 Steve Getty, BSCS  
 Joseph A. Taylor, BSCS

***Using a Self-Report Survey to Study the Effect of Teaching Practices on Students' Motivation***

David Fortus, Weizmann Institute of Science,  
 david.fortus@weizmann.ac.il  
 Dana Vedder-Weiss, Weizmann Institute of Science

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***Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies Related Paper Set – Examining Teacher Knowledge and Practices in Enacting Learning Progression-Based Science Instruction***

10:15am-11:45am, Heinz

***Learning Progression-Based Teaching Strategies in Environmental Science: Teachers' Successes and Struggles in Implementation***

Julie A. Bianchini, University of California, Santa Barbara,  
 jbianchi@education.ucsb.edu  
 Nissa R. Yestness, Colorado State University  
 Katherine J. Nilsen, SmartStart ECS  
 LaTisha M. Hammond, George Washington University  
 Jiwon Kim, Michigan State University  
 Sylvia D. Parker, University of Wyoming  
 Alan R. Berkowitz, Cary Institute of Ecosystem Studies

***Developing a Learning Progression for Formative Assessments***

Hui Jin, The Ohio State University, jin.249@osu.edu  
 Michele Johnson, University of California, Santa Barbara  
 Jinho Kim, University of California, Berkeley

***Teachers' Use of Learning Progression-Based Formative Assessment in Water Instruction***

Beth A. Covitt, University of Montana, beth.covitt@umontana.edu  
 Aubrey A. Cano, University of California, Santa Barbara  
 Bess Caplan, Baltimore Ecosystem Study  
 Sara Syswerda, Michigan State University

***Teachers' Uses of Learning Progression-Based Tools for Reasoning in Teaching about Water in Environmental Systems***

Kristin L. Gunkel, University of Arizona, kgunkel@email.arizona.edu  
 Beth A. Covitt, University of Montana  
 Ivan Salinas, University of Arizona

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***Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies Symposium – Reconceptualizing High School Chemistry Based on Authentic Practices***

10:15am-11:45am, King's Garden 4

***Presider:***

Hannah Sevian, University of Massachusetts, Boston

***Discussants:***

Joseph S. Krajcik, Michigan State University  
 Hannah Sevian, University of Massachusetts Boston  
 Vicente A. Talanquer, University of Arizona  
 Astrid M. W. Bulte, Utrecht University  
 Ilka Parchmann, University of Keil  
 Ron Blonder, The Weizmann Institute of Science  
 Deborah Herrington, Grand Valley State University  
 Marissa S. Rollnick, Wits University  
 Myunghwan Shin, Michigan State University  
 Tali Tal, Technion

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***Strand 5: College Science Teaching and Learning (Grades 13-20)***
***Poster Symposium – Chemistry Education Research (CER): At the Nexus of Disciplinary and Educational Approaches to Research***

10:15am-11:45am, Commonwealth 2

***Presider:***

Anne Loyle-Langholz

***Collaborative Discourses and the Construction of Explanations with Haptic Technology in Chemistry***

Abdi M. Warfa, Metropolitan State University,  
 moham227@gmail.com  
 Gillian H. Roehrig, University of Minnesota  
 Jamie L. Schneider, University of Wisconsin-River Falls

***Rethinking Testing in Chemistry***

Jamie L. Schneider, University of Wisconsin-River Falls,  
 jamie.schneider@uwrf.edu  
 Kirsten L. Murphy, University of Wisconsin-Milwaukee  
 Arundendu Chatterjee, University of Wisconsin-River Falls

***A Cross-Cultural Study of the Development of Understanding in Chemical Design***

Gabriela A. Szeinberg, University of Massachusetts-Boston,  
 Gabriela.Szeinberg@umb.edu  
 Hannah Sevian, University of Massachusetts-Boston

***Integrating Scale as a Theme into Instruction in General Chemistry***

Jackie Trate, University of Wisconsin-Milwaukee, jtrate@uwm.edu  
 Anja Blecking, University of Wisconsin-Milwaukee  
 Peter Geissing, University of Wisconsin-Milwaukee  
 Kristen Murphy, University of Wisconsin-Milwaukee

***Characterizing Standardized Testing Practice in College Chemistry Education***

Tom Holme, Iowa State University, taholme@iastate.edu

***A Longitudinal Study of the Effect of College Students' Attitude, Self-Concept, and Motivation on their Achievement in General and Organic Chemistry***

Julia Chan, University of New Hampshire, jym8@unh.edu  
 Christopher F. Bauer, University of New Hampshire

***The Development of a Learning Progression on Energy for a General Chemistry Course***

Melanie M. Cooper, Michigan State University, mmc@msu.edu  
 Michael W. Klymkowsky, University of Colorado  
 Nicole M. Becker, Michigan State University

***Tool Trouble: Challenges with Using Self-Report Data to Evaluate Long-Term Chemistry Teacher Professional Development***

Ellen J. Yeziarski, Miami University, yeziere@miamioh.edu  
 Deborah G. Herrington, Grand Valley State University

***Evaluation of Chemical Representation in Physical Chemistry Textbooks***

James M. Nyachwaya, North Dakota State University,  
 James.Nyachwaya@ndsu.edu  
 Nathan Wood, North Dakota State University

***Developing Assessment Items to Measure Students' Understanding of Multiple External Representations in Chemistry***

Stacey Lowery Bretz, Miami University, bretzsl@miamioh.edu

***Strand 6: Science Learning in Informal Contexts Looking Longitudinally at STEM Learning Outcomes in Out-of School Contexts***

10:15am-11:45am, King's Garden 5

***President:***

Leonie J. Rennie, Curtin University

***Cascading Influences: Long-Term Impacts of Informal STEM Experiences for Girls***

Lynn D. Dierking, Oregon State University,  
 dierkin@science.oregonstate.edu  
 Dale McCreedy, Franklin Institute Science Museum

***Declining STEM Interest in Adolescents: A Longitudinal Research Approach***

Nancy L. Staus, Oregon State University, stausn@onid.orst.edu  
 John H. Falk, Oregon State University  
 Lynn D. Dierking, Oregon State University  
 Jennifer Wyld, Oregon State University  
 Deborah Bailey, Oregon State University

***Long-term Museum Programs and their Impact on Underrepresented Youth's Ability to Persist in Science***

Preeti Gupta, American Museum of Natural History,  
 pgupta@amnh.org  
 Jennifer Adams, Booklyn College- CUNY  
 Alix Cotumaccio, American Museum of Natural History

***Strand 7: Pre-service Science Teacher Education Socioscientific Issues in Preservice Teacher Education***

10:15am-11:45am, Fort Pitt

***President:***

Sara Tolbert, University of Arizona

***In Debate and On Agreement: Preservice Teachers' Understanding and Evaluation of Climate Change Theories***

Asli Sezen-Barrie, Towson University, asezen@towson.edu  
 Hilal Aktamis, Adnan Menderes University, Turkey

***Preservice Science Teachers' Socioscientific Issues-Based Teaching Practice in Real Science Classrooms***

Mustafa Sami Topcu, Yildiz Technical University,  
 msamitopcu@gmail.com  
 Abdulkadir Genel, Mugla Sitki Kocman University

***Earth, Air, Fire, Water: Teachers Talk about Environmental Science***

Shawn M. Bullock, Simon Fraser University, sbullock@sfu.ca  
 Doug Hayhoe, Tyndale University College and Seminary

***Preservice Science Teachers' Epistemologies and Efficacy regarding a Socioscientific Issue***

Ahmet Kilinc, Abant Izzet Baysal University,  
 ahmetkilinc@ibu.edu.tr  
 Seda Baltaci, Abant Izzet Baysal University

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**Strand 7: Pre-service Science Teacher Education**  
***Understanding Pre-service Teachers' Identity and Identity Development***

10:15am-11:45am, Benedum

**Presider:**

Meredith A. Park Rogers, Indiana University

***Peer Interactions and Identity Development***

Steven D. Wall, University of North Carolina at Chapel Hill,  
 sdwall@email.unc.edu

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

***Gender Knowledge as an Important but Neglected Aspect of Pedagogy of Science***

Annica Gullberg, University of Gävle, agg@hig.se

Kristina Andersson, Uppsala University

Anita Hussenius, Uppsala University

Anna T. Danielsson, Uppsala University

Kathryn Scantlebury, University of Delaware

***Contextual Factors Shaping Teacher Identity and Agency among Non-traditional Science Teacher Candidates***

Gail Richmond, Michigan State University, gailr@msu.edu

Faith A. Muirhead, Michigan State University

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**Strand 8: In-service Science Teacher Education**  
***Science Teachers' Experiences with Engineering***

10:15am-11:45am, Duquesne

**Presider:**

Mehmet Erkol

***Professional Development in Engineering with Science and Math Teachers: Fostering Conceptual Understandings***

Christine G. Schnittka, Auburn University, schnittka@auburn.edu

George E. Turner, Auburn University

Randy W. Colvin, Auburn University

Mary Lou Ewald, Auburn University

***Development of a Complex Systems-based Model for Enhancing Teachers' Understanding of the Nature of Authentic Science and Engineering Research***

Annmarie R. Ward, Penn State University, arw192@psu.edu

Matthew Johnson, Penn State University

Jenay Robert, Penn State University

Leah Bug, Penn State University

***A Multiphase Study Exploring Physical Science Teachers' Practices and Beliefs about Engineering Integration***

Emily A. Dare, University of Minnesota, dare0010@umn.edu

Joshua A. Ellis, University of Minnesota

Gillian H. Roehrig, University of Minnesota

***Engineering Awareness among High School Science, Mathematics and Technology Teachers***

Abeera P. Rehmat, University of Nevada, Las Vegas,  
 rehmata@unlv.nevada.edu

Janelle M. Bailey, Temple University

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**Strand 10: Curriculum, Evaluation, and Assessment**  
***Nature of Science / Philosophy of Science***

10:15am-11:45am, Brigade

**Presider:**

Martina Nieswandt, University of Massachusetts, Amherst

***Validation of the Views of Science and Education Scale (VOSE) for English Language Speakers***

Erin E. Peters-Burton, George Mason University,  
 epeters1@gmu.edu

Toni A. Sondergeld, Bowling Green State University

***Aims and Values of Science: Implications for Curriculum Design and Assessment of Learning***

Zoubeida R. Dagher, University of Delaware

Sibel Erduran, University of Limerick, Ireland

***A Nature of Science Instrument: Looking at Ways to Illicit and Capture Interrelated NOS Aspects***

Christian A. Carstensen, University of Illinois at Chicago,  
 ccarst2@uic.edu

Huseyin Colak, Northeastern Illinois University



**Strand 11: Cultural, Social, and Gender Issues**  
***Symposium – Structure-Agency Dialectic: Insights into Science Learning and Teaching of Historically Marginalized Youth in the US***

10:15am-11:45am, King's Garden 1

***Discussants:***

Maria Varelas, University of Illinois at Chicago  
 Heidi B. Carlone, University of North Carolina at Greensboro  
 Felicia Moore Mensah, Teachers College, Columbia University  
 Leah A. Bricker, University of Michigan  
 Alberto J. Rodriguez, Purdue University  
 John Settlage, University of Connecticut  
 Pauline W. U. Chinn, University of Hawaii - Manoa  
 Justine M. Kane, Wayne State University  
 Maria S. Rivera Maulucci, Barnard College  
 Megan Bang, University of Washington  
 Jomo Mutegei, Indiana University, IUPUI  
 Angela Calebrese Barton, Michigan State University  
 Edna Tan, University of North Carolina at Greensboro  
 Julianne Wenner, University of Connecticut  
 Kimberly Richards, University of Illinois at Chicago

**Strand 12: Educational Technology**  
***Learning Science Using Simulations***

10:15am-11:45am, Sterlings 1

***President:***

Richard L. Lamb, Washington State University

***Learning and Engagement Effects of Embodied Interactions within an Immersive Science Simulation***

Robb Lindgren, University of Illinois Urbana-Champaign,  
 robblind@illinois.edu  
 Michael Tscholl, University of Illinois, Urbana-Champaign  
 Emily K. Johnson, University of Central Florida  
 Carolyn Glasshoff, University of Central Florida  
 J. Michael Moshell, University of Central Florida

***Meta-Analysis of Science Simulations for Learning***

Cynthia M. D'Angelo, SRI International, cynthia.dangelo@sri.com  
 Daisy Rutstein, SRI International  
 Christopher J. Harris, SRI International

***Science Teacher Questioning While Students Learn with Simulations***

Robert C. Wallon, University of Illinois at Urbana-Champaign,  
 rwallon2@illinois.edu  
 Barbara Hug, University of Illinois at Urbana-Champaign

**Strand 12: Educational Technology**  
***Web-based Learning Technologies***

10:15am-11:45am, Birmingham

***President:***

Tamara L. Clegg, University of Maryland

***Investigating Tutor-Student Interactions with a Digital Science Notebook***

Andy Smith, North Carolina State University,  
 peter.andrew.smith@gmail.com  
 Angi Shelton, North Carolina State University  
 Samuel Leeman-Munk, North Carolina State University  
 Courtney Behrle, North Carolina State University  
 Elysa N. Corin, North Carolina State University  
 Eric N. Wiebe, North Carolina State University  
 Robert Taylor, North Carolina State University  
 Bradford W. Mott, North Carolina State University  
 James C. Lester, North Carolina State University

***Effects of Web-Based Retrieval Practice Exercises on Plant Identification Performance***

Niels Proctor, University of Florida, noproctor@ufl.edu  
 Pavlo D. Antonenko, University of Florida  
 Mihai Giurcanu, University of Florida

***EvoGrader: An Automated Online Formative Assessment Tool for Evaluating Written Evolutionary Explanations***

Minsu Ha, Stony Brook University (SUNY),  
 minsu.ha@stonybrook.edu  
 Kayhan Moharreri, The Ohio State University  
 Ross H. Nehm, Stony Brook University (SUNY)

***"Evo in the News": A Tool to Enhance Students' Perceptions of the Relevance of Evolution***

Lynn M Infanti, Syracuse University, infantlm@lemoyne.edu  
 Jason R. Wiles, Syracuse University

**Strand 14: Environmental Education*****Related Paper Set – Elementary Students' Understanding of Causal Concepts in Environmental Issues and the Next Generation Science Standards***

10:15am-11:45am, King's Garden 3

***Discussant:***

Catherine Eberbach, Rutgers University

***A Microgenetic Study of Students' Default Explanations of Action at an Attentional Distance***

Lynneth Solis, Harvard University, sls355@mail.harvard.edu

Katarzyna M. Derbiszewska, Harvard University

Tina Grotzer, Harvard University

***Testing a Curriculum for Teaching Action at a Distance to Sixth Graders***

Maleka Donaldson Gramling, Harvard University,

Maleka\_Gramling@mail.harvard.edu

Lynneth Solis, Harvard University

Katarzyna M. Derbiszewska, Harvard University

Tina Grotzer, Harvard University

***Fourth and Sixth Graders Conceptions of Distributed Causality***

Katarzyna M. Derbiszewska, Harvard University,

katarzyna\_derbiszewska@harvard.edu

Lynneth Solis, Harvard University

Maleka Donaldson Gramling, Harvard University

Tina Grotzer, Harvard University

***Comparing Paths: Bayesian Sequence Analyses in a Microgenetic Study of Student Learning***

Michael S. Tutwiler, Harvard University, mst216@mail.harvard.edu

Tina Grotzer, Harvard University

**NARST Business Meeting**Box lunch provided for 1<sup>st</sup> 100 attendees who sign up.

12:00pm – 1:00pm, King's Garden 5

**Lunch—On Your Own****12:00pm – 1:00pm****Concurrent Session #5****1:15pm – 2:45pm****Research Committee Sponsored Session*****Poster Symposium – Sandra K. Abell Scholar Poster Session***

1:15pm-2:45pm, Commonwealth 2

***Presiders:***

Julie A. Luft, University of Georgia

Angela Calabrese-Barton, Michigan State University

***Supporting ELLs Science Learning Through Multimodal Formative Assessment: Principles, Practices, and Possibilities***

Preetha Menon, University of California, Santa Cruz,

pmenon@ucsc.edu

***Teachers' Practices about Chemical Reactions: Enacting Classroom Formative Assessment***

Dante Cisterna, Michigan State University, cisterna@msu.edu

***Science Teachers' Understandings of Science Practices Before and after the Participation in an Environmental Engineering Research Experiences for Teachers (RET) Program***

Dilek Ozalp, University of South Florida, dilekozalp@mail.usf.edu

***Students' Abilities to Critique Scientific Arguments Based on the Forms of Justification***

Amanda Knight, Boston College, knightam@bc.edu

Katherine L. McNeill, Boston College

***Identity Development of Science Teacher Leaders***

Somnath Sinha, University of Missouri, ssqh9@mail.missouri.edu

***Exploring Students' Perceptions of Teaching Episodes and the Subsequent Comparison to the Teachers' Expressed Intentions***

Peggy Ward, University of Arkansas, pdward@uark.edu

***African-American Girls and Scientific Argumentation: Lived Experiences, Intersecting Identities and Their Roles in Constructing and Evaluating Claims***

Phyllis Haugabook Pennock, Western Michigan University,

Phyllis.c.pennock@wmich.edu

***Teaching to Their Cultures? Exploring the Connection between Four Science Teachers' Instructional Practices and Their Beliefs about Teaching African American Children***

Samantha L. Strachan, Morgan State University-Baltimore,

sastr2@morgan.edu

***The Cultural Production of Creativity in Elementary Engineering Education***

Tess Hegedus, The University of North Carolina, Greensboro,  
tahegedu@uncg.edu

***Examining the Relationship between Physical Models and Students' Science Practices***

Alison Riley Miller, Teachers College, Columbia University,  
arileymiller13@gmail.com

***Elementary Students' Formulation of Explanations about the Water Cycle***

Laura Zangori, University of Nebraska-Lincoln,  
laura-zangori@huskers.unl.edu

***Understanding Roles of Assistive Technologies in Choice and Participation of Professionals with Disabilities in STEM Fields***

Heather A. Pacheco Arizona State University,  
pacheco.heather@gmail.com

***The Global to Local Continuum: A Cross-National Comparative Study of Beginning Science Teachers' Cycle of Instruction in South Africa and the United States***

Shannon L. Dubois, The University of Georgia, sdubois@uga.edu

***Culturally Relevant Formative Assessment Practices in A Physics Classroom***

Jiwon Kim, Michigan State University, kimjiwo1@msu.edu

***Making the Invisible Visible, a Pilot Case Study of Women in STEM***

Helen Douglass, University of Colorado Denver,  
Helen.L.Douglass@gmail.com

***Experienced Chemistry Teachers' Orientations to Teaching Science as Interrelated Sets of Beliefs***

Betul Ekiz, Middle East Technical University, Turkey,  
betulekiz@gmail.com

***Investigating the Interaction between Pre-Service Chemistry Teachers' Content Knowledge and Pedagogical Content Knowledge***

Elif Selcan Kutucu, Middle East Technical University, Turkey,  
selcan.kutucu@gmail.com,

***Communicating Phylogeny: Evolutionary Tree Design***

Teresa Macdonald, University of Kansas Natural History Museum, tmacd@ku.edu

***The Construction of Views of Theory-Practice Relationships in an Undergraduate Science Education Program***

Gabriel Menezes Viana, Federal University of Minas Gerais,  
gabrielviana@ufsj.edu.br

***Understanding the Critical Role of a District Science Coordinator***

Brooke A. Whitworth, University of Virginia, baw3tj@virginia.edu

***Knowledge Organization with Multiple External Representations in Computer Supported Collaborative Learning Environment for Arguing on Socio-Scientific Issues***

Bahadir Namdar, The University of Georgia,  
bahanamdar@gmail.com

***Building Home-School Connections: Beginning Science Teachers' Practices for Communicating with Families***

Nena Bloom, Northern Arizona University, Nena.Bloom@nau.edu

***Emotions and How They Emerge in A Climate Change Course for Prospective Elementary Education Students***

Elizabeth Hufnagel, The Pennsylvania State University,  
exh5064@psu.edu

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**Strand 2: Science Learning: Contexts, Characteristics and Interactions*****Identity, Positioning, Relevance, and Engagement in Science Learning***

1:15pm-2:45pm, Fort Pitt

**Presenter:**

Ellice Ann Forman, University of Pittsburgh

***Identity Work in the College Science Classroom: The Cases of Two Successful Latecomers to Science***

Phoebe A. Jackson, McGill University,  
phoebe.jackson@mail.mcgill.ca  
Gale A. Seiler, McGill University

***Youth Action Research in the Science Classroom: Implications for Youth's Identity Work***

Elizabeth Coleman, Loyola University Chicago,  
ecoleman3@luc.edu

***The Impact of Teacher Positioning of Students on Middle School Latina Girls' Engagement in Science***

Edna Tan, University of North Carolina - Greensboro,  
e-tan@uncg.edu

Theresa A. Hegedus, University of North Carolina at Greensboro

***Mending the STEM Pipeline: Integrating Personal and Scientific Identities through Discourse***

Amy E. Green, University of Maryland, amygreen@umd.edu

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

1:15pm-2:45pm, King's Garden 5

**President:**

Andy Cavagnetto, Washington State University

***Collaborative Tangible Agent-Based Computation for Modeling Physics***

Gokul Krishnan, Vanderbilt University,

gokul.krishnan@vanderbilt.edu

Pratim Sengupta, Vanderbilt University

***Facilitating Student Understanding of Dissolution Processes through Sociochemical Dialogs and Technology Use***

Abdi M. Warfa, Metropolitan State University,

moham227@gmail.com

***How Teachers Support Students' Using and Building Models Using Computer-based Material?***

Jane J. Lee, Michigan State University, leejaneej@msu.edu

Joseph S. Krajcik, Michigan State University

***Capturing Teachers Engagement with Scientific Modeling***

Jean Stevens, University of Maine,

jean.stevens@umit.maine.edu

Lauren Barth-Cohen, University of Maine

Daniel Capps, University of Maine

**Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies**  
**Science Inquiry Practices in the Elementary Classrooms**

1:15pm-2:45pm, Brigade

***Elementary Teachers' Adaptation of Investigation Questions across the Inquiry Continuum***

Mandy Biggers, Penn State University, msb33@psu.edu

***Inquiry Pedagogical Frames: A Heuristic for Science Teaching in Primary Classrooms***

Frederick T. Talaue, National Institute of Education, Singapore,

frederick.talaue@nie.edu.sg

Aik-Ling Tan, National Institute of Education

***Address Students' Inquiry or Follow the Lesson Plan? A Framing-Based Analysis of Elementary-School Science***

Loucas T. Louca, European University-Cyprus,

Louca.L@cytanet.com.cy

***"Doing" Science in the Elementary School Classroom: Latour Analysis of Inscriptions Linking Classroom and Fieldwork***

Kathryn A. Lanouette, University of California Berkeley,

kathryn.lanouette@berkeley.edu

Eric Berson, Stanford University

Kathleen E. Metz, University of California Berkeley

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

1:15pm-2:45pm, Sterlings 2 &amp; 3

**President:**

Muhammet Mustafa Alpaslan, Texas A&amp;M

***A Model-Observe-Reflect-Explain (MORE) Laboratory Module: Promoting High School Students' Molecular-level Understanding of Dissolution***

Linda Cummings, The Classical Academy, allegromus@gmail.com

Youngjin Song, University of Northern Colorado

***Advancing Tasks in Physics Education: Sharpening the Understanding of Scientific Experiments through Explicit Representational-Analysis-Tasks***

Jochen Scheid, University of Koblenz-Landau, Germany,

scheid@uni-landau.de

Andreas Mueller, JUFE (University of Geneva), Switzerland

Rosa Hettmannsperger, University of Heidelberg, Germany

Wolfgang Schnotz, University of Koblenz-Landau, Germany

***Secondary Science Students' Knowledge of Molecule Movement, Concentration Gradients, and Equilibrium through Multiple Learning Contexts***

