

**2012 NARST | March 25-28**



## ANNUAL INTERNATIONAL CONFERENCE

Re-Imagining Research in 21st Century Science Education for a Diverse Global Community

JW Marriott Indianapolis | Indianapolis, Indiana

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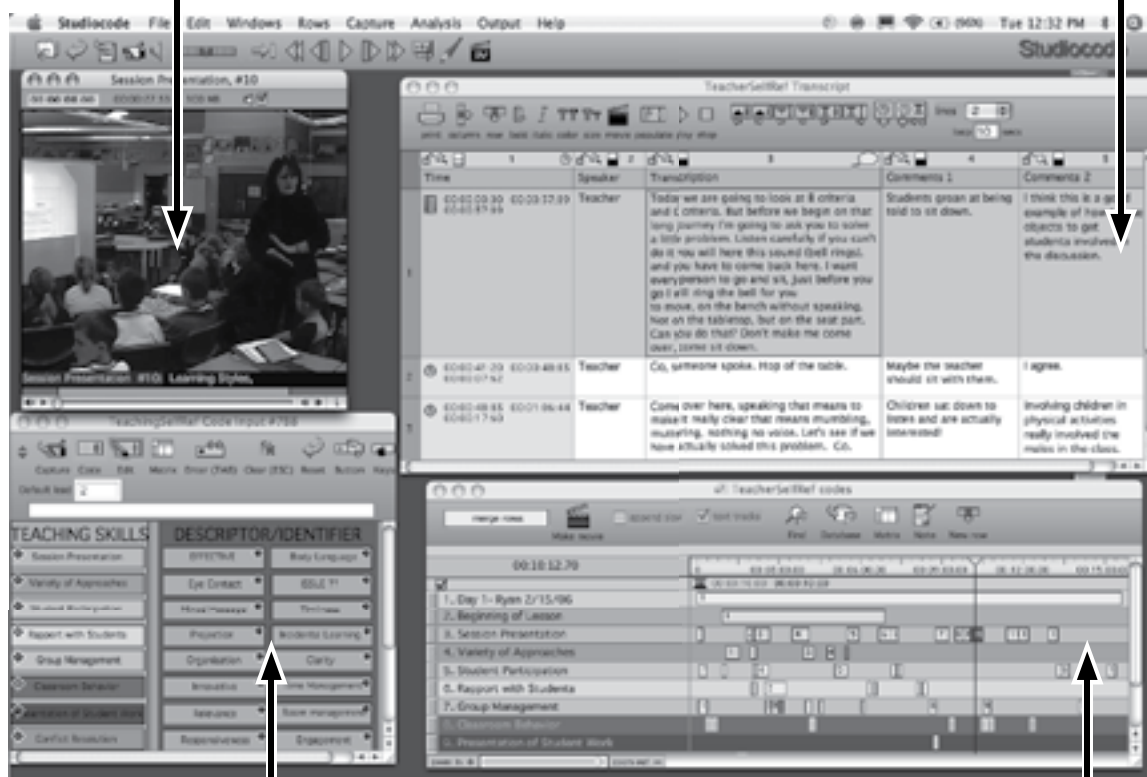
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### ACKNOWLEDGMENTS

The following members of the Program Committee helped in preparing and editing the 2012 NARST Annual International Conference Program Book.