Sara P. Raven, Kent State University, sraven1@kent.edu

Julie M. Kittleson, University of Georgia

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

***Engineering Pedagogies to Encourage Critical Thinking***

1:15pm-2:45pm, King's Garden 2

**President:**

Stanley M. Lo, Northwestern University

***Scientific Reasoning in relation to Content Learning among University Science and Engineering Students***

Lin Ding, The Ohio State University, ding.65@osu.edu

***Engineering Student Metacognition during Dynamic Transfer in a Problem Solving Scenario***

Adam Kirn, Clemson University, akirn@clemson.edu

Courtney J. Faber, Clemson University

Lisa C. Benson, Clemson University

***Assessing Dynamic Transfer of Knowledge during Engineering Problem Solving Using Teaching Interviews***

Courtney J. Faber, Clemson University, cfaber@clemson.edu

Adam N. Kirn, Clemson University

Randolph H. Hutchison, Furman University

Lisa C. Benson, Clemson University

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

***Novel Methods for Assessing Informal Science Learning***

1:15pm-2:45pm, Benedum

**President:**

Jennifer Dewitt, King's College London

***Translating Existing Research into New Approaches for Evaluating Informal Science Education***

Joy Kubarek-Sandor, Illinois Institute of Technology,

kubareksandor@yahoo.com

Stephanie Bohr, John G. Shedd Aquarium

***Assessing Visitor Learning in Zoos and Aquaria: A Revised Framework***

Chantal L. Barriault, Curtin University, chantal.barriault@postgrad.curtin.edu.au

curtin.edu.au

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

***Preservice Teachers' Beliefs and Conceptions of Science and Science Teaching***

1:15pm-2:45pm, King's Garden 3

**President:**

Robert H. Evans, University of Copenhagen

***Investigating Possible Background Characteristics Affecting Science Teaching Conceptions***

Hasan Deniz, University of Nevada, Hasan.deniz@unlv.edu

Elif Adibelli, University of Nevada, Las Vegas

Mustafa Sami Topcu, Yildiz Technical University

***Elementary Education Majors' Views on Evolution: Awakening the Dialogue on Elementary Education Models***

Ronald S. Hermann, Towson University, rhermann@towson.edu

***Where is Science? An Exploration of the Places Student Teachers Associate with Science Learning***

Anna T. Danielsson, Uppsala University,

anna.danielsson@edu.uu.se

Kristina Andersson, Uppsala University

Annica Gullberg, University of Gävle

Anita Hussenius, Uppsala University

***Dynamic Shifts within Belief Systems***

Brian Scott Fortney, Texas Tech University, brian.fortney@ttu.edu

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

***Teacher Preparation and Development for Inquiry-Based Learning Environments***

1:15pm-2:45pm, Rivers

**President:**

Phillip A. Boda, Columbia University

***Preparing for Inquiry: Examining the Design of Model-based Inquiry Experiences by Preservice Science Teachers***

Ron Gray, Northern Arizona University, ron.gray@nau.edu

Allyson Rogan-Klyve, Oregon State University

***Using Research on Cognitive Discussion Strategies to Support Pre-Service Science Teachers' Model-Based Teaching Skills***

Grant Williams, St. Thomas University, grantw@stu.ca

John J. Clement, University of Massachusetts

***Collaborative Reflective Supervision: Scaffolding Preservice Science Teachers' Classroom Practice of Inquiry***

Jeerawan Ketsing, Kasetsart University, fedujwk@ku.ac.th

***Conceptual Change in Science Teacher Preparation:  
Collaboration between Scientist and Educator***

Will Stoll, Georgia State University, wstoll2@student.gsu.edu  
Brett A. Criswell, Georgia State University  
Abdulkadir Demir, Georgia State University

**Strand 8: In-service Science Teacher Education  
*Examining Professional Communities***

1:15pm-2:45pm, Sterlings 1

***Unpacking the Noticing of Secondary Science  
Cooperating Teachers***

Shelly Rodriguez, University of Texas,  
shelly.rodriguez@austin.utexas.edu

***Enhancing Science Teachers' Understanding of  
Teaching Socioscientific Issues through Collaborative  
Action Research***

Hyunju Lee, Ewha Womans University, hlee25@ewha.ac.kr  
Yeonjoo KO, Ewha Womans University

***Supporting Science Teacher Learning and Development in  
Professional Learning Communities***

Cheryl A. McLaughlin, University of Florida, chermac72@ufl.edu

***The Relative Influence of Professional Community on  
Changes in Science Teaching***

Steven Mcgee, Northwestern University, mcgee@lponline.net  
Linda C. Lee, Northwestern University

***Tracing Professional Learning: Research Supporting the  
NSTA Learning Center***

Darren Cambridge, American Institutes for Research  
Albert Byers, National Science Teachers Association

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

1:15pm-2:45pm, Duquesne

***President:***

Jim Ryder, University of Leeds

***A Framework for Anchoring Analogical Reasoning  
Activities to the Chemistry Laboratory Experience***

Mitchell Bruce, University of Maine, mbruce@maine.edu  
Shirly Avargil, Technion - Israel institute of Technology  
Alice Bruce, University of Maine  
Francois Amar, University of Maine

***Chemistry Teachers' Implementation of Science  
Curriculum Reform: A Perspective from Turkey***

Fatih C. Mercan, Bogazici University, fatih.mercan@boun.edu.tr

***Teachers' Experiences of Externally Driven Science  
Curriculum Reform: A Review of Empirical Studies***

Jim Ryder, University of Leeds, j.ryder@education.leeds.ac.uk

***Clarity and Understandability of Two Modeling Languages  
in a Large-scale Project-based Information Systems  
Engineering Course***

Niva Wengrowicz, Technion-Israel Institute of Technology,  
nivawen@technion.ac.il  
Dov Dori, Technion-Israel Institute of Technology  
Yehudit Judy Dori, Technion-Israel Institute of Technology

**Strand 10: Curriculum, Evaluation, and Assessment  
*Related Paper Set – Educative Curriculum Materials  
for Elementary Science: Exploring Teachers' Use and  
Teachers' and Students' Learning***

1:15pm-2:45pm, Smithfield

***President:***

Elizabeth A. Davis, University of Michigan

***Investigating the Impacts of Educative Curriculum  
Materials: A Quantitative Perspective***

Patrick S. Smith, Horizon Research, Inc., ssmith62@horizon-  
research.com  
Adrienne A. Smith, Horizon Research, Inc.

***'Barely Four Hours a Week': Goals, Priorities, and Trade-  
offs in One Elementary Teacher's Investigation-Based  
Science Instruction***

Stefanie K. Iwashyna, University of Michigan,  
siwashyn@umich.edu  
Anna Maria Arias, University of Michigan  
Elizabeth A. Davis, University of Michigan  
Annemarie S. Palincsar, University of Michigan

***Investigating the Effects of Teaching Challenging Science  
Text with and without Educative Literacy Features***

Annemarie S. Palincsar, University of Michigan, annemari@  
umich.edu  
Anna Maria Arias, University of Michigan

***Supporting Use of Scientific Academic Language:  
Teachers' Use of Content-Corused Educative Features***

Sylvie M. Kademian, University of Michigan  
Anna Maria Arias, University of Michigan  
Elizabeth A. Davis, University of Michigan  
Annemarie S. Palincsar, University of Michigan

***Teachers' Use of Curriculum Material to Engage Elementary Students in Science Practices Integrated with Science Content***

Anna Maria Arias, University of Michigan  
John-Carlos Marino, University of Michigan  
Sylvie M. Kademian, University of Michigan  
Elizabeth A. Davis, University of Michigan  
Annemarie S. Palincsar, University of Michigan  
Brian J. Reiser, Northwestern University

***Strand 11: Cultural, Social, and Gender Issues Symposium – Science Education for Learners with Special Needs***

1:15pm-2:45pm, Birmingham

***Presenters:***

Anna R. Lewis, University of South Florida St. Petersburg,  
ARLewis@usf.edu  
J. Randy McGinnis, University of Maryland  
Sara Aronin, West Virginia University

***Strand 13: History, Philosophy, and Sociology of Science NOS & PCK***

1:15pm-2:45pm, Heinz

***Presider:***

David E. Long, George Mason University

***Assessment of Understandings of Nature of Science in Science Education: Past, Present, and Future***

Fouad Abd-El-Khalick, University of Illinois at Urbana-Champaign,  
fouad@illinois.edu

***A Comparison of Teachers' Knowledge Structures for NOS and SI and their Classroom Practice***

Stephen A. Bartos, Middle Tennessee State University,  
Stephen.Bartos@mtsu.edu  
Norman G. Lederman, Illinois Institute of Technology

***Impact of Self-Regulation on Pre-Service Science Teachers' Conceptual Understandings about Nature of Science in Hypermedia***

Mehmet F. Tasar, Gazi Universitesi  
Nagihan Imer Çetin, Gazi Universitesi  
Betül Timur, Çanakkale On Sekiz Mart University

***The Clinical Internship's Influence on Mentor Teachers' Classroom Practice for and Conceptions of NOS***

Judith S. Lederman, Illinois Institute of Technology,  
ledermanj@iit.edu  
Stephen A. Bartos, Middle Tennessee State University  
Selina Bartels, Illinois Institute of Technology  
Norman G. Lederman, Illinois Institute of Technology

***Strand 14: Environmental Education EE perceptions and Understandings amongst Middle, Secondary, and College Students***

1:15pm-2:45pm, King's Garden 4

***Presider:***

Patricia Patrick, Texas Tech University

***Exploring Students' Understanding of the Energy Concept in Environmental Science Context***

Mihwa Park, University at Buffalo, mihwapar@buffalo.edu  
Joseph A. Johnson, Edinboro University of Pennsylvania

***Secondary Marine Science Students' NOS Views, Socioeconomic Culture and Willingness to Mitigate Global Warming***

Benjamin C. Herman, University of South Florida,  
bcherman@usf.edu

***Reimagining Environmental Education: Urban Youths' Perceptions and Investigations of their Communities***

Marissa Bellino, The Graduate Center, CUNY,  
marissabellino@gmail.com  
Jennifer Adams, Booklyn College- CUNY

***Sustainability on Earth and Science Learning: Perceptions from 8th Grade Pupils Involved with a Role Playing Activity***

Sofia Freire, Institute of Education of University of Lisbon,  
asraposo@ie.ul.pt  
Mónica Baptista, Institute of Education of University of Lisbon  
Ana Freire, Institute of Education of University of Lisbon

***Strand 15: Policy Supporting the STEM pipeline***

1:15pm-2:45pm, King's Garden 1

***Presider:***

Sharon J. Lynch, George Washington University

***What Can Be Learned About the Outcomes of NSF STEP-funded Projects From Publicly Available Data?***

Maryanne Sydlik, Western Michigan University,  
maryanne.sydlik@wmich.edu  
Cody T. Williams, Western Michigan University

***Postsecondary Outcomes for Graduates of Inclusive STEM-Focused High Schools***

Barbara Means, SRI International, barbara.means@sri.com  
Ann House, SRI International  
Viki Young, SRI International  
Haiwen Wang, SRI International  
Naomi Tyler, SRI International

***An Investigation of Urbanicity and Gender: Implications for Supporting the STEM Pipeline***

Eric N. Wiebe, North Carolina State University,  
eric\_wiebe@ncsu.edu

Alana Unfried, North Carolina State University  
LaTricia Townsend, North Carolina State University  
Malinda Faber, North Carolina State University  
Jennifer O. Corn, North Carolina State University

***The Impact of STEM Charter and Magnet Schools on Achievement***

Eugene Judson, Arizona State University,  
Eugene.Judson@asu.edu

**Break****2:45pm – 3:15pm, Ballroom Foyer****Concurrent Session #6****All strand poster sessions.****3:15pm – 5:15pm****Poster Session A****3:15pm – 4:15pm, Ballroom 2, 3, and 4****Strand 1: Science Learning, Understanding and Conceptual Change*****Poster Session A***

3:15pm – 4:15pm, Ballroom 2, 3, and 4

**A1. *Profiles in Learning by Argumentation***

Lauren Barth-Cohen, University of Maine,  
lauren.barthcohen@maine.edu  
Daniel Capps, University of Maine  
Jonathan Shemwell, University of Maine

**A3. *Bridging Emergent Attributes and Darwinian Principles in Teaching Natural Selection***

Dongchen Xu, Arizona State University, dongche1@asu.edu  
Michelene T.H. Chi, Arizona State University

**A5. *The Evolution of Science Literacy: Examining Intertextual Connections in the Course of Science Literacy***

Carol J. Manocchi-Verrino, Fordham University,  
manocchi@fordham.edu  
John Craven, Fordham University

**A7. *Expanding Elementary Students' Participation in Experimentation and Argumentation***

Eve Manz, University of Colorado Boulder,  
eve.manz@colorado.edu

**A9. *Reading and Learning of Science Concepts from Text – An Eye Tracking Analysis***

Fang-Ying Yang, National Taiwan Normal University,  
fangyang@ntnu.edu.tw  
Jinmian Yang, University of California, San Diego  
Keith Rayner, University of California, San Diego

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

3:15pm – 4:15pm, Ballroom 2, 3, and 4

**A11. *Children's Collaborative Reasoning: Coordinating Everyday Evidence into Problem Solving***

Mijung Kim, University of Victoria, mjkim@uvic.ca

**A13. *Disentangling Aspects of Expansive or Bounded Framing that Impact Transfer***

Diane Lam, UC Berkeley, dianelam@berkeley.edu  
Xenia Meyer, University of California, Berkeley  
Clay Carrigan, UC Berkeley  
Naqia Yasini, UC Berkeley  
Iana Meitlis, UC Berkeley  
Michael DeChenne, UC Berkeley  
Claire Abu-Assal, UC Berkeley  
Maya Srinath, UC Berkeley  
Norielle Adricula, UC Berkeley  
Jenine Hassoun, UC Berkeley

**A15. *Epistemological Beliefs and Motivational Factors on High School Students' Achievement in Physics***

Muhammet Mustafa Alpaslan, Texas A&M University,  
alpaslan27@tamu.edu  
Bugrahan Yalvac, Texas A&M  
Fatma Alpaslan

**A17. *Teachers Guiding Students' Models of Magnetism***

Jouni Viiri, University of Jyväskylä, jouni.viiri@jyu.fi  
Sari Harmoinen, Pohjankartano School, Oulu



**A19. *Negotiating Identities: Exploring Graduate Students' Views of Scientists and Mathematicians in an Interdisciplinary GK-12 Program***

Hillary Mason, University Of Colorado, Denver,  
Hillary.Mason@ucdenver.edu

Bryan Shao-Chang Wee, University of Colorado Denver

Julie Rodriguez, University of Colorado Denver

Mike Jacobson, National Science Foundation

Jim Loats, Metropolitan State College of Denver

**A21. *Towards a Typology of Argument Schemes that Could Describe a SSI Discussion in the Science Classroom***

Maria Evagorou, University of Nicosia, evagorou.m@unic.ac.cy  
Chrystalla Lymbouridou, Ministry of Education & Culture

**A23. *Implications for Grouping Problem-Solving Teams Based on Students' Metacognitive Competence***

Pavlo D. Antonenko, University of Florida,  
p.antonenko@coe.ufl.edu

**A25. *Probing the Dynamics of Primary Science Classrooms in Nigeria in Relation to Pupils' Interest in Science***

Olatunde Lawal Owolabi, Lagos State University,  
owot2002@yahoo.co.uk

Peter A. Okebukola, Lagos State University

Wasiu Otun, Lagos State University

Ayodele Ogunleye, University of Lagos

Sunday Banjoko, Lagos State University

Jimmy Avoseh, Lagos State University

Salihu Ojo Sadiku, Lagos State University

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

3:15pm – 4:15pm, Ballroom 2, 3, and 4

**A27. *Using Trade Books to Engage Students in STEM Learning***

Kristina Maruyama Tank, University of Minnesota,  
kmtank@umn.edu

Bhaskar Dahal, University of Minnesota

Tamara J. Moore, Purdue University

**A29. *Probing the Dynamics of Primary Science Classrooms in Nigeria in Relation to Pupils' Interest in Science***

Olatunde Lawal Owolabi, Lagos State University,  
owot2002@yahoo.co.uk

Peter A. Okebukola, Lagos State University

Wasiu Otun, Lagos State University

Ayodele Ogunleye, University of Lagos

Sunday Banjoko, Lagos State University

Jimmy Avoseh, Lagos State University

Salihu Ojo Sadiku, Lagos State University

**A31. *Responding to the NGSS: Local Elementary Teachers' Perceptions of Teaching Science***

Erica M. Riggs, Wright State University, riggs.21@wright.edu

Michelle A. Fleming, Wright State 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, Ballroom 2, 3, and 4

**A33. *Learning with Optical Black-Box-Experiments in the 6th Grade***

Henning Rode, Leibniz Universität Hannover,  
rode@idmp.uni-hannover.de

Gunnar Friege, Leibniz Universität Hannover

**A35. *A Review of Research on Students' Understanding of Matter***

Jan Christoph Hadenfeldt, (IPN) Kiel, hadenfeldt@ipn.uni-kiel.de  
Knut Neumann, Leibniz Institute for Science Education (IPN) Kiel

**A37. *First Semester Changes in Teacher Questioning from Argument Based Inquiry Professional Development***

Brian R. Pinney, University of Iowa, brian-pinney@uiowa.edu

Brian M. Hand, University of Iowa

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

3:15pm – 4:15pm, Ballroom 2, 3, and 4

**A39. *Faculty Use of "Clickers" in University Learning Environments***

Grant E. Gardner, Middle Tennessee State University,  
Grant.Gardner@mtsu.edu

Subodh Dutta, East Carolina University

Karen Mulcahy, East Carolina University

Vera Tabakova, East Carolina University

Diane Majewski, East Carolina University

**A41. *TPACK Development of University Physics Instructors in Two Contexts***

Syh-Jong Jang, Chung-Yuan Christian University,  
jang@cycu.edu.tw

Yahui Chang, Shaanxi Normal University, China

**A43. *Virtual Participation in the PCK Summit: Web-Based Resources for Researchers***

Julie Gess-Newsome, Oregon State University-Cascades,  
julie.gess-newsome@osucascades.edu  
Janet Carlson, BSCS  
April L. Gardner, Biological Science Curriculum Study

**A45. *Using Point-of-View Video Data to Analyze the Development of Scientific Expertise in Undergraduate Research***

Joseph A. Harsh, Indiana University, jharsh@indiana.edu  
Adam V. Maltese, Indiana University  
Russell Balliet, Indiana University  
Michael Lathery, Noblesville, IN Community Schools

**A47. *Taking College Science Teaching to the Next Level***

Selcen Guzey, University of Minnesota, kendi003@umn.edu  
David Langley, University of Minnesota

**A49. *Using WordCloud to Inform Students' Energy Understanding—Applying Text Mining and Social Network Analysis (SNA) Approach***

Shannon Sung, Spelman College and University of Georgia,  
ilaria.huang@gmail.com

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**Strand 6: Science Learning in Informal Contexts  
Poster Session A**

3:15pm – 4:15pm, Ballroom 2, 3, and 4

**A51. *The Perspective of Fossil Clubs and Paleontologists for Participating in a Community of Practice***

Kent J. Crippen, University of Florida, kcrippen@coe.ufl.edu  
Bruce MacFadden, University of Florida  
Shari Ellis, Florida Museum of Natural History  
Austin Hendy, University of Florida - Florida Museum of Natural History  
Betty Dunckel, Florida Museum of Natural History

**A53. *Addressing Inquiry during Professional Development at an Informal Science Institution***

Gary M. Holliday, The University of Akron, gholliday@uakron.edu  
Norman G. Lederman, Illinois Institute of Technology  
Judith S. Lederman, Illinois Institute of Technology

**A55. *Effects of Live Facilitation in the Mythbusters Exhibit***

Aaron Price, Museum of Science and Industry, Chicago,  
aaron.price@msichicago.org  
Katherine Gean, Museum of Science and Industry, Chicago  
Heather Barnes, Museum of Science and Industry, Chicago

**A57. *Getting Students OUTSIDE: Using Technology as a Way to Stimulate Engagement***

Carrie J. Boyce, The University of Southern Mississippi,  
carrie.boyce@eagles.usm.edu  
Chandrani Mishra, The University of Southern Mississippi  
Kristy L. Halverson, University of Southern Mississippi  
Aimee K. Thomas, Loyola University New Orleans

**A59. *An Exploratory Study: How Do Extracurricular Robotics Activities Change Students' Attitudes Toward Science?***

Niyazi Erdogan, Texas A&M University, niyazierdogan@tam.u.edu  
Ayse T. Oner, Texas A&M University  
Alpaslan Sahin, Texas A&M University  
Mary Margaret Capraro, Texas A&M University  
Robert M. Capraro, Texas A&M

**A61. *How Popular Media Influences Students' Images of Scientists and Their Interest in Science***

Jennifer Jocz, National Institute of Education,  
jennifer.tan@nie.edu.sg  
Junqing Zhai, National Institute of Education, Singapore  
Aik-Ling Tan, National Institute of Education

**A63. *Using Thematic Comics to Promote Public Understanding of Nanotechnology***

Huann-Shyang Lin, National Sun Yat-Sen University,  
huannlin@faculty.nsysu.edu.tw  
Shu-Fen Lin, National Changhua University of Education  
John K. Gilbert, King's College London  
Zuway-R Hong, National Sun Yat-sen University  
Ling Lee, National Sun Yat-sen University

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

3:15pm – 4:15pm, Ballroom 2, 3, and 4

**A65. *Analyzing Identity Discourse in Statements of Preservice Teachers' Science Learning Experience and Teaching Philosophy***

Pei-Ling Hsu, University of Texas at El Paso, phsu3@utep.edu  
Giuliano Reis, University of Ottawa  
Angelica Monarrez, University of Texas at El Paso

**A67. *Mentor Teacher Contributions to Preservice Teacher Learning to Use Student Ideas in Science Instruction***

Elsa N. Schaub, University of Arizona,  
eschaub@email.arizona.edu

**A69. *Supporting Pre-Service Science Teachers in Developing Culturally Relevant Pedagogy Without Access to Diverse Settings***

Stephen Krajieski, Pennsylvania State University, sek194@psu.edu  
Scott McDonald, Pennsylvania State University

**A71. *Impact of Scientific modeling on Pre-Service Teachers' Knowledge Generation***

Frackson Mumba, University of Virginia, fracksonm@excite.com  
Vivien M. Chabalengula, University of Virginia

**A73. *The Impact of an Optional Mastery Experience on Science Self-Efficacy in Elementary Pre-Service Teachers***

Christine Knaggs, Lourdes University, cknaggs@lourdes.edu  
Toni A. Sondergeld, Bowling Green State University

**A75. *Pre-service Elementary Teachers' Understanding of Inquiry***

Kristin N. VanWyngaarden, University of Nebraska at Omaha, kvanwyngaarden@unomaha.edu  
Sheryl L. Mcglamery, University of Nebraska  
Saundra L. Shillingstad, University of Nebraska at Omaha

**A77. *Evolutionary Reasoning Patterns and Acceptance Levels in Chinese Pre-service Biology Teachers: A Global Comparison***

Xin Wei, Beijing Normal University, lakewe@gmail.com  
Ross H. Nehm, Stony Brook University (SUNY)  
Minsu Ha, Stony Brook University (SUNY)  
Jian Wang, Beijing Normal University  
Dan Hou, Tianjin Normal University

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

3:15pm – 4:15pm, Ballroom 2, 3, and 4

**A79. *The Role Scientist Mentors Play with Science Teachers During A Summer RET Program***

Rommel J. Miranda, Towson University, Rmiranda@towson.edu  
Julie B. Damico, Towson University

**A81. *Science Teachers' Perceptions Towards STEM Education: Possibilities and Challenges***

Heba El-deghaidy, American University in Cairo and Suez Canal University, h.eldeghaidy@aucegypt.edu  
Nasser Mansour, Exeter of University-UK and Tanta University- Egypt  
Mohammed Alzaghibi, Ministry of Education

**A83. *Engaging Professional Development and Developing a Community of Practice***

Morten Lundsgaard, Office of Mathematics, Science, and Technology Education, mlundsga@illinois.edu  
Chris P. Cunnings, University of Illinois at Urbana-Champaign

**A85. *Examining the Effects of Professional Development on Students' Attitudes, Experiences with Inquiry, and Content Knowledge***

Michelle Cook, Clemson University, mcook@clemson.edu

**A87. *Foregrounding Youth Narratives of Informal Science Learning: A Professional Development Model***

Daniel Birmingham, Loyola University Chicago, dbirmingham@luc.edu  
Angela Calabrese-Barton, Michigan State University

**A89. *Impact of Explicit Nature of Science Instruction on Middle School Science and Mathematics Teachers' Understanding of the Nature of Science***

Sissy S. Wong, University of Houston, sissywong@uh.edu  
Lionnel G. Ronduen, University of Houston  
Eunjin Bang, Iowa State University

**A91. *Case Study: Impact of Instructional Coaching on Science Teacher's Inquiry-Based Instruction in Rural Schools***

SoonChun Lee, University of Nebraska, Lincoln, slee37@unl.edu  
Gwen Nugent, University of Nebraska, Lincoln  
Gina Kunz, University of Nebraska, Lincoln  
James A. Houston, University of Nebraska, Lincoln  
Sue Ellen DeChenne, University of Northern Colorado

**Strand 9: Reflective Practice****Poster Session A**

3:15pm – 4:15pm, Ballroom 2, 3, and 4

**A93. "Is That a Model?": Preservice and Inservice Teachers' Interpretations of Scientific Practices During Video Club**

Heather J. Johnson, Vanderbilt University,  
heather.j.johnson@vanderbilt.edu  
Michelle Cotterman, Vanderbilt University

**Strand 10: Curriculum, Evaluation, and Assessment****Poster Session A**

3:15pm – 4:15pm, Ballroom 2, 3, and 4

**A95. Validating Proposed Learning Progressions on Force and Motion Using the Force Concept Inventory**

Gavin W. Fulmer, National Institute of Education (Singapore),  
gavin.fulmer@nie.edu.sg  
Lyna Kwan, National Institute of Education (Singapore)

**A97. Development of Assessment Items for a Learning Progression on Plate Tectonics and Geocognitions**

Seungho Maeng, Kangwon National University,  
South Korea, seunghom@gmail.com  
Ki-Young Lee, Kangwon National University, South Korea

**A99. Eighth Grade Students' Conceptions of Science Assessment and Feedback in Taiwan**

Min-Hsien Lee, National Sun Yat-sen University, Taiwan,  
leemh@mail.nsysu.edu.tw  
Tzung-Jin Lin, National Taiwan University of Science and  
Technology, Taiwan  
Chin-Chung Tsai, National Taiwan University of Science and  
Technology, Taiwan

**A101. Beginning Chemistry Teachers' Representation of the Chemistry Curriculum**

Krista L. Adams, University of Nebraska-Lincoln,  
kadams12@unl.edu  
Julie A. Luft, University of Georgia

**A103. Cross-year and Cross-major Variations in University Students' Scientific Reasoning**

Lin Ding, The Ohio State University, ding.65@osu.edu

**A105. The Impact of Reform-Based Science Learning on U.S. Students' Science Learning Outcomes: PISA 2006**

Nai-en Tang, University of Missouri, ntb5c@mail.missouri.edu  
Chia-lin Tsai, University of Missouri  
Lloyd H. Barrow, University of Missouri

**A107. Designing and Exploring Quality Classroom Assessments for Students' Learning in High School Chemistry**

Kemal Izci, Van Yuzuncu Yil University, kikrc@mail.missouri.edu  
Nilay Muslu, University of Missouri  
Shannon Burcks, University of Missouri  
Marcelle Siegel, University of Missouri

**A109. Nursing Students' Attitudes Toward Science: A Modification of the Scientific Attitude Inventory II (SAI II)**

Jill D Maroo, University of Northern Iowa, jill.maroo@uni.edu  
Kristy L. Halverson, University of Southern Mississippi

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

3:15pm – 4:15pm, Ballroom 2, 3, and 4

**A113. Language, Identity, and the Stress of Learning Science Language**

Salina T. Gray, Stanford University, sgray@stanford.edu  
Bryan A. Brown, Stanford University  
Andrew Wild, Stanford University  
Brian M. Donovan, Stanford University

**A115. Science Teacher Beliefs about Students and Reform in Rural, High Poverty, All African American Schools**

Carolyn S. Wallace, Indiana State University,  
carolyn.wallace@indstate.edu  
M. Jenice Goldston, University of Alabama, Tuscaloosa  
Elizabeth R. Allison, University of Alabama, Tuscaloosa

**A117. Experiences of Women of Color Being Mentored in Computing**

Maria Ong, TERC, ong.mia@gmail.com  
Lily Ko, TERC  
Rachel R. Kachchaf, TERC  
Apriel K. Hodari, Council for Opportunity in Education

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

3:15pm – 4:15pm, Ballroom 2, 3, and 4

**A119. Computer Assisted Approach vs. Constructivist Approach for the Instruction of Cell Division and Reproduction**

Yilmaz Kara, Karadeniz Technical University,  
yilmazkaankara@yahoo.com

**A123. *Learning with Digital Evolution Software: Improving Student Understanding and Acceptance of Evolution***

Amy M. Lark, Michigan State University, majchrz1@msu.edu  
 Gail Richmond, Michigan State University  
 Robert T. Pennock, Michigan State University

**A125. *The Impact of a Science Methods Course on Pre-Service Science Teachers' Technological Pedagogical Content Knowledge***

Sedef Canbazoglu Bilici, Aksaray University,  
 sedefcanbazoglu@gmail.com  
 Havva Yamak, Gazi University  
 Nusret Kavak, Gazi University  
 Selcen Guzey, University of Minnesota

**A127. *STEM Teacher Development Using Web 2.0 Tools for Collaborative Instructional Design***

Pavlo D. Antonenko, University of Florida,  
 p.antonenko@coe.ufl.edu

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

3:15pm – 4:15pm, Ballroom 2, 3, and 4

**A129. *The Epistemic Beliefs and Socio-cultural Views of Science in College Majors and Non-majors***

Brendan E. Callahan, Kennesaw State University,  
 bcallah7@kennesaw.edu  
 Samantha R. Fowler, Florida Institute of Technology

**A131. *Developing and Implementing a NOS Focused Course for Science Education Undergraduate Freshman***

John M. Hilton, Delaware Technical College & Community  
 Center, jhilton14@comcast.net  
 Michael H. Buoni, Delaware Technical Community College

**A133. *Developing Pre-Service Science Teachers' NOS Views: Using Blogs as a Platform for Reflection***

Sinan Ozgelen, Mersin University, sozgelen@gmail.com  
 Hatice Sancar-Tokmak, Mersin University  
 Lutfi Incikabi, Kastamonu University

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

3:15pm – 4:15pm, Ballroom 2, 3, and 4

**A135. *Exploring Fourth and Eighth Grade Students' Views of Energy Flow through Ecosystems***

Ashlie B. Arkwright, University of Kentucky, ambeal0@uky.edu  
 Rebecca McNall Krall, University of Kentucky

**A137. *Examining Cultural Bias in Standardized Science Test Items***

Juliann Dupuis, Notre Dame of Maryland University, jdupuis@ndm.edu  
 Eleanor D. Abrams, University of New Hampshire

**A139. *Making Place-Based Socio-Scientific Issues Discernible to Urban Middle School Science Teachers***

Gayle A. Buck, Indiana University, gabuck@indiana.edu  
 Kristin L. Cook, Bellarmine University  
 Ingrid S. Weiland, University of Louisville

**A141. *The Relationship between Students' Critical Evaluation Abilities and Plausibility Reappraisal of Climate Change***

Doug Lombardi, Temple University, doug.lombardi@temple.edu  
 Carol B. Brandt, Temple University

**Strand 15: Policy  
Poster Session A**

3:15pm – 4:15pm, Ballroom 2, 3, and 4

**A143. *Technologies of Regulation: A Critical Analysis of Performativity in the Next Generation Science Standards***

Darren G. Hoeg, University of Toronto, hoeg\_darren@hotmail.com  
 John L. Bencze, University of Toronto

**Poster Session B**

**4:15pm – 5:15pm, Ballroom 2, 3, and 4**

**Strand 1: Science Learning, Understanding and Conceptual Change  
Poster Session B**

4:15pm – 5:15pm, Ballroom 2, 3, and 4

**B2. *Learning and Teaching Crosscutting Concepts from Cognitive Perspectives***

Dongmei Zhang, The University of Georgia, dongmei@uga.edu  
 Barbara A. Crawford, University of Georgia

**B4. *Exploring Features of School Scientific Inquiry of Science Core High School in Korea***

Sun-Kyung Lee, Seoul National University, sunlee@snu.ac.kr  
 Jeong-Woo Son, Gyeongsang National University  
 Myeong-Kyeong Shin, Gyeongin National University of Education  
 Hae-Ae Seo, Busan National University  
 Gyuho Lee, Gyeongin National University of Education  
 Chui Im Choi, Seoul National University  
 Hojang Song, Seoul National University

**B6. High School Students' Understandings of Climate Change**

Katherine E. Carson, Curtin University, k.carson@curtin.edu.au  
 Vaile Dawson, Curtin University  
 Leonie J. Rennie, Curtin University

**B8. Promoting Mechanistic Reasoning in Early Childhood Science Education**

Loucas T. Louca, European University-Cyprus, Louca.L@cytanet.com.cy  
 Chrystalla Papademetri-Kachrimani, European University-Cyprus

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

4:15pm – 5:15pm, Ballroom 2, 3, and 4

**B10. Early Learning about Shadows with Mobile Devices: A Case Study for Preschool Children**

Michail Kalogiannakis, University of Crete, mkalogian@edc.uoc.gr

**B12. Characterizing the Views of NOS and OTS of Scientists Teaching Elementary School Science**

Matthew Johnson, Penn State University, mmj125@psu.edu  
 William S. Carlsen, Penn State University

**B14. "I'm a Believer in Both": Documenting the Sense-Making of Teachers and Students About Evolution**

Elaine Klein, University of Washington, erklein@uw.edu  
 Veronica Cassone McGowan, University of Washington  
 Katie Van Horne, University of Washington  
 Philip L. Bell, University of Washington

**B16. Interactions between High-School Chemistry Teachers and Gifted Students in a Regular Classroom**

Naama Benny, Weizmann Institute, naama.benny@weizmann.ac.il  
 Ron Blonder, The Weizmann Institute

**B18. Career to Pleasure in Science: The Influence of Career Motivation to Learning Science in Korean High School Students**

Sein Shin, Chonbuk National University, hmmds@naver.com  
 Jun-Ki Lee, Chonbuk National University  
 Minsu Ha, SUNY Stony Brook

**B20. Capturing the Narratives of Emergent Science Students in Science Learning through Journaling and Oral Narratives**

Ann W. Wright, Canisius College, wrighta@canisius.edu  
 Sue Dale Tunnicliffe, University of London

**B22. Science Classroom Norms for the Treatment of Evidence from Authority**

Susan A. Kirch, New York University, susan.kirch@nyu.edu

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

4:15pm – 5:15pm, Ballroom 2, 3, and 4

**B24. Elementary Teachers' Implementation of Formative Assessment Strategies: Supporting Students' Learning about Water and Earth Materials**

Jaime L. Sabel, University of Nebraska-Lincoln, jaime.sabel@huskers.unl.edu  
 Cory T. Forbes, University of Nebraska-Lincoln  
 Mandy Biggers, Penn State University

**B26. Science Inquiry Centered Argumentation Model (SciCAM) for Young English Language Learners**

Thomas R. Tretter, University of Louisville, tom.tretter@louisville.edu  
 Yuliya Ardasheva, Washington State University  
 Lori Norton-Meier, University of Louisville  
 Sherri L. Brown, University of Louisville

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

4:15pm – 5:15pm, Ballroom 2, 3, and 4

**B28. Contributions of Action Research in 6th and 7th Grade Students' Associations of STSE**

Sinem Toraman, Yildiz Technical University, storaman@yildiz.edu.tr  
 Ünsal Umdü Topsakal, Yildiz Technical University  
 Aysun Öztuna Kaplan, Sakarya University  
 Esra Macaroglu Akgul, Yildiz Technical University

**B30. Strengthening Science Attitudes: Planetarium-Based Scientific Visualizations for Middle and High School English Language Learners**

Thomas R. Tretter, University of Louisville, tom.tretter@louisville.edu  
 Yuliya Ardasheva, Washington State University

**B32. Motivation to Innovate: Inquiry-based Science as Character Education**

Sarah Barrett, York University, sbarrett@edu.yorku.ca

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

**Poster Session B**

4:15pm – 5:15pm, Ballroom 2, 3, and 4

**B34. *Risks of Nanotechnology: An International Study of the Perceptions of Engineering and Science Students***

M. Gail Jones, North Carolina State University,  
gail\_jones@ncsu.edu

Grant E. Gardner, Middle Tennessee State University

Ron Blonder, The Weizmann Institute

Antti Laherto, University of Helsinki

Virginie Albe, ENFA

Gina Childers, North Carolina State University

Manuela Paechter, University of Graz

**B36. *The Nature of Experiences Responsible for the Generation and Maintenance of Interest in STEM***

Christina S. Melki, Indiana University, csmelki@indiana.edu

Adam V. Maltese, Indiana University

Heidi Wiebke, Indiana University

**B38. *Discourse Between Men and Women During PBL Engineering Group Work***

Anne Marie Casper, Colorado State University,  
aramaticasper@gmail.com

Meena M. Balgopal, Colorado State University

Rebecca Atadero, Colorado State University

Karen Rambo-Hernandez, Colorado State University

Darrell Fontane, Colorado State University

**B40. *Early Exploration of an Online Peer-group Homework System in an Introductory Physics Course***

James F. Kisiel, California State University, Long Beach,  
j.kisiel@csulb.edu

**B42. *Healthcare Students' Levels of Scientific Literacy and the Impact of Contextual Teaching on Scientific Literacy***

Inga Ploomipuu, University of Tartu, ingaploomipuu@nooruse.ee

Miia Rannikmae, University of Tartu

Jack B. Holbrook, University of Tartu

**B44. *The Use of Physical Models of Protein Structures to Probe for Learning and Reasoning Difficulties***

Sara L. Johnson, Purdue University, saraljohnson@gmail.com

Richard C. Garratt, São Carlos University

Nancy J. Pelaez, Purdue University

Trevor R. Anderson, Purdue University

**B46. *Preferred Mentorship Practices as Reported by Students in Undergraduate Research Experiences***

Adam V. Maltese, Indiana University, amaltese@indiana.edu

Joseph A. Harsh, Indiana University

Russell N. Balliet, Indiana University

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**Strand 6: Science Learning in Informal Contexts  
Poster Session B**

4:15pm – 5:15pm, Ballroom 2, 3, and 4

**B50. *Understanding Learners and Learning of General Relativity***

Bruna Irene Grimberg, Montana State University,  
grimberg@montana.edu

Joey Shapiro-Key, Montana State University

**B54. *Marrying Education and Neuroscience Methods Illuminates Expert-Novice Meaning-making Differences from a Scientific Visualization***

Kathryn Stofer, University of Florida, stofer@ufl.edu

**B56. *Mentoring a Student Led Robotics Team***

Nathan R. Dolenc, University of Virginia, nrd3fp@virginia.edu

Claire Mitchell, University of Virginia

Robert H. Tai, University of Virginia

**B58. *The M in STEM - Developing Scientific and Mathematical Literacy through an Interdisciplinary, Inquired-based Science-camp***

Louise Bindel, Martin-Luther-Universität Halle-Wittenberg,  
louise.bindel@biodidaktik.uni-halle.de

Martin Lindner, Martin-Luther-Universität Halle-Wittenberg

**B60. *A Collaborative Evaluation of an Informal Science Education Program***

Vanessa Vernaza-Hernandez, University of South Florida

Walter J Rosales, University of South Florida

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

4:15pm – 5:15pm, Ballroom 2, 3, and 4

**B62. *Evolution Education: A Preservice Teacher's Changing Identity***Nicholas A. Linke, University of Missouri - Columbia,  
nalvxd@mail.missouri.edu

Patricia J. Friedrichsen, University of Missouri-Columbia

**B64. *Interactive Computer Simulation on Biology Teachers' Understanding of Homeostasis Concepts***Vivien M. Chabalengula, University of Virginia,  
mweenechabalengula@gmail.com

Frackson Mumba, University of Virginia

Rasheta Fateen, Southern Illinois University Carbondale

**B66. *Pre-service Teachers' Scientific Literacy Level***Adam Alsultan, Southern Illinois University Carbondale,  
alsultan@siu.edu

Vivien M. Chabalengula, University of Virginia

Frackson Mumba, University of Virginia

**B68. *Using Teacher Noticing to Assess Science Teacher Pedagogical Content Knowledge Development***

Matty Lau, New York Hall of Science, mlau@nysci.org

David E. Kanter, New York Hall of Science

Sherryl Graves, Hunter College- CUNY

**B70. *Science Teaching Identity and Identity Work of Three Differently-positioned Beginning Elementary Teachers***

Lucy Avraamidou, University of Nicosia, Cyprus,

lucyavraamidou@gmail.com

**B72. *An Inquiry into a Teacher Education Programme That Supports Student Engagement in Science***

Paul Davies, Institute of Education London, p.davies@ioe.ac.uk

Shirley A. Simon, Institute of Education London

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

4:15pm – 5:15pm, Ballroom 2, 3, and 4

**B74. *Integrating Nanoscience and Technology in the High School Science Classroom: Face-to-Face vs. Asynchronous Professional Development***

Douglas W. Huffman, University of Kansas, huffman@ku.edu

John D. Ristvey, McREL

**B76. *Enacting STEM in teacher development***Phyllis Balcerzak, Washington University in St. Louis,  
pbalcerz@wustl.edu

Rachel Ruggirello, Washington University in St. Louis

**B78. *Teachers' Learning about Assessment: Possible Professional Learning Trajectories***

Heejung MIN, Chongryang middle school, isflora@hanmail.net

Seoung-Hey Paik, Korea National University of Education

Nam-Hwa Kang, Korea National University of Education

**B80. *Determining the Effectiveness of Enacted PD Course Based on Identified Teacher's Needs***

Ana Valdmann, University of Tartu, anavaldmann@gmail.com

Jack B. Holbrook, University of Tartu

Miia Rannikmae, University of Tartu

**B82. *Examining Two School Districts' Approaches to STEM Professional Development: A Qualitative Study***

Merryn Cole, University of Kentucky, merryn.cole@uky.edu

Jennifer A. Wilhelm, University of Kentucky

**B84. *How does Teachers' Participation in an Research Experience Shape their Students' Science Learning***

Barry Golden, University of Tennessee, bwgolden@utk.edu

Sibel Bahbah, Florida State University

Sherry A. Southerland, Florida State University

Ellen M. Granger, Florida State University

**B86. *A Study of the Impact of Professional Development on Hispanic Student Performance on State Mandated Assessments of Science***

Carla C. Johnson, Purdue University, carlacjohnson@purdue.edu

Jamison D. Fargo, Utah State University

**B88. *Metaphors in Teaching Exhibited by First-year Science Teachers in Online Mentoring Dialogues***

Eunjin Bang, Iowa State University, ejbang@iastate.edu

Sissy S. Wong, University of Houston

Julie A. Luft, University of Georgia

**Strand 9: Reflective Practice****Poster Session B**

4:15pm – 5:15pm, Ballroom 2, 3, and 4

**B90. *Heather's Story: Using Autoethnography to Open Communication in Public Understanding of Science***

Heather Rudolph, University of Georgia, hrudolph@uga.edu

**B92. *Foundational Skills of Inquiry***

Jack V. Sears, Downtown Little School, jackvansears@gmail.com

Jenny D. Ingber, Bank Street College of Education



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**Strand 10: Curriculum, Evaluation, and Assessment  
Poster Session B**

4:15pm – 5:15pm, Ballroom 2, 3, and 4

**B94. *Assessing Evolutionary Understanding within the Context of Humans: Exploring Reasoning Patterns of Biology and Biological Anthropology Students***

Elizabeth P. Beggrow, The Ohio State University,  
beggrow.7@osu.edu

**B96. *The Impact of Elementary Science Classroom Assessments on Teacher Decision-Making***

Jeni R. Davis, University of South Florida, jenidavis@usf.edu

**B98. *Undergraduate Science Curriculum Development: Using Delphi Methodology to Identify Biochemistry/ Chemistry Concepts Central to Biology Majors***

Rethabile R. Tekane, Purdue University, rtekane@purdue.edu  
Trevor R. Anderson, Purdue University  
Nancy J. Pelaez, Purdue University

**B100. *What Ideas About Nanotechnology Should Be Taught In School Science? Based on Delphi Study***

Sohair Sakhnini, Weizmann Institute, asakhnini@gmail.com  
Ron Blonder, Weizmann Institute

**B102. *How to Teach Big ideas: A Theoretical Framework and Teaching Modules for Practice***

Eunmi Park, Gwangnam high school, watw33@hanmail.net  
Heojeong Yoon, Global Institute for STS Education  
Jiyoung Kim, Doonchon Middle School  
Yoonha Lee, Daeyoung Middle School  
Dami Bang, Catholic University of Korea  
Jieun Park, Ewha Womans University  
Juyeon Song, Korean Educational Development Institute

**B104. *Investigating the Cognitive Validity of a Performance Assessment Using Think Alouds***

Jan Heidrich, Leibniz Institute for Science Education (IPN) Kiel,  
heidrich@ipn.uni-kiel.de  
Knut Neumann, Leibniz Institute for Science Education (IPN) Kiel  
Stefan Petersen, Leibniz Institute for Science Education (IPN) Kiel

**B106. *STEM Solar Lab. An Innovative Approach to Learning Science Concepts***

Martina Nieswandt, University of Massachusetts, Amherst,  
mnieswan@educ.umass.edu  
Michael Lehan, Diversified Construction Services, LLC.

**B108. *The Examination of A Pullout STEM Program for Urban Upper Elementary Students***

Daniel L. Dickerson, Old Dominion University, ddickers@odu.edu  
Angela Eckhoff, Old Dominion University  
Craig Stewart, University of Memphis  
Shanan Chappell, Old Dominion University  
Stephanie Hathcock, Old Dominion University  
William McConnell, Old Dominion University

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

4:15pm – 5:15pm, Ballroom 2, 3, and 4

**B110. *Teacher Voices on Participatory Action Research (PAR) in Science Classrooms: A Critical Race Theory Analysis***

Deb Morrison, University of Colorado, educator.deb@gmail.com

**B112. *Changing Perceptions about Engineering in a Year-long Girls in Engineering Program***

Tirupalavanam G. Ganesh, Arizona State University,  
tganesh@asu.edu

**B114. *Muslim Students' and Teachers' Views on Evolution – A Review***

Khadija Fouad, Indiana University, kfouad@indiana.edu

**B116. *Science through the Lenses of Immigrant Elders: Perceptions of Conflict and Acceptance***

Nancy Albrecht, University of Minnesota, albr0137@umn.edu  
Bhaskar Upadhyay, University of Minnesota

**B118. *Tibetan Buddhist Monastics Studying Western Science: Negotiating Buddhist Theology and Western Science***

Tenzin Sonam, University of Arizona,  
tenzinsonam@email.arizona.edu  
Bruce Johnson, University of Arizona

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

4:15pm – 5:15pm, Ballroom 2, 3, and 4

**B120. A Case Study Contrasting Students' Exploration of a Complex Causal Scenario in a Virtual World**Caroline J. Courter, University North Carolina at Wilmington,  
cjc6476@uncw.edu

Tina Grotzer, Harvard University

Katarzyna M. Derbiszewska, Harvard University

Michael S. Tutwiler, Education to Harvard University

Amy M. Kamarainen, New York Hall of Science

Shari Jackson Metcalf, Harvard University

Chris J. Dede, Harvard University

**B122. The Impact of Autocorrelation: Clustering and Student Outcomes in a Multi-User Virtual Environment Assessment**

Michael S. Tutwiler, Harvard University, mst216@mail.harvard.edu

Tina A. Grotzer, Harvard University

Katarzyna M. Derbiszewska, Harvard University

Amy M. Kamarainen, New York Hall of Science

Shari Jackson Metcalf, Harvard University

Chris Dede, Harvard University

**B124. Integration of 3-D Interactive Simulations into Science Curricula**

Craig Turczynski, Norfolk State University, c.m.turczynski@spartans.nsu.edu

Dana Hayes, Norfolk State University

Michael Kozhevnikov, Norfolk State University

**B126. Virtuality and Reality – Results from Research on Learning with Digital Media in Outdoor Education**Martin Lindner, Martin-Luther-University Halle-Wittenberg,  
martin.lindner@biodidaktik.uni-halle.de

Alexander Finger, Martin-Luther-University Halle-Wittenberg

**B128. Future Worlds: An Interactive Museum-based Sustainability Exhibit**

James Minogue, North Carolina State University, james\_minogue@ncsu.edu

Eleni Lobene, North Carolina State University

Jonathan P. Rowe, North Carolina State University

Kirby Culbertson, North Carolina State University

Justin Phillips, North Carolina State University

Rachel Earnhardt, North Carolina Museum of Natural Sciences

Maggie Stalls, North Carolina Museum of Natural Sciences

Bradford W. Mott, North Carolina State University

James C. Lester, North Carolina State University

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

4:15pm – 5:15pm, Ballroom 2, 3, and 4

**B130. Women's Entrance into NASA: A Portrait of the Women Astronauts of the Space Shuttle Era**

Heather B. Page, New York University, hbp208@nyu.edu

**B132. Towards a Theoretical Framework on the Relations between NOS Understanding and Science Content Learning**

Hanno Michel, Leibniz IPN Kiel, hanno.michel@physik.rub.de

Irene Neumann, Leibniz IPN Kiel

**B134. Empirical Study on Interdependencies between Physics Teacher's Notions about Science and Methods of Instruction**

Lydia M. Schulze Heuling, Universität Freiburg,

lydia.heuling@wvf.uni-freiburg.de

Silke Mikelskis-Seifert, IPN Kiel

Matthias Nückles, Universität Freiburg

**B136. A National Study of Turkish Grade 10 Students' and Science Teachers' Conceptions of Scientists and the Interactions between Science, Technology, and Society**Fouad Abd-El-Khalick, University of Illinois at Urbana-Champaign,  
fouad@illinois.edu

Nihal Dogan, Abant Izzet Baysal University

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

4:15pm – 5:15pm, Ballroom 2, 3, and 4

**B138. Enabling Scientific Observations of the Natural World Using an e-Trailguide**Heather Toomey Zimmerman, Penn State University,  
heather@psu.edu**B140. Chinese Students' Argumentation and Epistemology about Global Climate Change**

Shiyu Liu, University of Minnesota, liux0631@umn.edu

Gillian Roehrig, University of Minnesota

**B142. The Evolution of a Controversy: How Science Teachers have Led the Charge in Public Education**

Robert W. Danielson, University of Southern California, robert.danielson@usc.edu

Gale M. Sinatra, University of Southern California

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## Evening/Social Events

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### Membership and Elections Committee Sponsored Session

#### *Graduate Student Forum*

The Graduate Student Forum aims to guide and encourage beginning researchers by discussing various problems that may arise, e.g. when completing the dissertation or searching for a position. Attendees of the forum are given the opportunity to question a panel of experienced colleagues on all matters of academic interest.