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Program Committee Chair

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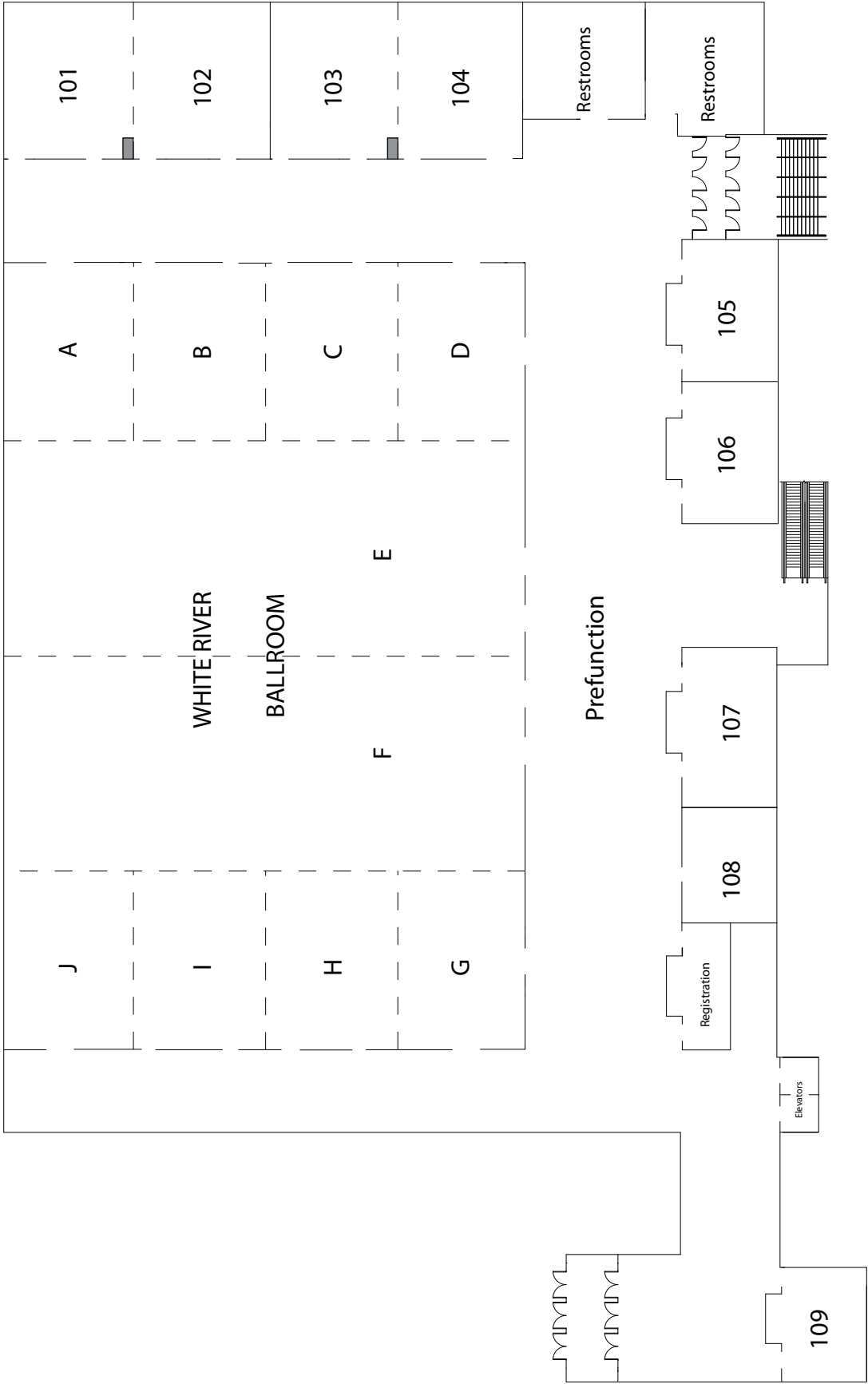