5:30pm – 7:00pm, King's Garden 4 and King's Garden 5

#### **Presiders:**

Jodi Devonshire, University of Missouri

Shelly Rodriguez, University of Texas, Austin

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### Membership and Elections Committee Sponsored Session

#### *Early Career Faculty Forum*

This forum will use a rotating round table approach to introduce junior faculty members and post-doctoral fellows to peers, recently promoted colleagues, and prominent scholars. This forum will focus on the nuances of succeeding during their early careers as faculty members. It will include discussion of issues of research publication; grant writing, and sustaining professional partnerships. In addition, the forum will explore many of the challenges of transitioning into new profession committees. The Early Career Faculty forum will provide participant with a detailed examination of the many small details that impact the successful navigation of early faculty careers in science education.

5:30pm – 7:00pm, King's Garden 3

#### **Presiders:**

Christopher Wright, University of Tennessee

Sonya Martin, Seoul National University

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### JRST Editorial Board Meeting and Reception

#### *Sponsored by Wiley-Blackwell (By invitation only.)*

6:00pm-8:30pm, Sterlings 1, 2, and 3

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### Celebrating the 10<sup>th</sup> year of *EURASIA J Math Sci & Tech Ed* Reception

#### *Sponsored by iSER – Int'l Society of Educational Research. (By invitation only.)*

6:00pm – 7:30pm, King's Garden 1

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### *International Journal of Science and Mathematic Education Reception*

#### *Sponsored by Springer (By invitation only.)*

6:00pm – 8:00pm, Commonwealth 1

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### **Graduate Student and Early Career Scholars Social Informal Social – On Your Own; This event is not sponsored by NARST.**

7:00pm – 8:00pm, Off-Site: Perle', 25 Market Square, <http://perlepg.com/index.php>

**Tuesday, April 1, 2014**



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## Conference Registration

7:00am – 5:00pm, Ballroom Foyer

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## Committee Meetings

### 7:00am – 8:15am

#### **NARST Outstanding Paper Award Committee Meeting**

7:00am – 8:15am, Heinz

#### **Outstanding Doctoral Research Award Committee Meeting**

7:00am – 8:15am, Birmingham

#### **Early Career Research Award Committee Meeting**

7:00am – 8:15am, Smithfield

#### **Distinguished Contributions through Research Award Committee Meeting**

7:00am – 8:15am, Fort Pitt

#### **JRST Award Committee Meeting**

7:00am – 8:15am, Benedum

#### **Equity and Ethics Committee Meeting**

7:00am – 8:15am, King's Garden 1

#### **External Policy and Relations Committee Meeting**

7:00am – 8:15am, King's Garden 2

#### **Research Committee Meeting**

7:00am – 8:15am, King's Garden 3

#### **Membership and Election Committee Meeting**

7:00am – 8:15am, King's Garden 4

#### **International Committee Meeting**

7:00am – 8:15am, King's Garden 5

#### **Program Committee Meeting**

7:00am – 8:15am, Brigade

#### **Publications Advisory Committee Meeting**

7:00am – 8:15am, Rivers

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## Plenary Session #2

*Thirteen Questions about Science Education*

8:30am – 10:00pm, Ballroom 1

#### **Presiders:**

Lynn Bryan, Purdue University

Valarie Akerson, Indiana University

**Discussant:** Kenneth Tobin, CUNY

#### **Panelists:**

Ana M. Becerra, Just Communities/Cumunidades Justas  
(co-sponsored with Equity & Ethics Committee)

Timothy Knight, Indianapolis Metropolitan Police Department  
(co-sponsored with CADASE RIG)

H. Richard Milner, University of Pittsburgh

Shirley Steinberg, University of Calgary

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## Break

### 10:00am – 10:30am, Ballroom Foyer

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## Concurrent Session #7

### 10:30am – 12:00pm

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#### **Presidential Sponsored Session**

*Symposium – Book Study – “Start Where you are But Don't Stay There: Understanding Diversity, Opportunity Gaps, and Teaching in Today's Classrooms” by H. Richard Milner*

10:30am-12:00pm, Commonwealth 2

#### **Presenter:**

Lynn Bryan, Purdue University

**Presenter:** H. Richard Milner, University of Pittsburgh

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

### ***Symposium – Studying Argumentation in a High School Biology Classroom: Understanding the Temporal Development of Dialogue***

10:30am-12:00pm, King's Garden 1

#### **Presenters:**

Ellice Ann Forman, University of Pittsburgh, [ellice@pitt.edu](mailto:ellice@pitt.edu)  
 Virginia Ramirez-Deltoro, University of Pittsburgh  
 Adam Loretto, University of Pittsburgh  
 Lisa M. Brown, University of Pittsburgh  
 Barbara Barnhart, University of Pittsburgh at Greensburg  
 Linda Deafenbaugh, University of Pittsburgh  
 Cindy Passmore, University of California, Davis  
 Sue Johnson, University of California, Santa Barbara  
 Gregory J. Kelly, Penn State University  
 Cody Foster, North Monterey County High School

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

### ***Aspects of Learning Processes in the Elementary Science Classroom***

10:30am-12:00pm, Brigade

#### **Presenter:**

Irene U. Osioma, California State University, Dominguez Hills

### ***The Impact of Contradictions Associated with Elementary Science Instruction: What Can We Learn?***

Julianne A. Wenner, University of Connecticut,  
[julianne.wenner@uconn.edu](mailto:julianne.wenner@uconn.edu)  
 Julie M. Kittleson, University of Georgia

### ***Analyses of Learning Process Sequences – a Video Study in Elementary School Science Classes***

Christina Krumbacher, University of Duisburg-Essen,  
[tina.krumbacher@uni-due.de](mailto:tina.krumbacher@uni-due.de)  
 Hans Ernst Fischer, University Duisburg-Essen

### ***Towards a Pedagogical Content Knowledge for Literacy Instruction in Science***

Diego Xavier Roman, Stanford University, [dxroman@stanford.edu](mailto:dxroman@stanford.edu)  
 Brian M. Donovan, Stanford University  
 Michelle Friend, Stanford University  
 Jonathan Francis Osborne, Stanford University  
 Alexis Patterson, Stanford University

### ***Learning through Modeling in K-6 Science Education: Re-Visiting the Modeling-Based Learning Cycle***

Zacharias C. Zacharia, University of Cyprus, [zach@ucy.ac.cy](mailto:zach@ucy.ac.cy)  
 Loucas T. Louca, European University-Cyprus

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

### ***Investigating Teachers' Knowledge and Practice***

10:30am-12:00pm, King's Garden 5

#### **Presenter:**

Claudia Vergara, University Alberto Hurtado

### ***An Exploration into Science Teachers' Subject Matter Knowledge and Knowledge of Students' Natural Selection Alternative Conceptions***

Margaret M. Lucero, Santa Clara University, [mlucero@scu.edu](mailto:mlucero@scu.edu)  
 Anthony Petrosino, University of Texas - Austin

### ***First Semester Changes in Teaching Practice in an Argument Based Inquiry Professional Development***

Brian R. Pinney, University of Iowa, [brian-pinney@uiowa.edu](mailto:brian-pinney@uiowa.edu)  
 Brian M. Hand, University of Iowa

### ***Measuring Pedagogical Content Knowledge of Argumentation through the Development of a Teacher Argumentation Assessment***

Katherine L. Mcneill, Boston College, [kmcneill@bc.edu](mailto:kmcneill@bc.edu)  
 Maria Gonzalez-Howard, Boston College  
 Rebecca Katsh-Singer, Boston College  
 Suzanna Loper, Lawrence Hall of Science

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

### ***Symposium – Teaching and Learning Science for English Language Learners***

10:30am-12:00pm, King's Garden 3

#### **Presenter:**

Hayat Hokayem, Texas Christian University

#### **Presenters:**

Molly Weinburgh, Texas Christian University,  
[m.weinburgh@tcu.edu](mailto:m.weinburgh@tcu.edu)  
 Cecilia Silva, Texas Christian University  
 Alan Oliveira, State University of New York  
 Sara Salloum, Long Island University  
 Carol Stuessy, Texas A&M  
 Mary Head, Texas A&M

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

***Approaches to Chemistry Instruction***

10:30am-12:00pm, Rivers

**Presenter:**

Anna Lewis, University of South Florida

***Foundations for a Learning Progression on Chemical Synthesis: Conceptual Sophistication and Modes of Reasoning***

Melissa Weinrich, University of Arizona,  
weinrich@email.arizona.edu

Vicente A. Talanquer, University of Arizona

***Mapping Students' Ideas about Chemical Reactions at Different Educational Levels***

Fan Yan, University of Arizona, fanyan@email.arizona.edu

Vicente A. Talanquer, University of Arizona

***Benefits, Costs, and Risks Analysis as a Crosscutting Concept in Chemistry Education***

Steven Cullipher, University of Massachusetts Boston,  
steven.cullipher@gmail.com

Melissa Weinrich, University of Arizona

Hannah Sevan, University of Massachusetts Boston

Vicente A. Talanquer, University of Arizona

***Effect of Modified Process-oriented Teaching on First Year University Students' Understanding of Stereochemistry Concepts***

David F. Treagust, Curtin University, d.f.treagust@curtin.edu.au

Venkat R. Vishnumolakala, Curtin University

Daniel Southam, Curtin University

Mauro Mocerino, Curtin University

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

***Cognitive Teaching and Learning Approaches***

10:30am-12:00pm, King's Garden 4

***Examining the Impact of Animations and Viewing Sequence on Learners' Understanding of Hadley Cell Circulation***

Daniel W. Harris, Salisbury University, dwharris@salisbury.edu

***Explaining Instructional Decision Making by Analyzing a Geology Instructor's Use of Metaphors***

Glenn Dolphin, University of Calgary, grdolphi@syr.edu

Sharon Dotger, Syracuse University

***Scientific Reasoning Skills among Non-Science Majors at a Community College***

Steve Bennett, Michigan State University, benne455@msu.edu

Amelia Wenk Gotwals, Michigan State University

***Undergraduates' Cognitive Resources for Understanding Environmental Literacy***

Katherine Nilsen, University of California, Santa Barbara,  
katynilsen@gmail.com

Ashley Iveland, University of California, Santa Barbara

Ethny Stewart, University of California, Santa Barbara

Julie A. Bianchini, University of California, Santa Barbara

Danielle Boyd Harlow, University of California, Santa Barbara

Jennifer Thorsch, University of California, Santa Barbara

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**Strand 6: Science Learning in Informal Contexts  
*Related Paper Set – Scientists, Educators, and Publics in Engagement: Who Learns From Whom?***

10:30am-12:00pm, Benedum

**Discussant:** John Baek, NOAA

***Experts Aren't Perfect, and Novices Aren't Perfectly Awful***

Kathryn Stofer, University of Florida, stofer@ufl.edu

***Scientists Embracing Outreach Means Changing Cultures and Convictions***

Celeste F. Barthel, Oregon State University, celeste.barthel@oregonstate.edu

***Scientists Learning Through Engagement in Outreach with Adult Learners***

Laura H. Good, Stanford University, doverl@onid.orst.edu

***Seeing is Believing: The Role of Data in Changing Scientists Views of Learners and Engagement***

Shawn Rowe, Oregon State University, shawn.rowe@oregonstate.edu

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**Strand 7: Pre-service Science Teacher Education  
*Practices in Teacher Education Programs***

10:30am-12:00pm, King's Garden 2

**Presenter:**

Gail Richmond, Michigan State University

***Developing a Statewide Community of Practice for Science Education Faculty***

Mollianne G. Logerwell, George Mason University,  
mlogerwe@gmu.edu

David E. Long, George Mason University



***Examining a New Teacher Preparation Program's Effect on Preservice Teachers' Views of Nature of Science***

Huseyin Colak, Northeastern Illinois University, h-colak@neiu.edu  
Christian A. Carstensen, University of Illinois at Chicago

***A STEM Pre-service Teacher Preparation Program: Where Scientific and Technological Literacy Meet***

Timothy P. Scott, Texas A&M University, tim@science.tamu.edu  
Perkins P. Abigail, Texas A&M University

***Investigation of the Influence of Professional Competence on the Quality of Scripts***

Anita Stender, IPN Kiel, Stender@ipn.uni-kiel.de  
Maja Brueckmann, Zurich University of Teacher Education (PH Zurich)  
Knut Neumann, Leibniz Institute for Science Education (IPN) Kiel

***Strand 8: In-service Science Teacher Education Trajectories of Teacher Change: Activating and Influencing Teacher Resources for Enacting Instruction around Scientific Practices***

10:30am-12:00pm, Sterlings 1

***Reflecting on Change: How Teachers Conceptualize the Shift to Practice-based Science Instruction***

Arash Jamshidi, University of California, Davis, ajamshidi@ucdavis.edu  
Arthur Beauchamp, University of California, Davis  
Julia Svoboda Gouvea, University of California, Davis  
Rich Hedman, California State University, Sacramento  
Cynthia Passmore, University of California-Davis

***Shifting to Authentic Scientific Inquiry: Unpacking Three Stories of Teacher Change***

Jen Richards, University of Maryland, College Park, jrich@umd.edu  
Ayush Gupta, University of Maryland, College Park  
Andrew Elby, University of Maryland, College Park

***Changing Contextual Discourses to Support the Improvement of Science Teaching***

Jessica J. Thompson, University of Washington, jjthomps@u.washington.edu  
Sara Hagenah, University of Washington

***How Teachers' Understanding of Models and Modeling Influence Shifts in their Science Instruction***

Julia Svoboda Gouvea, University of California, Davis, jmsvoboda@ucdavis.edu  
Arthur Beauchamp, University of California, Davis  
Rich Hedman, California State University, Sacramento  
Arash Jamshidi, University of California, Davis  
Wendell H. Potter, University of California, Davis  
Lin Xiang, University of Kentucky  
Cynthia Passmore, University of California, Davis

***Strand 9: Reflective Practice******Methods and Approaches in Reflective Practice***

10:30am-12:00pm, Duquesne

***President:***

Janell Nicole Catlin, Columbia University

***A Critical Review of Methodological Approaches and Strategies for Elicited Metaphor-based Research in Teacher Education***

Eulsun Seung, Indiana State University, esseung@gmail.com  
Soonhye Park, University of Iowa  
Jinhong Jung, Northern Illinois University

***Deepening Reflective Practice Through the Use of Action Research in Secondary Science Teacher Education***

Rita Hagevik, The University of North Carolina at Pembroke, rita.hagevik@uncp.edu

***The Impact of Formative Assessment on Diverse Learners: An Action Research Study***

Rachelle A. Haroldson, Science Museum of Minnesota, rharoldson@smm.org

***Comparing the Effectiveness of Two Types of Diagnostic Instruments***

Hye-Eun Chu, Nanyang Technological University, hyeun.chu@gmail.com

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**Strand 10: Curriculum, Evaluation, and Assessment  
Symposium – New Instruments for Studying the Impacts  
of Science Teacher Professional Development**

10:30am-12:00pm, Smithfield

**Presider:**

Eric R. Banilower, Horizon Research, Inc.

**Presenters:**

Peggy Trygstad, Horizon Research, Inc.,

ptrygstad@horizon-research.com

Eric R. Banilower, Horizon Research, Inc.

Patrick S. Smith, Horizon Research, Inc.

Courtney L. Nelson, Horizon Research, Inc.

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**Strand 11: Cultural, Social, and Gender Issues  
Related Paper Set – Accessing Children’s Scientific  
Thoughts through Student-Generated Representations**

10:30am-12:00pm, Birmingham

**Presider:**

Maria Varelas, University of Illinois at Chicago

**Research and Classroom Spaces for Creative Visions of  
Scientists among African American Third Graders**

Leon Walls, University of Vermont, lwalls@uvm.edu

Gale A. Seiler, McGill University

**Improvisation, Interculturality, and Signifying in  
Developing Scientific Representational Practices**

Christopher G. Wright, University of Tennessee, Knoxville,

cwrigh48@utk.edu

**Cultivating, Creating, and Critiquing Representations in an  
ArtScience Studio**

Eli Tucker-Raymond, TERC, eli\_tucker-raymond@terc.edu

Beth Warren, TERC

Ann S. Rosebery, TERC

**Children’s Understandings of Forest Ecosystems**

Megan Bang, University of Washington

Jasmine Alfonso, Northwestern University

Douglas Medin, Northwestern University

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**Strand 11: Cultural, Social, and Gender Issues  
Symposium – Positioning Equity in Formative Assessment  
Research and Practice: Using Assessment to Support  
Science Learning for All Students**

10:30am-12:00pm, Fort Pitt

**Discussants:**

Jerome M. Shaw, University of California - Santa Cruz

Edward G. Lyon, Arizona State University

Preetha K. Menon, University of California-Santa Cruz

Marcelle Siegel, University of Missouri-Columbia

Deb Morrison, University of Colorado at Boulder

Erin M. Furtak, University of Colorado

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**Strand 12: Educational Technology  
Interactive Technologies for Increased Engagement**

10:30am-12:00pm, Sterlings 2 & 3

**Presider:**

Jillianne Code, University of Victoria

**Adapting Interactive Technology to Younger Science  
Learners with a New Framework for Differentiating  
Classroom Interventions**

J. Bryan Henderson, Stanford University, jbryanh@stanford.edu

**What Do Students’ Explanations Look Like When They  
Only Use Peer Generated Data?**

Joseph S. Krajcik, Michigan State University, krajcik@msu.edu

Ibrahim Delen, Michigan State University,

delenibrahim@gmail.com

Wan-Tzu Lo, University of Michigan, Ann Arbor

Alex Kuhn, University of Michigan, Ann Arbor

Steven Mcgee, Northwestern University

Jennifer Duck, The Learning Partnership

Chris Quintana, University of Michigan, Ann Arbor

**Player and In-Game Characteristics That Support  
Collaborative Learning within an Educational Online  
Science Game**

Camellia Sanford, Rockman et al, camellia@rockman.com

Joshua Halterman, Rockman et al

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**Strand 14: Environmental Education  
Integrating the Environment into Elementary Education**

10:30am-12:00pm, Heinz

**Presider:**

Sarah J. Carrier, North Carolina State University

**Development and Validation of an Alternative Assessment  
for Ecological Learning in Elementary Students**

Michael Dentzau, Columbus State University,

dentzau\_michael@columbusstate.edu

**Knowledge, Skills, or Attitudes/Beliefs: The Context of Agricultural Literacy in Upper Elementary Science Curricula**

Farah L. Vallera, Lehigh University, fav203@lehigh.edu  
Alec M. Bodzin, Lehigh University

**Finding a Place for the Outdoors in Elementary School Science**

Linda P. Tugurian, North Carolina State University, ltuguri@ncsu.edu  
Sarah J. Carrier, North Carolina State University

**Awards Luncheon**

**12:15pm – 2:15pm, Ballroom 1, 2, 3, and 4**

**Concurrent Session #8**

**2:30pm – 4:00pm**

**Equity and Ethics Committee Sponsored Session Symposium – A Panel Discussion**

2:30pm-4:00pm, Commonwealth 2

**Presider:**

Felicia M. Mensah, Teachers College, Columbia University

**Presenters:**

Jerome Shaw, University of California, Santa Cruz  
Deborah Roberts-Harris, University of New Mexico  
Leon Walls, University of Vermont

**Publications Advisory Committee Sponsored Session Symposium – What Might Science Education Learn from Science Communication Research?**

2:30pm-4:00pm, Heinz

**Public Meanings of Science Concepts**

Heather Toomey Zimmerman, Penn State University, haz2@psu.edu

**The Impact of Popular Media on the “Pipeline” of Future Scientists and Public Engagement with Science**

Evan Szu, Stanford University, evan.szu@gmail.com  
Jonathan Osborne, Stanford University

**Science Education Know-How in Science Communication Training for Scientists**

Ayelet Baram-Tsabari, Technion – Israel Institute of Technology, ayelet@technion.ac.il

**Now and Later: The Differing Significance of Time in Education and Communications**

Noah Feinstein, University of Wisconsin, nfeinstein@wisc.edu

**The Connection between Science Education Communication in US Policy Making**

Bruce V. Lewenstein, Cornell University, b.lewenstein@cornell.edu

**Strand 2: Science Learning: Contexts, Characteristics and Interactions****Related Paper Set – STEAM: Incorporating Art in STEM education to Promote Identity Formation and Engagement in Scientific Practices**

2:30pm-4:00pm, King's Garden 2

**Presider:**

Brigid Barron, Stanford University

**Discussant:** Nancy Vye, University of Washington

**Colors of Nature: Connecting Evolutionary Biology, Optical Science, and Arts Education to Promote STEM-related Identity Work in Middle School Girls**

Carrie T. Tzou, University of Washington Bothell, tzouct@northwestern.edu

Laura Conner, University of Alaska Fairbanks

Stephen Pompea, National Optical Astronomy Observatory

Mareca Guthrie, University of Alaska Fairbanks

**Exploring the Water Cycle in 4th Grade through Performance Art**

Veronique Mertl, Mertl Learning & Educational Consulting, vm.mertl@gmail.com

Tammy Tasker, Mertl Learning & Educational Consulting

**Connecting to Science through Art: Examples from a Citizen Science Project**

Brigid Barron, Stanford University, barronbj@stanford.edu

Caitlin Martin, Stanford University

Veronique Mertl, Mertl Learning & Educational Consulting

**STEAM and STEAM Learning in Museums and Libraries: Current Trends in Investigations of Learning and Identity Development**

Sandra Toro, Institute of Museum and Library Services

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**Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies**  
***The Next Gen of Elementary Science: Testing, Conceptions, and Practices***

2:30pm-4:00pm, Rivers

**Presider:**

Bridget T. Miller, University of South Carolina

***Teacher Change in Primary Grades Inquiry Science Classroom Practices Following Professional Development***

Joan Kaderavek, University of Toledo,

joan.kaderavek@utoledo.edu

Scott C. Molitor, University of Toledo

Geoffrey Milewski, The University of Toledo

Regina Rotshtein, The University of Toledo

Tamala North, The University of Toledo

Hoangha Dao, University of Toledo

Nicholas J. Liber, University of Toledo

Charlene M. Czerniak, The University of Toledo

***Elementary Teachers Conceptions and Practices: Fostering Students' Use of Scientific Models with the Water Cycle***

Tina Vo, University of Iowa, Ms.TinaVo@gmail.com

Cory T. Forbes, University of Nebraska-Lincoln

Christina V. Schwarz, Michigan State University

Laura Zangori, University of Nebraska-Lincoln

***Elementary Education in the Outdoors: Addressing Gender, Ethnicity, and Testing***

Sarah J. Carrier, North Carolina State University,

sarah\_carrier@ncsu.edu

Margareta M. Thomson, North Carolina State University

Linda P. Tugurian, North Carolina State University

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**Strand 6: Science Learning in Informal Contexts**  
***Drawing on Community Resources and Concerns to Engage Youth with STEM***

2:30pm-4:00pm, Brigade

**Presider:**

Lynn D. Dierking, Oregon State University

***Discovering Place: Developing Community Connections through an Informal STEM Summer Experience for American Indian Youth***

Marcie A. Galbreath, University of Idaho,

galb4114@vandals.uidaho.edu

Anne Kern, University of Idaho

***The Use of Community Resources to Promote Science Learning***

Chanyah Dahsah, Michigan State University, dahsahc@gmail.com

Chaninan Pruekpramool, Srinakharinwirot University, Thailand

Theerapong Sangpradit, Srinakharinwirot University, Thailand

Joseph S. Krajcik, Michigan State University

***It is more than Just Science: Engaging Youth in Scientific Explorations through Solving Social Justice Problems in their Own Neighborhoods***

Dennis Debay, Manhattanville College, debay@bc.edu

Mike Barnett, Boston College

Sheron Mark, Loyola Marymount University

David Blustein, Boston College

Catherine Wong, Boston College

Amie Patchen, Boston College

Lin Zhang, Boston College

James Haley, Boston College

***The Potential of a Citizen Science Project to Develop Students' Science Literacy***

Leonie J. Rennie, Curtin University, l.rennie@curtin.edu.au

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**Strand 7: Pre-service Science Teacher Education**  
***Effective Practices in Learning-to-Teach Science***

2:30pm-4:00pm, Duquesne

**Presider:**

Irene U. Osisioma, California State University, Dominguez Hills

***Investigating the Effect of Science Writing Heuristic Laboratory Report Format on Critical Thinking***

Meltem Irmak, Gazi University, meltemsavas@gmail.com

Hilal Yanis, Gazi University

Jale Ercan, Gazi University

***Peer Teaching Feedback Discussions and Moves to Notice Ambitious Science Teaching: Opportunities for Collective Analysis***