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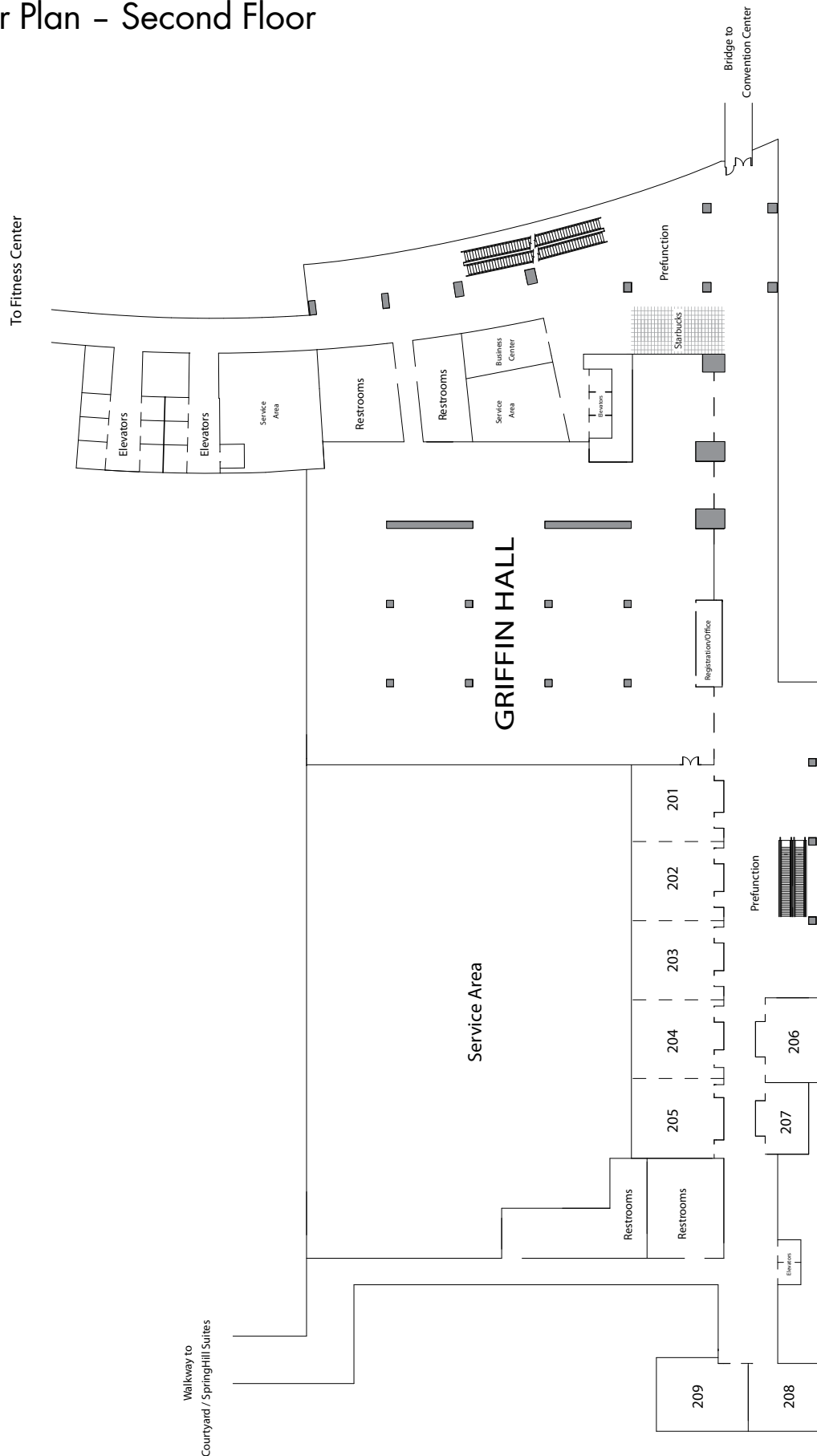
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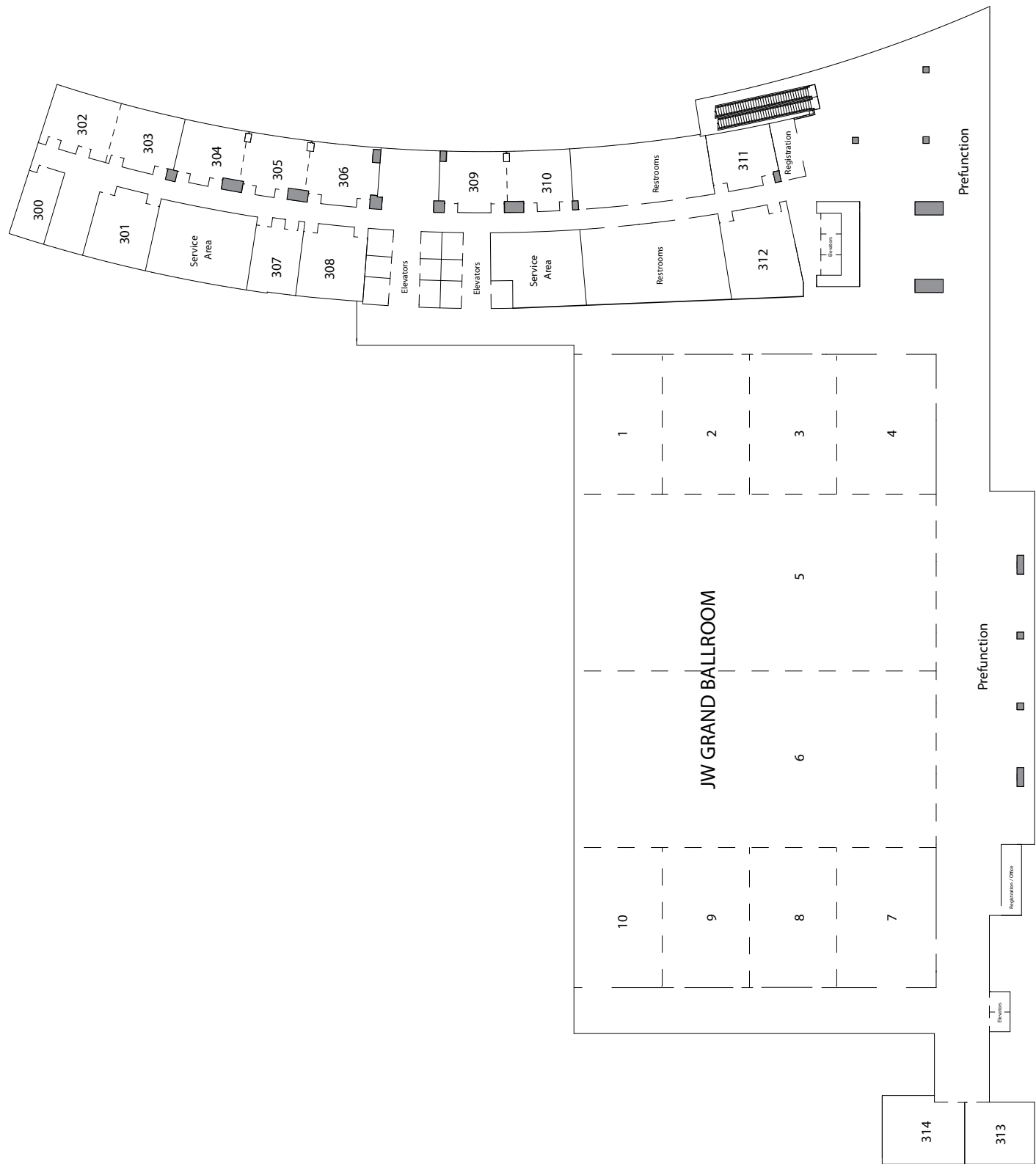
Hotel Floor Plan - First Floor



# Hotel Floor Plan – Second Floor



Hotel Floor Plan - Third Floor





# 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.

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. The Journal 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. This volume 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.
- E-NARST News describing recent developments in research and in the profession. E-NARST News provides opportunities to work with prominent people throughout the world on research projects and with affiliated organizations such as the National Science Teachers Association (NSTA), the Association for Science Teacher Education (ASTE), and the American Association for the Advancement of Science (AAAS). Our newsletter is now published online twice a year and posted to 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 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. The overall length of the paper sessions may vary based on the number of papers assigned to that session, but each paper within a particular session will observe the 15-minute presentation guideline. For example, four papers grouped together will be given a 90-minute time period, while two papers grouped together will be given a 45-minute time period for the overall session. This will optimize the grouping of papers by allowing strand coordinators to group papers based on similarity, rather than forcing the grouping of papers to fit a standard time block. Each presenter is expected to disseminate a paper during or immediately following the session, unless the paper is on the NARST 2012 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 2012 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 2012 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. Audience members will have approximately 90 minutes to circulate throughout the room to view the posters and interact with the presenters. Each presenter must set up the display prior to the start of the session and then remove it promptly at the end of the session. Each presenter is expected to disseminate a paper during the session, unless a summary of the poster is on the 2012 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. So, 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 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. Presider Roles

- 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.

## Discussant Roles

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

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Alexandra D'Imperio, Drohan Management Group

# 2013 NARST Annual International Conference

The Program Chair invites NARST members and others to participate in the 2013 NARST Annual International Conference, and start planning next year's program proposals during the 2012 conference.