Amanda Benedict-Chambers, Missouri State University,

benedictchambers@missouristate.edu

***Examining Preservice Elementary Teachers' Abilities to Attend to Students' Scientific Thinking***

Stacy McCormack, Indiana University, smccorma@indiana.edu

Susan Hawkins, Indiana University

Meredith A. Park Rogers, Indiana University

Maria Zoretic-Goodwin, Indiana University

Banu Avsar Erumit, Indiana University

Christina S. Melki, Indiana University

Heidi Wiebke, Indiana University

Mi Yeon Lee, Arizona State University

***Learning to Teach Elementary Science: Using Video Analysis as a Reflective Tool***

Brian Hartman, Oregon State University, hartmanb@onid.orst.edu  
SueAnn I. Bottoms, Oregon State University

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**Strand 7: Pre-service Science Teacher Education  
*Symposium – Preparing Next Generation STEM Teachers for Careers in High-Need Schools: Developing Critical Dialogue, Negotiation, Partnership***

2:30pm-4:00pm, King's Garden 3

***Presenters:***

Gail Richmond, Michigan State University, gair@msu.edu  
Ralph C. Dershimer, University of Michigan  
Maria M. Ferreira, Wayne State University  
Marcia K. Fetters, Western Michigan University  
Allison Young, Western Michigan University  
Beth W. Kubitskey, Eastern Michigan University  
Nelson Maylone, Eastern Michigan University

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**Strand 8: In-service Science Teacher Education  
*Effects of Professional Development on Knowledge of Content and Modeling***

2:30pm-4:00pm, Smithfield

***Presider:***

Christine R. Lotter, University of South Carolina

***From Using Models to Developing Models: Professional Development that Pushes on Teacher Thinking***

Daniel Capps, University of Maine, daniel.capps@maine.edu  
Jonathan Shemwell, University of Maine  
Lauren Barth-Cohen, University of Maine  
Shirly Avargil, Technion - Israel institute of Technology

***Effect of a Curricular and Professional Development Intervention on Elementary Teachers' Science Content Knowledge***

Brandon S. Diamond, University of Miami,  
b.diamond@bio.miami.edu  
Jaime Maerten-Rivera, University of Miami  
Okhee Lee, New York University

***The Effects of In-service Learning Process Sequence Teacher Training on Student Knowledge in Physics***

Simon Zander, University Duisburg-Essen,  
simon.zander@uni-due.de  
Heiko Krabbe, University Duisburg-Essen  
Hans Ernst Fischer, University Duisburg-Essen

***The Effects of Celestial Motion Model on Science Teachers' Investigation of Apparent Celestial Motion***

Sopita Jansri, Mahidol University, Kungphy@hotmail.com  
Watcharee Ketpichainarong, Innovative Learning

***The Impact of an Immersive Professional Development Program on In-Service K-8 Teachers' Abilities to Provide Procedural Knowledge and Conceptual Understandings of Inquiry in the Classroom***

Peter Garik, Boston University, garik@bu.edu  
Margaret D. Nolan, Boston University  
Emily C. Allen, Boston University  
Donald DeRosa, Boston University  
Andrew Duffy, Boston University  
Manher Jarivwala, Boston University  
Nicholas Gross, Boston University  
Bennett Goldberg, Boston University

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**Strand 8: In-service Science Teacher Education  
*Taking a Closer Look at Assessment and Curriculum***

2:30pm-4:00pm, King's Garden 5

***Presider:***

Deb Morrison, University of Colorado at Boulder

***Teachers' Perceptions of Pacing Guides as a Tool to Teach Science: Case of Constrained Professionalism***

Grant E. Gardner, Middle Tennessee State University,  
Grant.Gardner@mtsu.edu  
M. Gail Jones, North Carolina State University  
Laura Elizabeth Robertson, East Tennessee State University  
Sarah W. Robert, NCSU

***Investigating and Exemplifying High School Chemistry Teachers' Assessment Literacy***

Kemal Izci, Van Yuzuncu Yil University, kikrc@mail.missouri.edu  
Marcelle Siegel, University of Missouri-Columbia

***Negotiating the Use of Formative Assessment for Learning in the Era of Accountability Testing***

Xinying Yin, California State University-San Bernardino,  
xinying1128@gmail.com  
Gayle A. Buck, Indiana University

**Strand 8: In-service Science Teacher Education*****Teacher Conceptions and Conceptual Change***

2:30pm-4:00pm, Sterlings 2 &amp; 3

***Conceptions of Teaching among Turkish and American K-8 Science Teachers***

Hasan Deniz, University of Nevada, Hasan.deniz@unlv.edu

Elif Adibelli, University of Nevada, Las Vegas

Abeera P. Rehmat, University of Nevada, Las Vegas

Mustafa Sami Topcu, Yildiz Technical University

***Exploring How Industry Experiences Impact Teachers' Conceptions of Relevancy and Authenticity Related To Teaching Practices***

Sanlyn Buxner, University of Arizona, buxner@email.arizona.edu

Beau Vezino, University of Arizona

Elise Bostic, South Mountain High School

Bruce Johnson, University of Arizona

Tenzin Sonam, University of Arizona

Julia K. Olsen, University of Arizona

***Investigating Science Educators' Conceptions of Climate Science and Learning Progressions in a Professional Development Academy***

Emily Hestness, University of Maryland, hestness@umd.edu

J. Randy McGinnis, University of Maryland

Wayne Breslyn, University of Maryland

Robert C. McDonald, University of Maryland

Chrystalla Mouza, University of Delaware

Nicole Shea, University of Delaware

Katy Wellington, University of Maryland

***Linking Research about Conceptual Change and Teaching Practice in Primary Schools***

Marie-Noel Bety, Universite de Montreal,

marie-noel.bety@umontreal.ca

***The Development of In-Service Science Teachers' Pedagogical Content Knowledge Related to Interdisciplinary Science Inquiry***

Erica L. Smith, State University of New York at Buffalo,

elsmith4@buffalo.edu

Xiufeng Liu, State University of New York At Buffalo

**Strand 11: Cultural, Social, and Gender Issues*****Symposium – Teaching and Learning Science in a Neoliberal Context***

2:30pm-4:00pm, King's Garden 4

***Discussants:***

G. Michael Bowen, Mount Saint Vincent University

Alexandra Schindel Dimick, University at Buffalo

Jean R. Aguilar-Valdez, St. Olaf College

Zoe E. Buck, University of California Santa Cruz

Trish Kahle, University of Chicago

**Strand 12: Educational Technology*****Online Learning Communities***

2:30pm-4:00pm, Fort Pitt

***President:***

Brian C. Baldwin, University of North Georgia

***Using Student-Created Videos about Alternative Energy to Support Argumentation in High School Science Classrooms***

Jennifer L. Weible, Penn State University, jlw1086@psu.edu

Heather Toomey Zimmerman, Penn State University

***Social Discourse Patterns: When Scientists Partner with Students Online***

Abigail C. Perkins, Texas A&amp;M University,

acperkins@neo.tamu.edu

Carol L. Stuessy, Texas A&amp;M University

***Chemical Interactions in Learning Facebook Groups***

Shelley Rap, Weizmann Institute of Science,

shelley.rap@weizmann.ac.il

Ron Blonder, Weizmann Institute of Science

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

2:30pm-4:00pm, King's Garden 1

**Presider:**

Catherine M. Koehler, Southern Connecticut State University

***An Examination of Tacit Knowledge and its role in  
Science Classrooms***

Rory Glass, University of Albany - SUNY, rglass@albany.edu

***Graduate Students' Ideas about Science and the Nature of  
Knowing Generated by a Sci-Fi Film***

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

jymyers2@illinois.edu

Fouad Abd-El-Khalick, University of Illinois at Urbana-Champaign

***American High School Biology Classroom Practices from  
1935 - 1960: Implications for Today***

Julie Bokor, University of Florida, jbokor@ufl.edu

***A Framework for Defining Physical Concepts***

Chee Leong Wong, Nanyang Technological University,

alphonsuswong@gmail.com

Hye-Eun Chu, Nanyang Technological University

Kueh Chin Yap, Nanyang Technological University

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**Strand 14: Environmental Education**

***In-service Teachers and Climate Change***

2:30pm-4:00pm, Benedum

**Presider:**

Xavier Fazio, Brock University

***Toward the Development of an Internet-based Resource  
for Teaching about Global Change: Results from the Needs  
Assessment Survey***

Molly AM Stuhlsatz, BSCS, mstuhlsatz@bscs.org

Minda Berbeco, National Center for Science Education

Lisa D. White, University of California Museum of Paleontology

Mark S. McCaffrey, National Center for Science Education

Audrey Mohan, BSCS

Christopher Wilson, BSCS

***Using Photo Elicitation Interview to Conceptualize In-  
Service Secondary School Science Teachers' Knowledge  
for Climate Change***

Devarati Bhattacharya, University of Minnesota,

Minneapolis, devarati@umn.edu

Engin Karahan, University of Minnesota

Shiyu Liu, University of Minnesota

Gillian Roehrig, University of Minnesota

***Arguing about Global Climate Change: In-Service  
Teachers' Argumentation and Epistemology on Climate  
Issues***

Shiyu Liu, University of Minnesota, liux0631@umn.edu

Gillian Roehrig, University of Minnesota

Anne Loyle-Langholz, University of Minnesota

Devarati Bhattacharya, University of Minnesota

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**Strand 14: Environmental Education**

***Pre-service Teachers and Sustainability, Service-  
learning, and the Environment***

2:30pm-4:00pm, Sterlings 1

**Presider:**

Erica Blatt, College of Staten Island, CUNY

***Preservice Elementary Teachers' Identity Development in  
an Environmentally-Focused Service-Learning Course***

Rachel E. Wilson, Appalachian State University, wilsonre3@  
appstate.edu

Leslie Bradbury, Appalachian State University

***A Phemenographic Study of Beginning Teachers'  
Conceptions of Sustainability***

Rita Hagevik, The University of North Carolina at Pembroke,

rita.hagevik@unpc.edu

Patty Stinger-Barnes, University of Tennessee

Dorothy Blanks, University of Tennessee

***Service-learning in Support of Science Teacher Education***

Meghan E. Marrero, Mercy College, mmarrero3@mercy.edu

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**Strand 15: Policy**

***Science Education Reform Policy Issues***

2:30pm-4:00pm, Birmingham

**Presider:**

Gavin W. Fulmer, National Institute of Education (Singapore)

***Assessing Multinational Interest in STEM - First Findings***

Adam V. Maltese, Indiana University, amaltese@indiana.edu

***Engineering in Science? A Study of Next Generation  
Science Standards and State-Level Science Standards***

Tamara J. Moore, Purdue University, tamara@purdue.edu

Kristina M. Tank, University of Minnesota

Aran W. Glancy, University of Minnesota

Jennifer Kersten, Richfield High School/University of Minnesota

**Connecting Policy with Practice: Nigerian Case Study of Science Teacher Education, Demand, Supply and Quality**

Peter A. Okebukola, Lagos State University,  
pokebukola@yahoo.com

Foluso Okebukola, Lagos State University  
Olatunde Lawal Owolabi, Lagos State University  
Sunday O. Banjoko, Lagos State University  
Ayodele Ogunleye, University of Lagos

**The Advanced Placement Test-Taking Explosion: What Is the Science and Math Blast Effect?**

Eugene Judson, Arizona State University,  
Eugene.Judson@asu.edu

**Enhancing Students' Critical Thinking Skills through Argument Based Inquiry: Results from A Scale up Research Project in Turkey**

Murat Gunel, TED University, murat.gunel@tedu.edu.tr  
Recai Akkus, Abant Izzet Baysal University  
Melike Ozer-Keskin, Gazi University  
Nilay Keskin-Samanci, Gazi University

**Naïve Genetic Determinism and Genetics/Genomics Literacy: Do Human Intuitions have an Impact?**

Kostas Kampourakis, University of Geneva,  
Kostas.Kampourakis@unige.ch  
Bruno J. Strasser, University of Geneva

**Concurrent Session #9****4:15pm – 5:45pm****Publications Advisory Committee Sponsored Session Symposium – The Anatomy of a Good Article: Publishing in the Journal of Research in Science Teaching**

4:15pm-5:45pm, King's Garden 1

**Presenters:**

Angela Calabrese Barton, Michigan State University,  
acb@msu.edu  
Joseph Krajcik, Michigan State University  
Bob Geier, Michigan State University

**Strand 1: Science Learning, Understanding and Conceptual Change****Argumentation, Intuition, and Decision-making**

4:15pm-5:45pm, Sterlings 1

**Presider:**

Calvin Kalman, Concordia University

**Performance Expectations for Engaging with Ecosystem Services Science when Making Everyday Decisions: A Delphi Study Linking Ecosystem Services to All Citizens**

John R. Ruppert, Rutgers University, jruppert@spc.edu  
Ravit Golan Duncan, Rutgers University

**Argumentation Prompts Mediating Students' Performance and Epistemic Games on Conceptual Physics Problems**

Carina M. Rebello, University of Missouri, cp5xc@mail.mizzou.edu  
Lloyd H. Barrow, University of Missouri  
N. Sanjay Rebello, Kansas State University

**Strand 1: Science Learning, Understanding and Conceptual Change****Related Paper Set – Development of Student Understanding of Ecosystem Change across Contexts and Scales**

4:15pm-5:45pm, Duquesne

**Ecological Systems and Learning Progressions: Applications of Basic Principles across Multiple Scales of Organization**

John C. Moore, Colorado State University,  
jcmoore@nrel.colostate.edu  
Laurel Hartley, University of Colorado Denver  
Jennifer H. Doherty, Michigan State University  
Cornelia Harris, Cary Institute of Ecosystem Studies  
Alan R. Berkowitz, Cary Institute of Ecosystem Studies  
Charles W. Anderson, Michigan State University

**Learning Progression Framework and Assessments for Community Ecology**

Laurel Hartley, University of Colorado Denver,  
hartleylaurel@gmail.com  
Jennifer H. Doherty, Michigan State University  
Cornelia Harris, Cary Institute Of Ecosystem Studies  
John C. Moore, Colorado State University  
Alan R. Berkowitz, Cary Institute of Ecosystem Studies  
Charles W. Anderson, Michigan State University

**Developing Understanding of Evolution in Complex Contexts**

Jennifer H. Doherty, Michigan State University,  
dohert59@msu.edu  
Laurel Hartley, University of Colorado Denver  
Cornelia Harris, Cary Institute of Ecosystem Studies  
Charles W. Anderson, Michigan State University



***Unifying Life: Placing Urban Tree Diversity into an Evolutionary Context***

Yael Wyner, City College of New York

Jennifer Doherty, Michigan State University

**Strand 2: Science Learning: Contexts, Characteristics and Interactions*****Engaging Students in Experimental Design, Measurement, Computational Thinking, Data Analysis, and Causal Thinking***

4:15pm-5:45pm, Heinz

**Presenter:**

Chanyah Dahsah, Michigan State University

***Unpacking the Development of Measurement Practice***

Eve Manz, University of Colorado Boulder,

eve.manz@colorado.edu

***Long-Term Development of Agent-Based Computational Modeling in 5th Grade: Shifting from Programming to Modeling***

Amy V. Farris, Vanderbilt University, amy.s.voss@Vanderbilt.Edu

Amanda C. Dickes, Vanderbilt University

Gokul Krishnan, Vanderbilt University

Cherifa Ghassoul, Vanderbilt University

Pratim Sengupta, Vanderbilt University

***Teaching and Learning the Nature of Scientific Evidence Demands Attention to the Notion of Causality***

Susan Kirch, New York University, susan.kirch@nyu.edu

***Supporting the Development of Student Reasoning Across an Evolving Scientific Explanation***

Ann M. Novak, Greenhills School/Curtin University,

anovak@greenhillsschool.org

David F. Treagust, Curtin University

**Strand 2: Science Learning: Contexts, Characteristics and Interactions*****Related Paper Set – Representing Science: Visual Data Highlighting Understandings and Meanings of Science***

4:15pm-5:45pm, Commonwealth 2

***Science Teacher Candidates' Drawings of the Digestive and Endocrine Systems***

Patricia Patrick, Texas Tech University, trish.patrick@ttu.edu

***A Longitudinal Study of a Class of English Primary Children from Five Years to Eleven Years on Their Developing Understanding of What was Inside Their Body***

Sue Dale Tunnicliffe, University of London,

lady.tunnicliffe@me.com

Michael J. Reiss, University of London

***Drawing for the Public: Newspaper Comic Panels Portray U.S. Science Values and Attitudes as Part of the Socio-Cultural Setting for Science Learning***

Phyllis Katz, University of Maryland, pkatz15@gmail.com

***Understandings the Meanings Secondary Biology Students Construct Around Science from Drawings***

Jeremy F. Price, Fairmont State University,

Jeremy.price@fairmontstate.edu

**Strand 2: Science Learning: Contexts, Characteristics and Interactions*****Socioscientific Issues and What Counts as Science***

4:15pm-5:45pm, King's Garden 3

**Presenter:**

Jonathan Francis Osborne, Stanford University

***Socioscientific Intertextuality in Secondary Science***

Alandeom W. Oliveira, University at Albany, SUNY,

aoliveira@albany.edu

Troy D. Sadler, University of Missouri

Christina M. Nash, University at Albany, SUNY

***The Impact of Socioscientific Issues on Moral Reasoning and Moral Sensitivity in High School Students***

Eunhang Lee, Ewha Womans University, eunhanglee@gmail.com

Dana L. Zeidler, University of South Florida

Younglan Chung, Ewha Womans University

***Storytelling in 1st Grade Science: Negotiating what Counts as Scientific Knowledge and Who Talks Science***

Danusa Munford, Universidade Federal de Minas Gerais,

danusamun@gmail.br

Kely C.N. Souto, Universidade Federal de Minas Gerais

Vanessa Neves, Universidade Federal de Minas Gerais

Francisco A. Coutinho, Universidade Federal de Minas Gerais

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**Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies**  
***Investigating Beliefs and Epistemologies of Teachers and Students***

4:15pm-5:45pm, Fort Pitt

***Relations between the Turkish High School Students' Physics-related Personal Epistemologies and their Self-regulated Learning Strategies***

Muhammet Mustafa Alpaslan, Texas A&M University,  
alpaslan27@tamu.edu

Bugrahan Yalvac, Texas A&M University  
Cathleen C. Loving, Texas A&M University  
Victor Willson, Texas A&M University

***How Biology Teachers' Beliefs Influence the Tasks They Use***

Christian Förtsch, University of Munich,  
christian.foertsch@bio.lmu.de  
Sonja Werner, University of Munich  
Melanie Jüttner, University of Munich  
Birgit Jana Neuhaus, University of Munich

***Creationism vs. Evolution: A Study of the Opinions of Georgia Biology Teachers***

William H. Nye, Gwinnett County Public Schools,  
wnye@comcast.net

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

***Improving Undergraduate Instruction***

4:15pm-5:45pm, Birmingham

***Presider:***

Carrie J. Boyce, The University of Southern Mississippi

***Evaluating Institutional Change in Biological Sciences at a Research-Intensive University: The Beginning***

Rebecca L. Matz, Michigan State University, matz@msu.edu  
Sarah E. Jardeleza, Michigan State University  
Joseph S. Krajcik, Michigan State University

***Undergraduate Teaching Assistant Impact on Student Academic Achievement and Persistence in General Chemistry***

Stephanie B. Philipp, University of Louisville,  
stephanie.philipp@louisville.edu  
Thomas R. Tretter, University of Louisville  
Christine V. Rich, University of Louisville

***Using Department-Level Social Networks to Inform Instructional Change Initiatives***

Kathleen Quardokus, Western Michigan University,  
kathleen.m.quardokus@wmich.edu  
Charles R. Henderson, Western Michigan University

***Latency toward Public Speaking in Pre-engineering and Physics Students at a Two-year College***

Pamela A. Maher, University of Nevada Las Vegas,  
maherp@unlv.nevada.edu  
Janelle M. Bailey, Temple University  
Allan M. Tucka, College of Southern Nevada

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**Strand 6: Science Learning in Informal Contexts**  
***Related Paper Set – STEM Learning Ecosystems***

4:15pm-5:45pm, Rivers

***Designing for Activation: Building STEM Learning Pathways for Pittsburgh's Youth***

Kevin Crowley, University of Pittsburgh, crowleyk@pitt.edu  
Christian D. Schunn, University of Pittsburgh  
Meghan E. Bathgate, University of Pittsburgh  
Stacy Kehoe, University of Pittsburgh  
Marti Louw, University of Pittsburgh  
Peter S. Wardrip, University of Pittsburgh

***SYNERGIES: Understanding and Connecting STEM Learning Ecosystems in the Community***

Lynn D. Dierking, Oregon State University,  
dierkin@science.oregonstate.edu  
Nancy Staus, Oregon State University  
John H. Falk, Oregon State University  
Faik Karatsa, Oregon State University  
Jay Breslow, Oregon State University  
Tricia Harding, Oregon State University  
William R. Penuel, University of Colorado

***Connecting Community with STEM***

Ruth Kermish-Allen, The Island Institute,  
RAllen@islandinstitute.org  
Karen Peterman, Karen Peterman Consulting

***STEM Guides: Building Coherent Infrastructure in Rural Communities***

Janice R. Mokros, Maine Mathematics and Science Alliance  
Sue Allen, Maine Mathematics and Science Alliance  
Tom Keller, Maine Mathematics and Science Alliance

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

4:15pm-5:45pm, Brigade

**Presider:**

Saouma B. Boujaoude, American University in Beirut

***Assessing Quality of Pre-service Physics Teachers' Written Arguments***Mehmet Aydeniz, The University of Tennessee,  
maydeniz@utk.edu

Deniz Gurcay, Hacettepe University, Turkey

Ebru Balta, Hacettepe University, Turkey

***Using Discourse to Teach Science as Argument: The Successes & Strengths of Preservice Elementary Teachers***

Elisebeth Boyer, Ohio State University, boyer.386@osu.edu

Carla Zembal-Saul, Penn State University

***Pre-service Teacher Discourses: Vernacular Versus Formal Science Learning Discourses***

Mohammad A. Basir, Oakland University, basir@oakland.edu

***Prospective Science Teachers' Inferences about Student Understanding***

Vicente A. Talanquer, University of Arizona,

vicente@u.arizona.edu

Debra J. Tomanek, University of Arizona

Molly Bolger, University of Arizona

**Strand 7: Pre-service Science Teacher Education*****Preservice Science Teachers' Pedagogical Content Knowledge***

4:15pm-5:45pm, King's Garden 4

**Presider:**

Sevgi Aydin, Yuzuncu Yil University

***Towards an Evidence-Based Model of Pre-service Science Teachers' Pedagogical Content Knowledge***Vanessa Kind, School of Education Durham University, UK,  
vanessa.kind@durham.ac.uk***Nature and Development of Interplay among Pre-service Teachers' PCK Components in Mentoring-enriched PCK-based Practicum***

Betul Demirdogen, Bulent Ecevit University,

betuldemirdogen@gmail.com

Sevgi Aydin, Yuzuncu Yil University

Fatma Nur Akin, Middle East Technical University

Esen Uzuntiryaki, Middle East Technical University

***Mentor Influence in the Development of a Pre-service Biology Teacher's Pedagogical Content Knowledge***

Ellen Barnett, University of Missouri, eb4nd@mail.missouri.edu

Carol Robertson, Fulton High School

Patricia Friedrichsen, University of Missouri

***How Does Pre-Service Teacher PCK Knowledge Relate to Enactment? A Case Study of Teaching Chemical Equilibrium***

Marissa S. Rollnick, Wits University, marissa.rollnick@wits.ac.za

Elizabeth Mavhunga, University of Witwatersrand

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

4:15pm-5:45pm, Sterlings 2 &amp; 3

**Presider:**

Meghan R. Federer, The Ohio State University

***Students' Reasoning Processes on a Multiple-True-False Concept Inventory: Exploring the Importance of Substantive Validity Evidence in Test Validation***Elizabeth P. Beggrow, The Ohio State University,  
beggrow.7@osu.edu

Meghan R. Federer, The Ohio State University

Ross H. Nehm, Stony Brook University

Minsu Ha, Stony Brook University

***Using Think Alouds to Explore the Cognitive Validity of Ordered Multiple Choice Items***Jan Christoph Hadenfeldt, Leibniz Institute (IPN) Kiel,  
hadenfeldt@ipn.uni-kiel.de

Knut Neumann, Leibniz (IPN) Kiel

***Literature Review of Characteristics of Science Item Contexts***

Ting Wang, University of Washington, tingwang@uw.edu

Min Li, University of Washington

**Strand 10: Curriculum, Evaluation, and Assessment**  
***Implementing Genetics Curricula Informed by the NRC Framework***