## VENUE: NARST 2013 Annual International Conference

Wyndham Rio Mar  
Rio Grande, Puerto Rico  
April 6-9, 2013

Visit the website at: [www.wyndhamriomar.com](http://www.wyndhamriomar.com)

## THEME:

### The S in STEM Education: Policy, Research and Practice

Science, mathematics, engineering and technology are often indistinguishable in STEM research, both practical and applied. Researchers are increasingly accustomed to transdisciplinary collaborations. At the same time, there is an increasing recognition, both from cognitive and practical perspectives, that the new generation of science students needs science education that is more rigorous, relevant, and related to their lives. Given both phenomena, the movement towards STEM education may be inevitable. The intention of this conference theme is to fuel rich discussions about the role of science in STEM education; update one another about new developments in STEM education across the globe; and stimulate new inquiry. The conference theme should also engage attendees in critiques of STEM education, and the economic implications often associated with it.

There is no universally agreed upon definition of STEM education, but one is offered here that may be a useful starting point: "...an *interdisciplinary* approach to learning where rigorous academic concepts are coupled with real-world lessons as students apply science, technology, engineering, and mathematics in contexts that make connections between school, community, work, and the global enterprise enabling the development of STEM literacy and with it the ability to compete in the new economy" (Tsupros, Kohler, & Hallinen, 2009\*).

We encourage NARST members to align their proposals, whenever feasible, with the 2013 NARST Annual International Conference theme.

**SUBMISSION DEADLINE:** The Program Chair or designate must receive your program proposals for the 2013 Annual International Conference by August 15, 2012. The deadline allows sufficient time for processing, reviewing and evaluating the many proposals. In June 2012, the call for program proposals will appear on the NARST website.

Conference Chair: Sharon J. Lynch, President-Elect

\* Tsupros, N., R. Kohler, and J. Hallinen, 2009. *STEM education: A project to identify the missing components*, Intermediate Unit 1 and Carnegie Mellon, Pennsylvania.

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

### 2012

NSTA Indianapolis, IN, March 29 - April 1

AERA Vancouver, British Columbia, Canada, April 13 - 17

### 2013\*

NARST Rio Grande, Puerto Rico, April 6 - 9

NSTA San Antonio, TX, April 11 - 14

AERA Atlanta, GA, April 11 - 15

### 2014

NARST Pittsburgh, PA, March 30 - April 2

NSTA Boston, MA, April 3 - 6

AERA Philadelphia, PA, April 3 - 7

\*AERA in 2011 announced it would meet in Atlanta, Georgia USA in 2013. NARST could find no acceptable venue in Atlanta due to the late decision by AERA for its 2013 conference venue. As a result, NARST broadened its geographical search and selected the Wyndham Rio Mar in Rio Grande, Puerto Rico as our 2013 conference venue. However, on 24 February 2012 AERA announced to its membership that its 2013 conference site and dates have been changed to San Francisco, CA, April 27 – May 1, 2013. NARST will continue to meet its contractual obligations and hold its 86th Annual International Conference at the Wyndham Rio Mar, which is nestled between the Atlantic Ocean and the El Yunque Caribbean National Forest in a lush hideaway on the "Isle of Enchantment".

## **2011-12 Strand Coordinators**

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

Anat Yarden, Michelle Cook

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

Lisa A. Donnelly, Amy Taylor

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

Rebecca Monhardt, Nicole Glen

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

Anna Lewis, Sara Salloum

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

Linda Keen-Rocha, Sanghee Choi

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

Sandra Martell, Anita Welch, Heather Toomey Zimmerman

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

Jennifer Wilhelm, Jacqueline McDonnough

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

Nate Carnes, Danielle Dani

### **Strand 9: Reflective Practice**

Tang Wee Teo, Kim Charmatz

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

Ling Liang, Gavin Fulmer

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

Geeta Verma, Shawn Holmes

### **Strand 12: Educational Technology**

Reizelle Barreto, Len Annetta

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

Norm Lederman, Catherine Koehler

### **Strand 14: Environmental Education**

Isha DeCoito, Jennifer Adams

### **Strand 15: Policy**

Andy Shous, Sarah J. Carrier

## Program Proposal Reviewers

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Moll, Rachel	Price, Aaron	Stapleton, Sarah	Wood, Nathan
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Murphy, Amy	Rector, Meghan	Sung, Shannon	Yilmaz-Tuzun, Ozgul
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Nelson, Tamara	Riedinger, Kelly	Sweeney, Sophia	Yu, Shu-Mey
Nelson, Frederick	Rivera, Seema	Szyjka, Sebastian	Zembal-Saul, Carla
			Zimmerman, Heather