4:15pm-5:45pm, Smithfield

***Learning about Genetics in Elementary Classrooms: A Comparison Study***

Dante Cisterna, Michigan State University, cisterna@msu.edu

Michelle Williams, Michigan State University

Amal Ibourk, Michigan State University

Amy Frahm, Michigan State University

***Developing a Mentor Model for Cross-grade Genetics Curricula***

Tamara J. Heck, Michigan State University, heckt@msu.edu  
 Joi Merritt, Arizona State University  
 Elizabeth X de los Santos, Michigan State University

***Cross-grade Findings: Patterns of Students' Knowledge Integration Related to Genetics***

Joi Merritt, Arizona State University, jmerritt@msu.edu  
 Amanda Opperman, Michigan State University  
 Dante Cisterna, Michigan State University  
 Amal Ibourk, Michigan State University  
 Michelle Williams, Michigan State University

***Tools to Support Scientific Modeling and Explanations***

Yves Beauvineau, Culturally Responsive Science Pedagogies  
 Angela H. DeBarger, SRI International  
 Erika D. Tate, Bluknowledge LLC  
 Amanda Opperman, Michigan State University  
 Joi Merritt, Arizona State University

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

***Symposium – Impact: Mini-Symposium as a Powerful Synergy for Young Black Scholars in Science Education***

4:15pm-5:45pm, Benedum

***Presider:***

Malcolm B. Butler, University of Central Florida

***Discussants:***

Mary Atwater, The University of Georgia  
 Salina T. Gray, Stanford University  
 Geraldine L. Cochran, Florida International University  
 Ashraf A. Shady, Queens College, CUNY  
 Vanashri J. Nargund-Joshi, New Jersey City University  
 Tamecia R. Jones, Purdue University  
 Line A. Saint-Hilaire, Queens College, CUNY  
 Gillian U. Bayne, Lehman College CUNY  
 Natasha Johnson, University of Georgia

**Strand 12: Educational Technology**

***Technology in Science Teacher Professional Development***

4:15pm-5:45pm, King's Garden 5

***Presider:***

Jennifer Weible, Penn State University

***A Personalized Digital Badging Space for Science Teacher Professional Development***

Christopher Gamrat, Penn State University, cwg118@psu.edu  
 Heather Toomey Zimmerman, Penn State University

***Speak, Chat, or Write: Differential Interactions in Science Teacher Professional Development with Distance Education Tools***

Lauren Madden, The College of New Jersey, maddenl@tcnj.edu  
 M. Gail Jones, North Carolina State University  
 Gina Childers, North Carolina State University

***Exploring the TPACK of Taiwanese Secondary School Science Teachers Using a New Contextualized TPACK Model***

Syh-Jong Jang, Chung-Yuan Christian University,  
 jang@cycu.edu.tw

***Teachers' Perceptions of Their Use of Technologies for Self-directed Learning and the Obstacles They Present***

Jennifer Jocz, National Institute of Education, Singapore,  
 jennifer.tan@nie.edu.sg  
 Wenli Chen, National Institute of Education, Singapore  
 Doris Choy, National Institute of Education, Singapore  
 Horn Mun Cheah, National Institute of Education, Singapore  
 Seng Chee Tan, National Institute of Education, Nanyang Technological University

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

***Subject Matter: Biology***

4:15pm-5:45pm, King's Garden 2

***Presider:***

Jason R. Wiles, Syracuse University

***The Challenges of Scientific Knowledge on Socioscientific Decision Making***

Mijung Kim, University of Victoria, mjkim@uvic.ca

***Utilizing a Phenomenology of Place in Science Education to Enable Youth in Democratic Reforms***

Rachel Luther, University of Southern Mississippi Gulf Coast,  
 rachel.luther@gmail.com

***The Effect of Learner-directed Scientific Investigations on Students' Questionings and their Nature of Science Views***

Banu Avsar-Erument, Indiana University, bavsar@indiana.edu  
 Khadija Fouad, Indiana University  
 Valarie Akerson, Indiana University

***Exploring Relationships between Students' Conceptions of the Nature of Science, Evolution, and Global Climate Change***

Benjamin Carter, Syracuse University, elijahcarter@gmail.com  
 Jason R. Wiles, Syracuse University

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## Evening/Social Events

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### Equity and Ethics Sponsored Outing

#### ***Equity Dinner (Maximum Attendance: 85)***

7:00pm – 10:00pm, Off-Site

Savoy Restaurant, 2623 Penn Avenue

Approximately 2.1 mile walk or short shared cab ride from the Qyndham. Dinner, including tax and gratuity, is \$35. ***Please Note:*** You must register for this event with your Advance Conference Registration. ***A Business Casual Dress Code is enforced at the Savoy Restaurant.*** Tickets purchased for this event are not refundable.

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**Wednesday, April 2, 2014**



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## Conference Registration

7:00am – 12:00pm, Ballroom Foyer

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## Strand Meetings

### 7:00am – 8:15am

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

Meeting—7:00am – 8:15am, Commonwealth 2

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

Meeting—7:00am – 8:15am, King's Garden 1

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

Meeting—7:00am – 8:15am, King's Garden 2

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

Meeting—7:00am – 8:15am, King's Garden 3

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

Meeting—7:00am – 8:15am, King's Garden 4

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

Meeting—7:00am – 8:15am, King's Garden 5

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

Meeting—7:00am – 8:15am, Benedum

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

Meeting—7:00am – 8:15am, Rivers

#### Strand 9: Reflective Practice

Meeting—7:00am – 8:15am, Brigade

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

Meeting—7:00am – 8:15am, Duquesne

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

Meeting—7:00am – 8:15am, Sterlings 1

#### Strand 12: Educational Technology

Meeting—7:00am – 8:15am, Smithfield

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

Meeting—7:00am – 8:15am, Birmingham

#### Strand 14: Environmental Education

Meeting—7:00am – 8:15am, Fort Pitt

#### Strand 15: Policy

Meeting—7:00am – 8:15am, Heinz

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## Concurrent Session #10

### 8:30am – 10:00am

#### International Committee Sponsored Session *Symposium – Linking Global Science Education Associations with NARST*

8:30am-10:00am, King's Garden 3

##### **Presider:**

Hsiao-Lin Tuan, NARST International Coordinator

##### **Discussants:**

Lynn Bryan, National Association for Research in Science Teaching

Manuela Welzel-Breuer, European Science Education Research Association

Chi-Jui Lien, East-Asian Association for Science Education

Marissa Rollnick, Southern African Association for Research in Mathematics, Science & Technology Education

Debbie Corrigan, The Australian Science Education Research Association

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

##### *Methodological Tradeoffs in Learning Progressions Research*

8:30am-10:00am, King's Garden 1

##### **Presider:**

Ann E. Rivet, Columbia University

**Discussant:** James Pellegrino, University of Illinois at Chicago

##### *Introduction and Discussion to Methodological Tradeoffs in Learning Progression Research*

Ann E. Rivet, Columbia University, rivet@tc.columbia.edu

Ravit Golan Duncan, Rutgers University

##### *Towards the Development of a Particle Model of Matter Progression*

Joi Merritt, Arizona State University, jmerritt@msu.edu



***Developing Validity Arguments for Learning Progression-Based Written Assessments***

Karen Draney, University of California, Berkeley,  
kdraney@berkeley.edu  
Jennifer Doherty, Michigan State University  
Charles W. Anderson, Michigan State University

***The Potential of Modern Statistical Approaches in Validating Learning Progressions***

Knut Neumann, Leibniz Institute (IPN) Kiel

***The Affordances and Challenges of Comparative Longitudinal Designs in Matter LP Research***

Carol Smith, University of Massachusetts

***Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies Discourse Opportunities in Elementary Science Classrooms***

8:30am-10:00am, Fort Pitt

***Presider:***

Mary E. Hobbs, Center for STEM Education

***Teacher's Role of Questioning: Approaches That Promote Student Cognitive Complexities and Dialogical Interaction in Argumentation***

Ying-Chih Chen, University of Minnesota, chen2719@umn.edu  
Brian M. Hand, University of Iowa

***Argumentation Opportunities and Support Using Traditional and Electronic Science Notebooks: A Comparative Study***

Courtney Behrle, North Carolina State University,  
cbehrle@ncsu.edu

Angela Shelton, North Carolina State University  
Lindsay Patterson, North Carolina State University  
Eric N. Wiebe, North Carolina State University

***Utilizing A Claims, Evidence, Reasoning Framework to Integrate K-5 Instruction***

Ingrid S. Weiland, University of Louisville, ingrid.weiland@louisville.edu  
Kristin Cook, Bellarmine University

***Examination of the Initial Practices of Three Fifth Grade Science Teachers Engaging Students in Critique***

Matthew J. Benus, Indiana University Northwest,  
mbenus@indiana.edu  
Brian M. Hand, University of Iowa

***Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies Investigating the Influence of Initiative, Self Efficacy and Emotions on Teaching***

8:30am-10:00am, Duquesne

***Presider:***

Isha DeCoito, York University

***Novice Science Teachers' Recognition and Use of Resources to Learn from Practice***

David Stroupe, Michigan State University, dstroupe@msu.edu

***The Effects of Emotive Reasoning on Secondary School Students' Ability to Evaluate Evidence on Socioscientific Issues***

Wardell Anthony Powell, University of South Florida,  
wardellpowell@aol.com

Dana L. Zeidler, University of South Florida

***Personal Self-Efficacy and Outcome Expectancy for Teaching Inquiry: Professional Development that Transforms Teachers' Instruction***

Christine R. Lotter, University of South Carolina,  
lotter@mailbox.sc.edu  
Stephen L. Thompson, University of South Carolina  
Tammie Dickenson, University of South Carolina  
Whitney Smiley, University of South Carolina

***The Impact of the Medium of Instruction on Students' Learning in Physics at the Senior Secondary Level in Hong Kong***

Dennis Fung, The University of Hong Kong, clfung@hku.hk  
Valerie Yip, The University of Hong Kong

***Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies Pedagogical Content Knowledge for Middle/Secondary Teachers***

8:30am-10:00am, King's Garden 5

***Presider:***

David F. Treagust, Curtin University

***Influence of Physics Teachers' CK, PCK and PK on Students Outcome***

Eva Cauet, University Duisburg-Essen, eva.cauet@uni-due.de  
Sven Liepertz, RWTH Aachen University  
Sophie Kirschner, University Giessen  
Andreas Borowski, University of Potsdam  
Hans Ernst Fischer, University Duisburg-Essen

***Cross-Cultural Validation of a Survey Measure of Biology Teachers' PCK for Teaching Photosynthesis***

Soonhye Park, University Of Iowa, soonhye-park@uiowa.edu  
Jee Kyung Suh, University of Iowa  
Kyungwoon Seo, University of Iowa  
Aeran Choi, Ewha Womans University

***Strand 6: Science Learning in Informal Contexts  
Novel Technologies to Engage the Public with Science***

8:30am-10:00am, Rivers

***Presenter:***

Catherine Eberbach, Rutgers University

***The Interaction of Scientific Literacy and Position towards  
Animal Experimentation in Authentic Online Public  
Discussions***

Ayelet Baram-Tsabari, Technion, ayelet@technion.ac.il  
Esther Laslo, Technion

***Utilizing Gigapixel Image Technology for Science  
Communication and Observational Skills Development in  
a Museum Setting***

Camellia Sanford, Rockman et al, camellia@rockman.com  
Marti Louw, University of Pittsburgh

***Science on Windows: Shifting the Context of  
Informal Learning Using Touchfoil Technologies with  
Environmental Data***

Amie Patchen, Boston College, Amie.Patchen@bc.edu  
Shakib Ahmed, Boston College  
Connor Rooney, Waltham High School  
Lin Zhang, Boston College  
Jae Jin Han, Boston College  
Dennis Debay, Manhattanville College  
James Haley, Boston College  
Mike Barnett, Boston College

***Mobile Devices Supporting Families' Scientific Talk  
Related to Trees***

Heather Toomey Zimmerman, Penn State University,  
heather@psu.edu  
Susan M. Land, Pennsylvania State University  
Lucy R. McClain, Penn State University  
Michael R. Mohny, Penn State University  
Gi Woong Choi, Penn State University  
Fariha H. Salman, Penn State University

***Strand 6: Science Learning in Informal Contexts  
Supporting Pre-service Teachers: The Role of Informal  
Science Environments***

8:30am-10:00am, Sterlings 1

***Presenter:***

John R. Ruppert, Rutgers University

***Studying Contributions of a Place-based Museum  
Teaching Residency on Urban Science Teacher  
Candidates***

Maritza Macdonald, American Museum of Natural History,  
mmacdonald@amnh.org

Preeti Gupta, American Museum of Natural History  
Alix R. Cotumaccio, American Museum of Natural History

***Summer Learning: Teacher and Student Co-Development***

Sumi Hagiwara, Montclair State University, hagiwaras@mail.  
montclair.edu

***Strand 7: Pre-service Science Teacher Education  
Cultural Approaches to Preservice Teacher Education***

8:30am-10:00am, Smithfield

***Preparation for Culturally Responsive Science Teaching:  
With and Without Field Placement in a High-Need School***

Kevin Goff, College of William & Mary, kdgoff@email.wm.edu  
Juanita Jo Matkins, College of William & Mary  
Jacqueline Theresa McDonnough, Virginia Commonwealth  
University

***Using a Structured Observation Protocol to Awaken  
Cultural Responsiveness in STEM Preservice Teachers***

Julie C. Brown, University of Florida, brownjc@ufl.edu  
Kent J. Crippen, University of Florida

***Forging Identities as Urban or High Needs Teachers:  
Voices of Entry Year Science and Mathematics Pre-  
service Teachers***

Roger Pomplas, University of Cincinnati, pomplar1@mail.uc.edu  
Helen M. Meyer, University of Cincinnati

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**Strand 7: Pre-service Science Teacher Education**  
***Educating Highly-qualified Science Teachers: Challenges and Perspectives***

8:30am-10:00am, Birmingham

***Professional Practice: Pre- to Post-Teacher Education Program***

Elizabeth B. Lewis, University of Nebraska-Lincoln,  
 elewis3@unl.edu

Aaron Musson, University of Nebraska-Lincoln

Jia Lu, University of Nebraska-Lincoln

***Observing Inquiry-based Instructional Practices***

Elizabeth B. Lewis, University of Nebraska-Lincoln,  
 elewis3@unl.edu

Aaron Musson, University of Nebraska-Lincoln

Jia Lu, University of Nebraska-Lincoln

***Following Teachers' Self-efficacy and Instructional Practices***

Aaron A. Musson, University of Nebraska-Lincoln,  
 aaronmusson@gmail.com

Elizabeth B. Lewis, University of Nebraska-Lincoln

***Discourse in the Classroom: A Comparison of Two Preservice Teachers***

Jia Lu, University of Nebraska-Lincoln, lvjia1027@gmail.com

Elizabeth B. Lewis, University of Nebraska-Lincoln

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**Strand 7: Pre-service Science Teacher Education**  
***Preservice Teachers' Conceptions and Enactment of Inquiry***

8:30am-10:00am, Brigade

***Presider:***

Jessica J. Thompson, University of Washington

***Facilitating Primary Pre-Service Teachers Understandings of Inquiry-Based Learning***

Gillian Kidman, Queensland University of Technology,  
 g.kidman@qut.edu.au

Stephen Keast, Monash University

Rebecca Cooper, Monash University

***Preservice Teachers' Conceptions and Enactments of Inquiry-Based Learning after a Physics Inquiry Course***

Paige K. Evans, University of Houston, pevans@uh.edu

***Examining Pre-service teachers' Conceptions of Inquiry using Teaching Scenarios***

Frackson Mumba, University of Virginia,  
 mumbafrackson@gmail.com

Vivien M. Chabalengula, University of Virginia

***Developing a Paper-Pencil-Test to Evaluate Pre-service Science Teachers' Competencies in Scientific Inquiry Focused on Biology***

Sabrina Mathesius, Freie Universität Berlin,  
 sabrina.mathesius@fu-berlin.de

Stefan Hartmann, Humboldt- Universität zu Berlin

Annette Upmeier zu Belzen, Humboldt-Universität zu Berlin

Dirk Krüger, Freie Universität Berlin

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**Strand 10: Curriculum, Evaluation, and Assessment**  
***Applying Rasch Modeling to Assessment Development and Validation***

8:30am-10:00am, Benedum

***Measuring the Conceptual Development of Student Understanding of Newton's Third Law***

Irene Neumann, Ruhr-Universität Bochum,  
 neumann@physik.rub.de

Joanna Peters, Ruhr-Universität Bochum

Ling L. Liang, La Salle University

Gavin W. Fulmer, National Institute of Education (Singapore)

***Validation of a Genomics and Bioinformatics Assessment: Analysis of Student Responses to a Criterion Referenced Multiple-Choice Measurement Tool***

Chad Campbell, The Ohio State University,  
 campbell.742@osu.edu

Ross H. Nehm, Stony Brook University

Brian Morton, Barnard College, Columbia University

***Constructing an Innovative Measure Assessing Interdisciplinary Understanding (IU)—Using Rasch Model to Assess Students' Energy Understanding***

Shannon Sung, University of Georgia, ilaria.huang@gmail.com

Ji Shen, University of Miami

***Assessing the Efficacy of the MUM as a Valid Measure for Understanding of Macroevolution for Undergraduate Non-Science Majors***

William L. Romine, Missouri Valley College,  
 romine.william@gmail.com

Emily M. Walter, Western Michigan University

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**Strand 10: Curriculum, Evaluation, and Assessment**  
***Building Learning Progressions for Scientific Argumentation***

8:30am-10:00am, King's Garden 2

**President:**

J. Bryan Henderson

***Assessing Middle School Students' Abilities to Critique Scientific Arguments***

Amanda M. Knight, Boston College, knightam@bc.edu

Cecilia Brito Alves, Lawrence Hall of Science

Matthew A. Cannady, Lawrence Hall of Science

Katherine L. McNeill, Boston College

P. David Pearson, University of California, Berkeley

***Argumentation at the Start of School: Characterizing the Entry Points into a Learning Progression for Argumentation***

Amelia Wenk Gotwals, Michigan State University,  
gotwals@msu.edu

Hayat Hokayem, Texas Christian University

Tanya Wright, Michigan State University

***IRT Analysis of Items Probing a Unidimensional Learning Progression for Argumentation of Increasingly Complex Structure***

J. Bryan Henderson, Stanford University, jbryanh@stanford.edu

Jonathan Francis Osborne, Stanford University

Anna MacPherson, Stanford University

Evan Szu, Stanford University

Michelle Friend, Stanford University

Andrew Wild, Stanford University

***An Epistemology-Based Learning Progression for Scientific Argumentation Embedded in System of Practice***

Brian J. Reiser, Northwestern University

Leema K. Berland, University of Texas, Austin

Lisa Kenyon, Wright State University

Christina V. Schwarz, Michigan State University

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**Strand 10: Curriculum, Evaluation, and Assessment**  
***Teachers' Assessment Practices***

8:30am-10:00am, Heinz

**President:**

Bill Zoellick, Schoodic Education & Research Center Institute

***Emergence of Teacher Sub-communities and Focus on Science Subject Knowledge***

Bill Zoellick, Schoodic Education & Research Center Institute,  
bill@sercinstitute.org

***Portraits of Assessment: The Intended and Enacted Assessments in Middle School Science Classrooms***

Matthew Kloser, University of Notre Dame, mkloser@nd.edu

Hilda Borko, Stanford University

Jose Felipe Martinez, University of California, LA

Brian Stecher, RAND Corporation

Rebecca Luskin, University of California, LA

***Beginning Science Teachers' Views and Enactments of Formative Assessment in South Africa and the U.S.***

Melissa A. Jurkiewicz, University of Georgia, maj32381@uga.edu

Rene Toerien, University of Cape Town

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**Strand 13: History, Philosophy, and Sociology of Science**  
***NOS & K-12***

8:30am-10:00am, Commonwealth 2

**President:**

J. Steve Oliver, The University of Georgia

***Reorganizing a Curricular Unit about Energy around a Historical Narrative***

Shulamit Kapon, University of Haifa,

shulamit.kapon@edu.haifa.ac.il

Irit Aharon, University of Haifa

***Baby Steps: Elementary Teachers' First Attempts to Learn about and Teach the NOS***

Bridget K. Mulvey, Kent State University, bmulvey@kent.edu

Lucy J. Kulbago, Kent State University

Randy L. Bell, Oregon State University

Jennifer Chiu, University of Virginia

***Impact of a Large Scale Professional Development Project on Middle School Students' Views of NOS***

Yalcin Yalaki, Hacettepe University, yyalaki@hacettepe.edu.tr

Nihal Dogan, Abant Izzet Baysal University

Serhat Irez, Marmara University

Gultekin Cakmakci, Hacettepe University

Gaye Bala, Hacettepe University

Ferah Ozer, Abant Izzet Baysal University

Gulcan Gunsever, Abant Izzet Baysal University

***First Assessment of High School Students' Understandings about Scientific Inquiry in Chile, South America***

Claudia Vergara, University Alberto Hurtado,  
claudia.vergara12@gmail.com

Norman G. Lederman, Illinois Institute of Technology

Judith S. Lederman, Illinois Institute of Technology

Juan Jimenez, Illinois Institute of Technology

Hernan Cofre, Pontificia Universidad Católica de Valparaíso

**Strand 14: Environmental Education*****Symposium – Sociocultural Research in Environmental Education: Approaches, Methods, and Contexts***

8:30am-10:00am, Sterlings 2 &amp; 3

***Presenters:***

Erica N. Blatt, College of Staten Island, CUNY  
 Deborah J. Tippins, University of Georgia  
 Heather Rudolph, University of Georgia  
 Stacey Britton, University of Mississippi  
 Patricia Patrick, Texas Tech University  
 Olivia Aguilar, Denison University

**Concurrent Session #11****10:15am – 11:45am****Presidential Sponsored Session*****Supporting the Implementation of the Next Generation Science Standards through Research***

10:15am-11:45am, Commonwealth 2

***Presiders:***

Lynn Bryan, Purdue University  
 Sharon Lynch, George Washington University

***Presenters:***

Members of the NARST-NGSS Position Papers Writing Teams  
 Members of the Committee on Developing Assessment of Science Proficiency in K-12

**Strand 1: Science Learning, Understanding and Conceptual Change*****Related Paper Set – Learning Progressions that Connect Science Practices, Crosscutting Concepts, and Disciplinary Core Ideas***

10:15am-11:45am, King's Garden 2

***Presider:***

Charles W. Anderson, Michigan State University

***Learning trajectories of Principle-Oriented Level 3 and Fact-Oriented Level 3 Science Learners***

Hannah K. Miller, Michigan State University, hkm@msu.edu  
 Allison Freed, Michigan State University  
 Jenny M. Dauer, University of Nebraska  
 Jennifer Doherty, Michigan State University  
 Charles W. Anderson, Michigan State University

***Relationships between Students' Inquiry and Application Practices for Carbon-Transforming Processes***

Allison Freed, Michigan State University,  
 allisonlwebster@gmail.com  
 Jenny M. Dauer, University of Nebraska  
 Hannah K. Miller, Michigan State University  
 Charles W. Anderson, Michigan State University

***Connecting Macroscopic-scale and Large-scale Inquiry Practices***

Jenny M. Dauer, University of Nebraska, dauerjen@msu.edu  
 Allison Freed, Michigan State University  
 Charles W. Anderson, Michigan State University

***Students' Ideas about Sustainability for Agricultural Production Systems***

Elizabeth X. de los Santos, Michigan State University  
 Joshua M. Rosenberg, Michigan State University

**Strand 2: Science Learning: Contexts, Characteristics and Interactions*****Instructional Practices in Chemistry and Physics***

10:15am-11:45am, King's Garden 3

***Presider:***

Hanife Can Sen, Yuzuncu Yil University

***Investigating the Shifts in Thai Teachers' Views of Learning and Practices while Adopting ABI Approach***

Nattida Promyod, University of Iowa, nattida5@hotmail.com  
 Brian M. Hand, University of Iowa

***Promoting Students' Understanding in Electrochemistry through Case-based Instruction***

Aysegul Tarkin, Yuzuncu Yil University, aytarkin@gmail.com  
 Esen Uzuntiryaki-Kondakci, Middle East Technical University

***Characterizing the Effectiveness of Coherent Instructional Materials on Middle School Students' Understanding of Core Science Ideas***

Sung-Youn Choi, University of Michigan,  
 choi.sungyoung@gmail.com  
 Shawn Stevens, University of Michigan  
 Namsoo Shin, University of Michigan  
 Deborah C. Peek-Brown, University of Michigan