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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
1940 Otis W. Caldwell	1962 Herbert A. Smith	1984 Ann C. Howe	2006 James Shymansky
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	
1948 Ira C. Davis	1970 Willard D. Jacobson	1992 Russell H. Yeany	
1949 Joe Young West	1971 Paul D. Hurd	1993 Emmett L. Wright	

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(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



## Current NARST Emeritus Members: 2011 / 2012

\*Denote first time Emeritus members

De Jong, Onno	Gunstone, Richard	Merzyn, Gottfried	Yager, Robert
Enochs, Larry*	Guo, Chong-Jee	Poel, Robert	Yore, Larry *
Fensham, Peter	Hewson, Peter	Ritz, William	Zoller, Uri
Ferguson-Hessler, Monica	Holliday, William	Roberts, Douglas	
Gilbert, John	Jaffarian, Bill	Rowell, Patricia	
Gilmer, Penny	Krockover, Gerald*	Segal, Lea	
Glynn, Shawn	Lemke, Jay*	Smith, Edward	
Good, Ron	Mason, Cheryl	Walding, Richard	

## 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.

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

## 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.

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

## 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.

Year	Awardee
1975	John J. Koran
1976	Anton E. Lawson
1977	no award
1978	Rita Peterson
1979	Linda R. DeTure
1980	M. James Kozlow and Arthur L. White
1981	William Capie, Kenneth G. Tobin, and Margaret Boswell
1982	F. Gerald Dillashaw and James R. Okey
1983	William C. Kyle, Jr., James A. Shymansky, and Jennifer Alport
1984	Darrell L. Fisher and Barry J. Fraser
1985	Hanna J. Arzi, Ruth Ben-Zvi, and Uri Ganiel (tie) Russell H. Yeany, Kueh Chin Yap, and Michael J. Padilla
1986	Barry J. Fraser, Herbert J. Walberg, and Wayne W. Welch (tie)
1987	Robert D. Sherwood
1988	Barry J. Fraser and Kenneth G. Tobin
1989	James J. Gallagher and Armando Contreras
1990	Patricia L. Hauslein, Ronald G. Good, and Catherine Cummins
1991	Nancy R. Romance and Michael Vitale
1992	Patricia Heller, Ronald Keith and Scott Anderson
1993	Wolff-Michael Roth
1994	Wolff-Michael Roth and Michael Bowen
1995	Wolff-Michael Roth
1996	Nancy J. Allen
1997	no award
1998	Wolff-Michael Roth, Reinders Duit, Michael Komorek, and Jens Wilbers
1999	Lynn A. Bryan
2000	Joseph L. Hoffman and Joseph S. Krajcik
2001	Allan G. Harrison
2002	Carolyn Wallace Keys, Eun-Mi Yang, Brian Hand and Liesl Hohenshell
2003	Wolff-Michael Roth
2004	Joanne K. Olson, 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. Scharmann
2011	Matthew Kloser
2012	Shelly R. Rodriguez and Julie Gess-Newsome

## Outstanding Doctoral Research Award

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

Year	Awardee	Major Professor
1992	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

## Early Career Research Award

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

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

## Outstanding Master's Thesis Award

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

Year	Awardee	Major Professor
1995	Moreen K. Travis	Carol L. Stuessy
1996	Lawrence T. Escalada	Dean A. Zollman
1997	C. Theresa Forsythe	Jeffrey W. Bloom
1998	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.