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

***The Effect of Different Instructional Approaches on  
Student Learning***

10:15am-11:45am, King's Garden 4

**Presenter:**

Jeffrey Nordine, Trinity University

***From Contrasting Cases to Contrasting Models: Supporting  
Generalization in Model Development***

Jonathan T. Shemwell, University of Maine,

jonathan.shemwell@maine.edu

Daniel K. Capps, University of Maine

Daniel Gibson, University of Maine

***Understanding the Teacher's Role in Orchestrating  
Technology Enhanced Inquiry Learning Environments***

Jennifer K. LeBlanc, Texas A&M University, leblanc16@tamu.edu

Baki Cavlazoglu, Texas A&M University

Cheryl Ann Peterson, Texas A&M University

Carol L. Stuessy, Texas A&M University

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

***Approaches to Chemistry Instruction***

10:15am-11:45am, Benedum

**Presenter:**

Marilyne Stains, University of Nebraska Lincoln

***College Chemistry Students' Use of Memorized Algorithms  
on the Particulate Nature of Matter***

James M. Nyachwaya, North Dakota State University,

james.nyachwaya@ndsu.edu

Gillian H Roehrig, University of Minnesota

***Computerized Lexical Analysis of Students' Written  
Interpretations of Chemical Representations***

Luanna B. Prevost, University of South Florida, prevost@usf.edu

Kevin Haudek, Michigan State University

Mark Urban-Lurain, Michigan State University

***Factors Contributing to Problem-Solving Performance in  
First-Semester Organic Chemistry***

Enrique Lopez, University of Colorado, Boulder,

enrique.lopez@colorado.edu

Richard J. Shavelson, Stanford University SK Partners, LLC

Kiruthiga Nandagopal, Stanford University

John Penn, West Virginia University

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

***Students' Understandings in Physics***

10:15am-11:45am, King's Garden 5

**Presenter:**

Muhsin Menekse, University of Pittsburgh

***Undergraduate Physics Student's Problem Solving Frame  
and Epistemological Beliefs***

Wendi Wampler, Linn Benton Community College,

wamplerw@linnbenton.edu

Lynn Bryan, Purdue University

***Changing Students' Approach to Learning Physics in  
Undergraduate Gateway Courses***

Calvin Kalman, Concordia University, Calvin.Kalman@concordia.ca

Marina Milner-Bolotin, University of British Columbia

Bruce M. Shore, McGill University, Canada

Gyoungho Lee, Seoul National University

Gul U. Coban, Dokuz Eylul University, Turkey

Xiang Huang, Marianopolis College, Canada

Ahmed Ibrahim, McGill University, Canada

Xihui Wang, McGill University

Mandana Sobhanzadeh, Mount Royal University

Wahidun Khanam, Concordia University, Canada

***Students Coming to Understand Ionizing Radiation - A  
Radiation Literacy Challenge***

Andy Johnson, Black Hills State University, andy.johnson@bhsu.edu

Rebecca Maidl, Black Hills State University

***College Students' Views and Use of Evidence in the  
Context of Conceptual Physics Problems***

N. Sanjay Rebello, Kansas State University, srebello@phys.ksu.edu

Carina M. Rebello, University of Missouri

Lloyd H. Barrow, University of Missouri

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

***Teaching and Learning in Biology***

10:15am-11:45am, Heinz

**Presenter:**

Hannah Sevian, University of Massachusetts

***A Model of Biology Experts' Mechanistic Explanations:  
Themes across Multiple Disciplines***

Caleb Trujillo, Purdue University, ctrujil@purdue.edu

Trevor Anderson, Purdue University

Nancy J. Pelaez, Purdue University

***Development of a Model for Current Use of Evolutionary Trees in Scientific Research***

Yi Kong, Purdue University, iamkongyi@gmail.com  
 Nancy J. Pelaez, Purdue University  
 Trevor Anderson, Purdue University

***An Exploration of Student Learning and Attitudes across Three Laboratory Platforms in a University Biology Course***

Amber J. Reece, University of Central Florida,  
 amber.reece@ucf.edu  
 Malcolm B. Butler, University of Central Florida  
 Kenneth Fedorka, University of Central Florida

***How Mastery and Learning Assessment Goals Significantly Increased Learning and Achievement in Introductory College Biology***

Obed Norman, Project STEM PEOPLE, onorman6@gmail.com

***Strand 6: Science Learning in Informal Contexts Designing Afterschool Programs: What Works and How do we Know?***

10:15am-11:45am, Rivers

***Presider:***

Alix R. Cotumaccio, American Museum of Natural History

***The Journey of a Science Teacher: Preparing Female Students in the Training Future Scientists after School Program***

Rona M. Robinson-Hill, University of Missouri- St. Louis,  
 rona.robinson-hill@slps.org

***Assessing Changes in Investigative Skills as an Impact of Informal Science Afterschool Programming***

Tirupalavanam G. Ganesh, Arizona State University,  
 tganesh@asu.edu  
 Terence J. G. Tracey, Arizona State University  
 Andrew Webber, Arizona State University

***Can Afterschool Programs Help Urban Elementary and Middle School Students learn STEM Concepts and Skills?***

Nancy Moreno, Baylor College of Medicine, nmoreno@bcm.edu  
 Barbara Tharp, Baylor College of Medicine  
 Gregory Vogt, Baylor College of Medicine  
 Alana Newell, Baylor College of Medicine  
 Michael Vu, Baylor College of Medicine

***One Activity at a Time: The Role of Instructional Materials in Afterschool Science***

Patrik Lundh, SRI International, patrik.lundh@sri.com  
 Ann House, SRI International  
 Carlin Llorente, SRI International  
 Cynthia M. D'Angelo, SRI International  
 Christopher J. Harris, SRI International  
 Tiffany Leones, SRI International

***Strand 7: Pre-service Science Teacher Education Symposium – Citizen Science in the Education of Teachers: Developing a Sense of Place, Agency and Mindfulness***

10:15am-11:45am, Sterlings 1

***Presenters:***

Lynda L. Jenkins, The Galloway School,  
 lynda.jenkins07@gmail.com  
 Stacey Britton, University of Mississippi  
 Elizabeth Pate, University of Texas  
 Deborah J. Tippins, The University of Georgia

***Strand 7: Pre-service Science Teacher Education Improving Preservice Science Teacher Preparation***

10:15am-11:45am, Brigade

***Presider:***

Elizabeth B. Lewis, University of Nebraska

***Training Pre-service Elementary Teachers to Effectively Teach Science to English Language Learners: The Impact on Student Learning***

Edward G. Lyon, Arizona State University, eglyon@asu.edu  
 Jerome M. Shaw, University of California, Santa Cruz  
 Preetha K. Menon, University of California, Santa Cruz  
 Trish L. Stoddart, University of California, Santa Cruz

***Risk Taking in Joint Spaces and its Impact on Preservice - Mentor Teacher Hierarchies***

Martha M. Canipe, University of Arizona,  
 mcanipe@email.arizona.edu  
 Kristin L. Gunckel, University of Arizona

***Examining Pre-Service Secondary Science Teachers' Lesson Planning for Whole-Class Discussions***

Danielle K. Ross, University of Pittsburgh, dkr13@pitt.edu  
 Jennifer L. Cartier, University of Pittsburgh

***Recruitment of Early STEM Majors into Possible Secondary Science Teaching Careers: The Role of Science Education Summer Internships***

Lisa A. Borgerding, Kent State University, ldonnell@kent.edu

**Strand 8: In-service Science Teacher Education**  
***Symposium – Research Experiences for Teachers: Proposed Relationships Between Elements of the Experience and Positive Outcomes***

10:15am-11:45am, Sterlings 2 & 3

**President:**

Bryan M. Rebar, University of Oregon

**Presenters:**

Lisa C. Benson, Clemson University  
 Sanlyn Buxner, University Of Arizona  
 Jeffrey S. Carver, West Virginia University  
 Allan Feldman, University of South Florida  
 John Keller, California Polytechnic State University  
 Renee S. Schwartz, Western Michigan University  
 Sherry A. Southerland, Florida State University

**Strand 10: Curriculum, Evaluation, and Assessment**  
***Defining and Assessing Scientific Literacy***

10:15am-11:45am, Smithfield

**President:**

Robert H. Evans, University of Copenhagen

***A Conceptual Framework for Environmental Science Literacy: The Case of Qatar***

Rola Khishfe, American University of Beirut, rk19@aub.edu.lb

***Budding Science and Literacy: A Classroom Video Study of the Challenges and Support in an Integrated Inquiry and Literacy Teaching Model***

Marianne Odegaard, University of Oslo,  
 marianne.odegaard@naturfagsenteret.no  
 Berit S. Haug, Norwegian Centre for Science Education  
 Sonja M. Mork, University of Oslo  
 Gard Ove Sorvik, University of Oslo

***Advances in Socioscientific Issues: Theory, Research and Practice***

Dana L. Zeidler, University of South Florida, Zeidler@usf.edu

***Exploring Measures of Fidelity of Implementation and Student Learning in 9th Grade Physics***

Deborah L. Hanuscin, University of Missouri,  
 hanuscind@missouri.edu  
 Christi Bergin, University of Missouri  
 Somnath Sinha, University of Missouri  
 Nilay Muslu, University of Missouri  
 Jaimie Foulk, University of Missouri

**Strand 11: Cultural, Social, and Gender Issues**  
***Impact of Gender and Equity on Middle School Students***  
 10:15am-11:45am, King's Garden 1

***How Instruction, Gender, and Race Affect Students' Spatial-Scientific Learning***

Jennifer A. Wilhelm, University of Kentucky,  
 jennifer.wilhelm@uky.edu  
 Michael Toland, University of Kentucky  
 Christa Jackson, University of Kentucky  
 Merryn Cole, University of Kentucky  
 Ronald Wilhelm, University of Kentucky

***"But the Science We Do Here Matters": Youth Sharing Visions of Civic Engagement with Science***

Daniel Birmingham, Loyola University Chicago,  
 dbirmingham@luc.edu  
 Angela Calabrese-Barton, Michigan State University

***"I Can Do Science!": Wrestling with Stereotypes and Science Identity***

Myunghwan Shin, Michigan State University,  
 shinmyu4@msu.edu  
 Angela Calabrese-Barton, Michigan State University

***Playing with Fire? The Hidden Curriculum in Genetics and its Impact on Adolescent Conceptions of Race***

Brian M. Donovan, Stanford University, briand79@stanford.edu

**Strand 11: Cultural, Social, and Gender Issues**  
***Language and Science Engagement***

10:15am-11:45am, Birmingham

**President:**

Felicia Moore Mensah, Columbia University

***Exploring the Relationship between Gender and Constructed-Response Explanation Performance***

Meghan R. Federer, The Ohio State University,  
 federer.21@osu.edu  
 Ross H. Nehm, Stony Brook University  
 Dennis K. Pearl, The Ohio State University

***Cross-Case Analyses of Four Inclusive STEM High Schools: School Mission and Student Supports***

Sharon J. Lynch, The George Washington University,  
 slynch@gwu.edu  
 Kathleen M. Ross, The George Washington University



***Do Linguistic Features of Science Test Items Prevent English Language Learners from Demonstrating Science Knowledge?***

Tracy E. Noble, TERC  
Rachel Kachchaf, TERC  
Ann S. Rosebery, TERC  
Beth Warren, TERC  
Catherine O'Connor, Boston University  
Yang Wang, Wisconsin Center for Education Research

***Finding Personally and Culturally Mediated Science: Making Locally Generated Knowledge Global***

Bhaskar Upadhyay, University of Minnesota, bhaskar@umn.edu  
Kara Coffino, University of Minnesota

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**Strand 12: Educational Technology**  
***Cloud Applications in Science Education***

10:15am-11:45am, Fort Pitt

**President:**

Tamara Holmlund Nelson, Washington State University

***Facilitating Outdoor, Authentic, and Interactive Learning in an Environmental Education Program via Cloud Application***

Miri Barak, Technion, Israel Institute of Technology,  
bmiriam@technion.ac.il

***Harnessing Cloud applications for Promoting Progressive Education Principles in Science and Technology***

Miri Barak, Technion, Israel Institute of Technology,  
bmiriam@technion.ac.il  
Ariella A. Levenberg, Technion

***A Phenomenographical Study of Student Experience in CyberCharter School Virtual Labs***

Victoria R. Raish, Penn State University, victoria@psu.edu  
Alison A. Carr-Chellman, Penn State University

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**Strand 12: Educational Technology**  
***Modeling and Models in Science Education***

10:15am-11:45am, Duquesne

**President:**

Noemi Waight, University at Buffalo

***High School Student Accomplishment of Cellular Biology Content Using 3-D Computer Based Modules***

J. Steve Oliver, University of Georgia, soliver@uga.edu  
Georgia W. Hodges, University of Georgia  
Kyung-A Kwon, University of Georgia  
Sara P. Raven, Kent State University  
Wendell F. Rogers, Jr., University of Georgia  
Melissa A. Jurkiewicz, University of Georgia  
Allan S. Cohen, University of Georgia  
YoonSun Jang, University of Georgia  
James N. Moore, University of Georgia  
Thomas P. Robertson, University of Georgia

***Mapping Students' Understanding of Big Ideas of High School Chemistry Concepts in the Context of Computer Modeling-based Teaching and Learning***

Noemi Waight, University at Buffalo, nwright@buffalo.edu  
Xiufeng Liu, State University of New York at Buffalo  
Melinda Whitford, State University of New York at Buffalo

***Technology Enhanced, Modeling-oriented Assessment (TMOA) in Science Education: A Conceptual Framework***

Young Ae Kim, University of Georgia, joyyakim@uga.edu  
Bahadir Namdar, University of Georgia  
Ji Shen, University of Miami

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**Lunch—On Your Own**  
**12:00pm – 1:00pm**

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## Concurrent Session #12

### 1:00pm – 2:30pm

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#### Presidential and Engineering Education RIG Co-Sponsored Session

##### *The Engineering Elephant in the Science Classroom: Awakening Dialogues between Science and Engineering Educators*

1:00pm-2:30pm, Brigade

##### **Presiders:**

Lynn Bryan, Purdue University  
Senay Purzer, Purdue University

##### **Presenters:**

Dale Baker, Arizona State University  
Erin Peters-Burton, George Mason University  
David Crismond, City University New York  
Richard Duschl, National Science Foundation  
Tamara Moore, Purdue University  
Chris Schnittka, Auburn University

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

##### *Exploring Scientific Reasoning*

1:00pm-2:30pm, Commonwealth 2

##### **Presider:**

Abdi M. Warfa, Metropolitan State University

##### *Obstacles and Supports for Effective Reasoning with Evidence in Authentic Science Investigations*

Thanh K. Le, University of Maine, thanh.le@maine.edu  
Jonathan Shemwell, University of Maine  
Daniel K. Capps, University of Maine  
Sarah Kim, Gulf of Maine Research Institute  
Christine Voyer, Gulf of Maine Research Institute

##### *Using Multiple Representations to Learn the Human Breathing Mechanism: Students' Explanations*

Mihye Won, Curtin University, mihye.won@curtin.edu.au  
Heojeong Yoon, Global Institute for STS Education  
David F. Treagust, Curtin University

##### *Teaching the Control of Variables Strategy: A Research-synthesis*

Martin Schwichow, Leibniz Institute, schwichow@ipn.uni-kiel.de  
Hendrik Haertig, IPN- Leibniz Institute  
Tim Hoeffler, IPN - Leibniz Institute

##### *Knowledge Building in Undergraduate Molecular Genetics: Exploring Student Knowledge Integration and Mechanistic Reasoning*

Katelyn Southard, University of Arizona,  
ksouthard@email.arizona.edu  
Tyler Wince, University of Arizona  
Molly Bolger, University of Arizona

##### *Visual Cueing and Feedback Influencing Undergraduate Students' Reasoning Resources on Conceptual Physics Problems*

Jeffrey W. Murray, Kansas State University, jwmurray@ksu.edu  
Amy Rouinfar, Kansas State University  
Elise Agra, Kansas State University  
Adam M. Larson, University of Findlay  
Lester C. Loschky, Kansas State University  
N. Sanjay Rebello, Kansas State University

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

##### *Argumentation, Discourse, and Reading as Inquiry*

1:00pm-2:30pm, Rivers

##### **Presider:**

Tamara L. Clegg, University of Maryland

##### *Student Navigation of Novel Science Practices and Discourse*

Monica C. Mobley, The University of Tennessee,  
mclutch@gmail.com  
Mehmet Aydeniz, The University of Tennessee

##### *Scientific Argumentation for All? The Relationship between Teacher Beliefs about Argumentation and Student Socioeconomic Status*

Rebecca Katsh-Singer, Boston College, katsh@bc.edu  
Katherine L. Mcneill, Boston College  
Suzanna Loper, University of California - Berkeley

##### *ELL Student Engagement in Argumentation Practice—Science Agency and Identity*

Suna Ryu, UC Berkeley, sunaryu@ucla.edu

##### *Intellectual Emancipation through Reading as Inquiry in Elementary Science*

Lorraine Otoide, York University, LOtoide@edu.yorku.ca

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

### *Nature of Science and Attitudes toward Science and Scientists*

1:00pm-2:30pm, King's Garden 3

#### **Presenter:**

Sarah Michaels, Clark University

### *Third Grade Latino Students' Views of the Nature of Science*

Leon Walls, University of Vermont, lwalls@uvm.edu

### *Assessment of Precollege Qatari Students' Attitudes toward Science*

Ryan Summers, University of Illinois at Urbana-Champaign, summers4@illinois.edu

Fouad Abd-El-Khalick, University of Illinois at Urbana-Champaign

Ziad Said, College of the North Atlantic, Doha, Qatar

Michael Culbertson, University of Illinois at Urbana-Champaign

### *Students' Uncertainty during Exoplanet Detection Tasks*

Zoe E. Buck, University of California Santa Cruz, zbuck@ucsc.edu

Hee-Sun Lee, University of California, Santa Cruz

Joanna Flores, University of California, Santa Cruz

### *Probing the Structure of Students' Attitudes towards Science: a Hong Kong Study at Senior Secondary Level*

May May Hung Cheng, The Hong Kong Institute of Education, maycheng@ied.edu.hk

Zhi Hong Wan, The Hong Kong Institute of Education

### *Exploring Aboriginal Students' Perceptions of Science and Scientists Using the Draw-a-Scientist Test*

Wanja Gitari, University of Toronto, wanja.gitari@utoronto.ca

Isha Decoito, York University

Stefano DiTommaso, University of Toronto

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

### *Scientific Discourse and Dialogues*

1:00pm-2:30pm, Heinz

#### **Presenter:**

Katrien Van Der Hoeven Kraft, Mesa Community College

### *Exploring the Impact of Reality Pedagogy: Understanding its Implementation on Urban Immigrant Students*

Tanzina Taher, Columbia University, tt2137@columbia.edu

Felicia Moore Mensah, Columbia University

Christopher Emdin, Columbia University

### *Between the Lines: The Role of Curriculum Materials and Teacher Language in Communicating Ideas about Scientific Modeling*

Carrie-Anne Sherwood, University of Michigan, casher@umich.edu

Carrie Allen Bemis, University of Colorado - Boulder

Savitha Moorthy, SRI International

Cynthia D'Angelo, SRI International

Tina Stanford, SRI International

Christopher J. Harris, SRI International

### *Are African Children's Interest and Achievement in Primary Science Influenced by Dynamics of Classroom Interaction?*

Rasheed Sanni, Lagos State University, Nigeria, riosan1@yahoo.co.uk

Peter A. Okebukola, Lagos State University

Kennedy O. Akudo, Lagos State University

Yinka Orulebaja, Lagos State University

Lateef Shekoni, Lagos State University

Kemi Akinsanya, Lagos State University

Olatunde Lawal Owolabi, Lagos State University

Ayodele Ogunleye, University of Lagos

Sunday O. Banjoko, Lagos State University

Francis Onoriode, Lagos State University

### *Assessing the Quality of Classroom Discourse and Interaction in Science Teaching*

Eric Berson, Stanford University, eberso@berkeley.edu

Jonathan Francis Osborne, Stanford University

Hilda Borko, Stanford University

KC Busch, Stanford University

Edit Khachatryan, Stanford University

Susan Million, Stanford University

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

### *Investigating Students' Understandings in College Science Courses*

1:00pm-2:30pm, Benedum

#### **Presenter:**

Annette Kankelborg, Montana Tech

### *Assessing College Students' Interdisciplinary Understanding in Sciences*

Ji Shen, University of Miami, ji.shen1221@gmail.com

Ou Lydia Liu, Educational Testing Service

Shannon Sung, University of Georgia

***Student use of Feedback from Written Formative Assessment***

Shannon M. Burcks, University of Missouri,  
burckssm@missouri.edu

Marcelle Siegel, University of Missouri  
Jayleenkumar Patel, University of Missouri  
Charlotte Phillips, University of Missouri  
David Emerich, University of Missouri  
Phuong Dung Nguyen, University of Missouri

***Disciplinary Foundations of Solving Interdisciplinary Scientific Problems***

Dongmei Zhang, The University of Georgia, dongmei@uga.edu  
Ji Shen, University of Miami  
Barbara A. Crawford, The University of Georgia

***The Influence of Preservice Chemistry Teachers' Particle Theory Understandings on their Understanding of Solution Chemistry***

Emine Adadan, Bogazici University, Turkey,  
emineadadan@hotmail.com

***Strand 8: In-service Science Teacher Education Conversations about Teacher Learning***

1:00pm-2:30pm, Duquesne

***President:***

Tirupalavanam G. Ganesh, Arizona State University

***Learning to Teach Writing in Science through a Collaborative Study Group***

Lori A. Fulton, University of Hawaii at Manoa, fultonl@hawaii.edu

***Conversations about Learning – Unpacking What Concept Maps Tell Educators***

Chad M. Huelsman, University of Cincinnati,  
huelsmcm@hotmail.com

Lindsay Owens, University of Cincinnati  
Helen M. Meyer, University of Cincinnati

***Learning and Motivation: Successful Professional Development Program for Palestinian In-Service Elementary Science Teachers***

Iyad M. Dkeidek, Al-Quds University, idkeidek@edu.alquds.edu  
Ziyad M. M. Qabaja, Al-Quds University

***Teachers' Perceptions of Working Conditions and Workplace Learning in the Context of China's Educational Reform***

Chunlei Zhang, East China Normal University,  
lukezhg@gmail.com  
Enshan Liu, Beijing Normal University

***Behind the Scenes of a Professional Development Program: Teachers' Experiences in Engineering Research***

Nancy P. Morabito, St. John's University, morabitn@stjohns.edu

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

1:00pm-2:30pm, King's Garden 2

***President:***

Heidi Wiebke, Indiana University

***Exploring the Relationship between Science Teaching Self-Efficacy and Reformed Teaching Practices of Inservice Elementary Teachers***

Corinne H. Lardy, San Jose State University,  
corinne\_lardy@yahoo.com

***Statewide Elementary Science Institute to Support Reforms-based Science Instruction: Results from Three Years of Implementation***

Randy L. Bell, Oregon State University,  
randy.bell@oregonstate.edu

Jennifer L. Maeng, University of Virginia  
Tyler L. St. Clair, Oregon State University

***Intervention's Effect on Teacher Change in Elementary Science Teaching with English Learners: Year 1 Results***

Shameka K. Hollimon, New York University, sh137@nyu.edu  
Okhee Lee, New York University  
Feng Jiang, New York University  
Alison Haas, New York University

***Changes in Pedagogical Content Knowledge Brought About by Teacher Professional Development in Elementary Science***

Joan I. Heller, Heller Research Associates,  
jheller@edservices.org

Kirsten Daehler, WestEd  
Luke W. Miratrix, Harvard University

***A Hybrid Learning Mathematics and Science Partnership, Teacher Academy in the Natural Sciences (TANS): Blended Instructional Model for Effective Professional Development***

Renee M. Clary, Mississippi State University,  
rclary@geosci.msstate.edu  
James Dunne, Mississippi State University  
Svein Saebo, Mississippi State University  
Anastasia Elder, Mississippi State University  
Deborah Tucker, Independent Science Education Consultant,  
Napa, CA  
Debbie Beard, Mississippi State University  
Charles Wax, Mississippi State University  
Joshua Winter, Mississippi State University

**Strand 8: In-service Science Teacher Education*****Impact of Science Professional Development on Student Learning: Four Studies Awaken Dialogue***

1:00pm-2:30pm, Sterlings 2 &amp; 3

**President:**

Kathleen Roth, BSCS

**Discussant:**

Suzanne Wilson, University of Connecticut

***Impact of Videocase-based Lesson Analysis Professional Development on Teacher and Student Science Learning***

Christopher Wilson, BSCS, cwilson@bscs.org

Joseph Taylor, BSCS

Kathleen Roth, BSCS

***Creating Effective, Sustainable Inquiry-Based Instruction in Middle School Science Classrooms***

Jeff C. Marshall, Clemson University, marsha9@clemson.edu

***Learning Science as Inquiry with the Urban Advantage: Documenting the Effects of Professional Development on Teachers and Their Students***

Suzanne Wilson, University of Connecticut,

Suzanne.wilson@uconn.edu

James Short, American Museum of Natural History

Jamie N. Mikeska, ETS

Suzanne Elgendy, American Museum of Natural History

***An Experiment Comparing Face-to-Face and Online Professional Development Effects on Teacher Learning, Practice, and Student Learning***

Beth W. Kubitskey, Eastern Michigan University,

mkubitske1@emich.edu

Barry Fishman, University of Michigan

G. Park, University of Michigan

Heather J. Johnson, Vanderbilt University

Richard Vath, University of Michigan

Spyros Konstantopoulos, Michigan State University

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

1:00pm-2:30pm, Sterlings 1

***Cedar STEM High School: Connecting a Rigorous Early-College Curriculum with Mastery and Experiential Learning***

Edmund M. Han, The George Washington University,

edmundhan@gmail.com

Sharon J. Lynch, The George Washington University

Ann House, SRI International

***Evaluating the Impact of a School Improvement Program in Students' Science Learning***

Melina Furman, Universidad de San Andres, Argentina,

melifurman@gmail.com

Maria E. Podesta, Universidad de San Andres, Argentina

***'Sustainability Thinking' in the S-T-E-S-E-P Context: From***

Uri Zoller, Haifa University - Oranim, uriz@research.haifa.ac.il

David Ben-Chaim

Naji Kortam

Tami Levy Nahum

***Putting Physics First: Four Case Studies of High School Science Department and Course Sequence Reorganization***

Douglas B. Larkin, Montclair State University,

larkind@mail.montclair.edu

***Measurement Uncertainties: What We Should Teach Our Students***

Julia L. Hellwig, ZfsL Recklinghausen, julia.hellwig@me.com

Burkhard Priemer, Humboldt University

**Strand 11: Cultural, Social, and Gender Issues*****Identity Development and Authentic Science Experiences***

1:00pm-2:30pm, King's Garden 4

***Actions Can Speak Louder Than Beliefs: Coherence in Perceived Recognition between Teacher and Student***

Cheryl A.P. Cass, North Carolina State University,

cheryl\_cass@ncsu.edu

Zahra Hazari, Clemson University

Carrie E. Beattie

Robynne M. Lock, Clemson University

***The Impact of a Research Apprenticeship Program Developed for Diverse High School Students***

Stephen R. Burgin, Old Dominion University, sburgin@odu.edu

William J. McConnell, Old Dominion University

Alonzo M. Flowers, Old Dominion University

Sharon M. Blythe, Old Dominion University

Tania Moran, Old Dominion University

***Exploring Science Identity Development at the Intersection of Race and Gender***

Amy DeFelice, CUNY Graduate Center,

amyferguson3@hotmail.com

Jennifer Adams, Booklyn College- CUNY

Alexia Cox, Brooklyn Academy of Science and the Environment

***Effects of an Authentic Science Experience on the Science Identities of Marginalized High School Students***

Angela Chapman, University of Texas - Pan American,  
chapmanam@utpa.edu

Allan Feldman, University of South Florida

Fayez Alshehri, University of South Florida

Dilek Ozalp, University of South Florida

Vanessa Vernaza-Hernandez, University of South Florida

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

***Symposium – Professional Development for Access and Equity in STEM Education: Changing Teacher and Leader Mindsets***

1:00pm-2:30pm, Smithfield

***Presider:***

Liesl Chatman, Science Museum of Minnesota

***Discussants:***

Kirsten Valentine Cadieux, University of Minnesota

Rachelle A. Haroldson, University of Minnesota

Vivian P. Johnson, Hamline University

Amy Grack Nelson, Science Museum of Minnesota

Nils C. Halker II, Science Museum of Minnesota

Wren Walker Robbins, Consultant

Liesl Chatman, Science Museum of Minnesota

Erin J. Straus, Science Museum of Minnesota

Travis O. Sandland, Science Museum of Minnesota

Bhaskar Upadhyay, University of Minnesota

**Strand 12: Educational Technology**

***Cognitive and Metacognitive Support Tools***

1:00pm-2:30pm, King's Garden 1

***The Impact of Using Computers as Cognitive Tools on Grade 10 Lebanese Students' Attitudes and Conceptual Understanding in Physics***

Sahar K. Alameh, American University of Beirut,  
sahar.alameh@gmail.com

Saouma B. Boujaoude, American University of Beirut

***iPad Self-monitoring Supports and Science Inquiry Methods for Students with Moderate Intellectual Disability***

Bridget T. Miller, University of South Carolina,  
btmiller@mailbox.sc.edu

Steven C. Smith, Purdue University

**Strand 12: Educational Technology**

***Mobile Applications in Science Education***

1:00pm-2:30pm, Birmingham

***Presider:***

Barbara Means, SRI International

***How Can a Mobile Application Change a Teacher's Practices to Support Students' Scientific Explanations?***

Ibrahim Delen, Michigan State University,  
delenibrahim@gmail.com

Wan-Tzu Lo, University of Michigan, Ann Arbor

Alex Kuhn, University of Michigan, Ann Arbor

Jennifer Duck, The Learning Partnership

Steven Mcgee, Northwestern University

Chris Quintana, University of Michigan, Ann Arbor

***Continuing to Flow: Student Experience during a Scaled-Up INPLACE Mobile Game***

Denise M. Bressler, Lehigh University, dmb309@lehigh.edu

Alec M. Bodzin, Lehigh University

***Complementary Affordances of Virtual Environments and Mobile Devices to Support Ecosystem Science Learning***

Shari J. Metcalf, Harvard University, shari\_metcalf@harvard.edu

Amy M. Kamarainen, New York Hall of Science

Tina Grotzer, Harvard University

Chris Dede, Harvard University

***Designing Mobile Augmented Reality and Online Discussion Activities to Scaffold Students' Socioscientific Reasoning***

Hsin-Yi Chang, National Kaohsiung Normal University,  
hsinyichang@nknuc.nknu.edu.tw

Ying-Shao Hsu, National Taiwan Normal University

Hsin-Kai Wu, National Taiwan Normal University

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

***Socioscientific Issues***

1:00pm-2:30pm, King's Garden 5

***Breadth and Depth of Socioscientific Reasoning: A New Assessment Strategy***

Nurcan Cansiz, Ataturk University, nurcansiz7911@gmail.com

Ozgul Yilmaz-Tuzun, Middle East Technical University

Troy Sadler, University of Missouri

***Peace, War and Science Education: Preservice Science Teachers' Belief System about a Possible Integration***

Ahmet Kilinc, Abant İzzet Baysal University,  
ahmet\_tr@yahoo.com  
Dundar Yener, Abant İzzet Baysal University  
Fatih Aydın, Abant İzzet Baysal University  
Mehmet Bahar, Abant İzzet Baysal University

***Socioscientific Issues as a Context for Promoting Middle School Students' Understanding of Nature of Science***

Yoonsook Chung, Ewha Womans University,  
venuself@naver.com  
Sung-Won Kim, Ewha Womans University

***Embracing Controversial Nature of NOS: Design Based Research on Developmental NOS Program***

Hyun Ok Lee, Ewha Womans University, Republic of Korea,  
philian@empas.com  
Kyunghee Choi, Ewha Womans College

**Strand 15: Policy*****Contextual Implications for Science Education Policy***

1:00pm-2:30pm, Fort Pitt

***Presenter:***

Sarah J. Carrier, North Carolina State University

***Policy, Pressure, and Administrative Decision Making in Elementary Science Education***

Cheryl O'Connor, George Mason University, coconn12@gmu.edu  
Donna R. Sterling, George Mason University  
David E. Long, George Mason University

***Time Allocation for Science in Elementary Classrooms***

Andrew J. Keck, George Mason University,  
andrew.j.keck@gmail.com  
Kristofer Pachla, George Mason University  
David E. Long, George Mason University

***Earth Science Curricular Reform in Secondary Education: A Systems-Based Approach***

Catherine Hantz, Stony Brook University, cpohlot@gmail.com  
Angela M. Kelly, Stony Brook University

***The Role of Motivation, Encouragement and Physics Education in Secondary School Students' Physics Aspirations***

Michael J. Reiss, University of London, m.reiss@ioe.ac.uk  
Tamjid Mujtaba, University of London

**Concurrent Session #13**

2:45pm – 4:15pm

**Research Committee Sponsored Session*****Symposium – Learning as a Community: Maximizing the Impact of Research Syntheses in Science Education***

2:45pm-4:15pm, Heinz

***Presenter:***

Joseph Taylor, BSCS, jtaylor@bscs.org

***Discussants:***

Christopher Wilson, BSCS

***Presenters:***

James Pellegrino, University of Illinois at Chicago  
Robert Slavin, Johns Hopkins University  
Daphne Minner, The Arnold Arboretum of Harvard University  
Alina Martinez, Abt Associates  
Erin Furtak, University of Colorado, Boulder  
M. Suzanne Donovan, SERP Institute  
Molly Stuhlsatz, BSCS

**Strand 1: Science Learning, Understanding and Conceptual Change*****Disciplinary Perspectives on Learning and Assessment***

2:45pm-4:15pm, Commonwealth 2

***Presenter:***

Andy Johnson, Black Hills State University

***Beyond a Misconceptions-Based Approach to Curriculum and Learning Progressions: A Case of High School Physics***

Alicia C. Alonzo, Michigan State University, alonzo@msu.edu  
Alexander Robinson, Thornapple Kellogg High School  
May Lee, Michigan State University

***The Growth of Evolutionary Thought: A Cross-Sectional Study of Elementary to College Students' Evolutionary Reasoning***

Minsu Ha, Stony Brook University (SUNY),  
minsu.ha@stonybrook.edu  
Ross H. Nehm, Stony Brook University (SUNY)

***Investigating the Evolution of Students' Conceptions about the Scientific Method***

Ozcan Gulacar, Texas State University-San Marcos,  
og14@txstate.edu  
Charles Bowman, Drexel University  
Maria Tomasso, Texas State University-San Marcos  
Alpaslan Sahin, Texas A&M University

***The Situated Nature of Evolutionary Understanding: Implications for the Design of Learning Progressions in Biology***

Xin Wei, Beijing Normal University, lakewe@gmail.com  
Minsu Ha, Stony Brook University (SUNY)  
Ross H. Nehm, Stony Brook University (SUNY)

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

***Exploring Contexts and Content Influence on Teaching and Learning Argumentation***

2:45pm-4:15pm, Sterlings 2 & 3

***The Role of Discursive Contexts in Argumentation***

Maria Pilar Jimenez-Aleixandre, Universidade De Santiago De Compostela, marilarj.aleixandre@usc.es  
Blanca Puig, Universidade de Santiago de Compostela  
Beatriz Bravo, Universidad de Granada  
Beatriz Crujeiras-Pérez, University of Santiago de Compostela

***How Content Knowledge and Past Experiences can influence an Episode of Argumentation***

Jonathon Grooms, Florida State University, jgrooms@fsu.edu  
Patrick J. Enderle, Florida State University  
Victor D. Sampson, Florida State University

***Organic Chemistry: From Memorisation to Argumentation in Educational Contexts***

Aybuke Pabuccu, Abant Izzet Baysal University, aybuke@ibu.edu.tr  
Sibel Erduran, University of Limerick, Ireland

***Transferring Knowledge about Socio-scientific Argumentation to Teaching Practice***

Maria Evagorou, University of Nicosia

***The Importance of Context in Supporting College Freshmen to Argue About SSI***

Barbara Barnhart, University of Pittsburgh at Greensburg  
Michael Ford, University of Pittsburgh

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

***Engineering and Science Learning***

2:45pm-4:15pm, King's Garden 2

***Presider:***

Robert H. Evans, University of Copenhagen

***Elementary Science Learning through Engineering Design: Effects Explored Using HLM***

William S. Carlsen, Penn State University, wcarlsen@psu.edu  
Matthew Johnson, Penn State University  
Christine M. Cunningham, Museum of Science, Boston  
Cathy Lachapelle, Museum of Science

***Middle School Students' Conceptions of NOE (Nature of Engineering)***

Anita M. Martin, University of Illinois, abmartin@illinois.edu  
Maya Israel, University of Illinois at Urbana-Champaign  
Fouad Abd-El-Khalick, University of Illinois at Urbana-Champaign

***The Impact of Instructional Materials on Dialogue Patterns and Learning in Collaborative Dyads***

Muhsin Menekse, University of Pittsburgh, muhsin@pitt.edu  
Micheline T. H. Chi, Arizona State University

***Exploring Cognitive Processes in Solving 3D Rotation Problems and the Relation to Science Concept Learning***

Yi-Chun Chen, National Taiwan Normal University, 898450023@ntnu.edu.tw  
Fang-Ying Yang, National Taiwan Normal University

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

***Models of Authentic Scientific Inquiry***

2:45pm-4:15pm, King's Garden 3

***Presider:***

Lynn D. Dierking, Oregon State University

***Scientists' Contribution to Students' Science Proficiencies via Online Mentoring***

Gokhan Ozturk, Texas A&M University, gozturk@tamu.edu

***The Discourse of Design in Long Term Investigations in Inquiry Based Middle School Classrooms***

Patricia Bills, Northern Kentucky University, billsp1@nku.edu



***Multilevel Mediation Modeling of a New Inquiry Based Approach to Teaching Science***

Mack Shelley, Iowa State University, mshelley@iastate.edu  
 Luke Fostvedt, Iowa State University  
 Marcia Laugerman, University of Iowa  
 Brian M. Hand, University of Iowa  
 William Therrien, University of Iowa

***Thirty-two Lessons: Snapshots of Classroom Complexity and Student Success in Orchestrations of Authentic Scientific Learning***

Carol L. Stuessy, Texas A&M University, c-stuessy@tamu.edu  
 Cheryl Ann Peterson, Texas A&M University  
 Jennifer K. LeBlanc, Texas A&M University

***Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies Learning Progressions for Teachers or Students in Middle/Secondary Grades***

2:45pm-4:15pm, Benedum

***Presider:***

Irene U. Osioma, California State University

***Testing PCK Learning Progressions with Teacher Leaders***

Patricia J. Friedrichsen, University of Missouri-Columbia, friedrichsenp@missouri.edu  
 Patrick L. Brown, Fort Zumwalt School District  
 Andrew B. West, Western Kentucky University  
 Deanna Lankford, University Of Missouri - Columbia

***Describing a Performance Trajectory for Model Based Teaching in Middle and Secondary Science Classrooms***

Christopher A Bogiages, University of South Carolina, Knowles Science Teaching Foundation, cbogiages@gmail.com  
 Christine R. Lotter, University of South Carolina

***Using Learning Progressions to Enhance Lebanese Students' Understanding of Complex Genetic Concepts***

Enja Osman, Lebanese University, ptc@aub.edu.lb  
 Saouma B. Boujaoude, American University of Beirut

***Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies Teaching Science through its Incorporation with Other Fields***

2:45pm-4:15pm, King's Garden 5

***Presider:***

J. Steve Oliver, The University of Georgia

***"I teach Science not Literacy": Developing Teachers' Pedagogical Design Capacity for Literacy in Secondary Science***

Kirsten K. N. Mawyer, University of Hawaii, kirkamaile@yahoo.com

***The Effects of Science-Arts Integration on Developing Scientific Imagination of Korean Middle School Students***

Jiyeong Mun, Ewha Womans University, jiyeong86@gmail.com  
 Sung-Won Kim, Ewha Womans University

***Analysing the Impact of a Comedy/Drama Enrichment Program to Engage Students with School Science***

Bernard J. Carr, University of Western Australia, 19013785@student.uwa.edu.au  
 Grady J. Venville, University of Western Australia  
 Marjan Zadnik, Curtin University  
 David G. Blair, University of Western Australia

***The Influence of Image Designs on Reading Comprehension and Perception of Science Concepts***

Yun-Ping Ge, National Changhua University, yunpingge@yahoo.com.tw  
 Hsiu-Ting Yang, National Changhua University, Taiwan  
 Kuo-Hua Wang, National Changhua University, Taiwan  
 Huey-Por Chang, National Changhua University, Taiwan

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

***Faculty Perspectives on College Science Teaching***

2:45pm-4:15pm, Fort Pitt

***Presider:***

Adam Kirn, Clemson University

***Faculty Views of the Relationship between Discipline-Based Educational Research and College Science Instruction***

Marilyne Stains, University of Nebraska-Lincoln, mstains2@unl.edu  
 Sue Ellen DeChenne, University of Nebraska-Lincoln

***Investigating the Specialized Knowledge that Faculty Draw Upon While Using Mathematical Representations to Teach Science***

Stephen B. Witzig, University of Massachusetts Dartmouth,  
switzig@umassd.edu

Kristen A. Degnan, University of Massachusetts Dartmouth  
Margaret M. French, University of Massachusetts Dartmouth  
Yenny F. Otálora, University of Massachusetts Dartmouth  
Heather L. Trahan-Martins, University of Massachusetts  
Dartmouth

***Defining the Roles of Graduate Student Mentors and Faculty Advisors in Undergraduate Research Programs***

Megan F. Campanile, Illinois Institute of Technology,  
mfaurot@hawk.iit.edu  
Norman G. Lederman, Illinois Institute of Technology  
Elana R. Jacobs, Illinois Institute of Technology  
Eric M. Brey, Illinois Institute of Technology

***Connecting Faculty Conceptions of Teaching, Instructional Practices, and Student Learning Outcomes: A Case Study***

Stanley M. Lo, Northwestern University,  
stanley-lo@northwestern.edu  
Su Swarat, Northwestern University  
Denise Drane, Northwestern University  
Greg Light, Northwestern University

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***Strand 6: Science Learning in Informal Contexts  
Developing Identities through Experiences in Informal  
Science Settings***

2:45pm-4:15pm, King's Garden 1

***Presider:***

Camellia Sanford, Rockman et al

***Teaching Outside the Box: Science Hobbyists' Role in Science Education***

M. Gail Jones, NC State University, Gail\_Jones@ncsu.edu  
Thomas Andre, Iowa State University  
Gina Childers, North Carolina State University  
Elysa N. Corin, North Carolina State University  
Vanessa Stevens, North Carolina State University

***Engaging Underrepresented Undergraduates in a Culture of Research through a Natural History Museum Internship***

James F. Kisiel, California State University, Long Beach, j.kisiel@csulb.edu

***Examining the Role of Learning Conversations on Students' Identity Development as a Learner of Science during a Girl Scout Field Trip***

Kelly Riedinger, University of North Carolina Wilmington,  
riedingerk@uncw.edu  
Amy R. Taylor, University of North Carolina Wilmington

***A New Theoretical Framework for Researching Environmental Identity***

Amanda Jaksha, University of Arizona, ajaksha@mac.com  
Bruce Johnson, University of Arizona

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***Strand 6: Science Learning in Informal Contexts  
Understanding the Diversity of Learners' Needs in Informal Science Environments***

2:45pm-4:15pm, Rivers

***Presider:***

Chantal L. Barriault, Curtin University

***Identifying Opportunities to Align Informal Educator Perceptions with Audience Expectations in Climate Change Education***

Cathlyn Styliniski, University of Maryland, cat@al.umces.edu  
Renae Youngs, Lifelong Learning Group  
Joe Heimlich, Lifelong Learning Group  
Sasha Palmquist, Palmquist & Associates, LLC  
Deborah Wasserman, Lifelong Learning Group

***An Examination of Culturally Sustaining Experiences for Hispanic Mothers at an Inquiry Based Science Center***

Ingrid S. Weiland, University of Louisville,  
ingrid.weiland@louisville.edu

***Informal Science Education Professionals' Goals for and Beliefs about Working with Preschool-age Audiences***

Michele Crowl, Penn State University, michelecrowl@gmail.com  
Julia Plummer, Penn State University

***Stepping-stones or Dead-ends: Understanding and Developing Learning Pathways across Science Programs in an Urban Setting***

Meghan E. Bathgate, University of Pittsburgh, meb139@pitt.edu  
Amaro Tuninetti, University of Virginia  
Christian D. Schunn, University of Pittsburgh

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

2:45pm-4:15pm, Brigade

***Presider:***

Sevim Sevgi, Middle East Technical University

***Analyzing Prospective Elementary Teachers' Conceptions of Dissolving Using the Ladder of Explanations Framework***

Karthigeyan Subramaniam, University of North Texas,  
Karthigeyan.Subramaniam@unt.edu  
Pamela Harrell, University of North Texas

***Teachers Need to Be As Smart As A 5th Grader: What Pre-service Teachers Know About Density***

Pamela Harrell, University of North Texas, pam.harrell@unt.edu  
Karthigeyan Subramaniam, University of North Texas

***Promoting Korean Pre-service Science Teachers' Understanding of Students' Misconceptions in Physics through the Research Experience***

Yeonjoo Ko, Ewha Womans University, rlokdalok@naver.com  
Hyunju Lee, Ewha Womans University

***Investigating Pre-service Physics and Chemistry Teachers' Conceptual Integration between Physics and Chemistry***

Mustafa Tuysuz, Middle East Technical University, mtuysuz@metu.edu.tr  
Oktay Bektas, Erciyes University  
Omer Geban, Middle East Technical University

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***Strand 8: In-service Science Teacher Education Assessing Teachers' Orientations, Practices, and Concerns of Reform-Based Science Teaching***

2:45pm-4:15pm, Duquesne

***Presider:***

Stephanie B. Philipp, University of Louisville

***Problem-based Assessment of Science Teaching Orientations: Formative Use in Teacher Education***

William W. Cobern, Western Michigan University, bill.cobern@wmich.edu  
David Schuster, Western Michigan University  
Betty Adams, Western Michigan University  
Brandy Skjold, Western Michigan University  
Amy E. Bentz, Western Michigan University  
Kelly Sparks, Western Michigan University  
Ebru Z. Mugaloglu, Bogazici University

***Views of Classroom Inquiry: Differing Perspectives***

Michael Dentzau, Columbus State University, dentzau\_michael@columbusstate.edu  
Katrina Roseler, Florida State University  
Sherry A. Southerland, Florida State University

***The Evolution of Secondary Science Teachers' Concerns about Teaching in an Innovative, Technology-rich Space***

Jessica Krin, Southern Illinois University, Edwardsville  
Georgia Bracey, Southern Illinois University, Edwardsville  
Mary Stephen, Southern Illinois University, Edwardsville

***Single Case Study Analysis of Secondary Science Teacher Using an Observation Protocol (UTOP)***

***Professional Development***

Audrey De Zeeuw, University of Texas at Austin, audreyruth@utexas.edu

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

***Exploring Teacher Identity***

2:45pm-4:15pm, Sterlings 1

***Presider:***

Sarah Michaels, Clark University

***Overcoming Status Differences and Conflicts in K-20 Partnerships: Towards Productive Communication and Reform-Oriented Identities***

Stacy Olitsky, Saint Joseph's University, solitsky@sju.edu

***Disruptive Pedagogy, Disrupting Identity: Science, Elementary Schools, and Policy Ideals in Practice***

David E. Long, George Mason University, dlong9@gmu.edu  
Wendy Frazier, George Mason University

***Exploring Teachers' Identity Development: The Role of Affirmations and Challenges in Transforming Science Pedagogy***

Maria S. Rivera Maulucci, Barnard College, mriveram@barnard.edu

***Science and Mathematics Teachers' Reflections on a Multifaceted Approach to Equity Professional Development***

Hilary A. Dwyer, University of California, Santa Barbara, hdwyer@education.ucsb.edu  
Alayna Wearly, University of California, Santa Barbara  
Julie A. Bianchini, University of California, Santa Barbara  
Mary E. Brenner, University of California, Santa Barbara

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

2:45pm-4:15pm, Smithfield

***Presider:***

Ling L. Liang, La Salle University

***Middle School Students' Preferred versus Experienced Instruction and their Attitudes toward Science***

Gavin W. Fulmer, National Institute of Education (Singapore), gavin.fulmer@nie.edu.sg  
Hongjia Ma, Nanjing Normal University  
Ling L. Liang, La Salle University

**Activity-Based Science Learning Style Preferences**

Xiaoqing Kong, University of Virginia, xk4wa@virginia.edu  
 John T. Almarode, James Madison University  
 Adam V. Maltese, Indiana University  
 Robert H. Tai, University of Virginia

**Attitudes toward Science, Technology, Engineering, and Mathematics (STEM) Subjects and Careers**

Selcen Guzey, University of Minnesota, kendi003@umn.edu  
 Tamara J. Moore, Purdue University  
 Michael Harwell, University of Minnesota

**A Comprehensive Review of Science Attitude Instruments Used for Middle School Students 2006-2012**

Phonraphee Thummaphan, University of Washington,  
 phonrt@uw.edu  
 Min Li, University of Washington

**Strand 12: Educational Technology****Digital Games in Science Education**

2:45pm-4:15pm, King's Garden 4

**Presider:**

Barbara Means, SRI International

**An Analysis of Gender Differences in a Virtual Environment-Based Science Assessment**

Minjung Ryu, University of Maryland, College Park,  
 mryu@umd.edu  
 Xiaoyang Gong, University of Maryland, College Park  
 Diane Jass Ketelhut, University of Maryland, College Park

**Impacts of Gaming, Teachers, and Interest on Student Science Learning Associated with Innovative Biotechnology Curricula**

Troy D. Sadler, University of Missouri, sadlert@missouri.edu  
 William L. Romine, University of Missouri  
 Deepika Menon, University of Missouri Columbia  
 Michelle Leigh Klosterman, University of Missouri  
 Len Annetta, George Mason University

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**Evening Events**

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**NARST Executive Board Meeting #3**

5:00pm – 10:00pm, Commonwealth 1

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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) and on the Conference CD included with the program. 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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