### Year Awardee(s)

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

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**Program/Scheduling Coordinator:** Toni Sondergeld

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# NARST Annual International Conference Schedule at a Glance - 2012

JW Marriott  
Indianapolis, IN USA

Event	Room	
<b>Saturday, March 24</b>		
7:30 AM – 5:00 PM	NARST Executive Board Meeting #1	Room 201 and 202
2:00 PM - 5:00 PM	Conference Registration	White River Registration
<b>Sunday, March 25</b>		
7:30 AM – 12:00 PM	NARST Executive Board Meeting #2	Room 201 and 202
7:00 AM – 5:00 PM	Registration	White River Registration
8:00 AM – 12:00 PM	Pre-Conference Workshop #1: Equity and Ethics Committee Title: Enacting Equity and Social Justice in Science Education Careers Organizers: Alicia Trotman, Michigan State University and Regina Wragg, University of South Carolina Participants: Julie Bianchini, University of California-Santa Barbara, Heidi Carlone, University of North Carolina-Greensboro; Christopher Emdin, Teachers College, Columbia University; Felicia Moore Mensah, Teachers College, Columbia University; Joi Merritt, Michigan State University; Deb Morrison, University of Colorado at Boulder; Deborah Roberts-Harris, University of New Mexico; Takumi Sato, Michigan State University; Blakely Tsurusaki, University of Washington; and Bhaskar Upadhyay, University of Minnesota	Room 101
8:00 AM – 12:00 PM	Pre-Conference Workshop #2: Publications Committee Title: Developing High Quality Reviews for the <i>Journal of Research in Science Teaching</i> Presenters: Angie Calabrese Barton, Joe Krajcik, Bob Geier, and JRST Associate Editors	Room 102
8:00 AM – 12:00 PM	Pre-Conference Workshop #3: Research Committee Title: A Cognitive Model for Implementing Knowledge: Moving Research into Practice Presenters: Dale R. Baker and Heather Pacheco, Arizona State University	Room 103
8:00 AM – 12:00 PM	Pre-Conference Workshop #4: Research Committee Title: Introduction to instrument development and evaluation in science education Presenters: Irene Neumann and Knut Neumann, Leibniz-Institute for Science and Mathematics Education (IPN); William Boone, Miami University; and Ross Nehm, Ohio State University	Room 104
12:00 PM – 1:00 PM	Lunch On your own- various restaurants	
1:00 PM – 2:30 PM	Concurrent Session # 1	
2:45 PM – 4:00 PM	Concurrent Session # 2	
4:00 PM – 4:30 PM	Break	White River Ballroom Foyer
4:30 PM – 6:00 PM	Plenary Session # 1 Paul Cobb, Vanderbilt University and Kara Jackson, McGill University Towards an Empirically-Grounded Theory of Action for Improving the Quality of Teaching Subject Matter at Scale	White River Ballroom A - E
6:00 PM – 7:00 PM	Mentor-Mentee Nexus	Room 101
6:00 PM - 7:00 PM	Research Interest Groups (RIGs) Meetings The Continental and Diasporic Africa in Science Education	Room 103
7:00 PM – 9:30 PM	Presidential / Welcome Reception (Appetizers served and cash bar)	White River Ballroom F - J

Event	Room
<b>Monday, March 26</b>	
6:00 AM - 7:15 AM	The INDY 5000 (5K) Science Education Fun Run / Walk
7:30 AM – 8:15 AM	Committee Meetings
7:00 AM – 5:00 PM	Registration
8:30 AM – 10:00 AM	Concurrent Session # 3
10:15 AM – 11:45 AM	Concurrent Session # 4
12:00 – 1:00 PM	NARST Business Meeting (Box lunch provided for 1st 100 attendees who sign up)
12:00 - 1:00 PM	Lunch On your own - various restaurants
1:15 PM – 2:45 PM	Concurrent Session # 5
2:45 PM - 3:15 PM	Break
3:15 PM - 4:15 PM	Concurrent Session # 6A: Poster Session
4:15 PM - 5:15 PM	Concurrent Session # 6B: Poster Session
5:30 PM – 7:00 PM	Graduate Student Forum
6:30 PM – 8:30 PM	JRST Editorial Board Meeting/Reception (Meeting open/Reception by invitation)
7:00 PM - 8:00 PM	Graduate Student and Early Career Scholars (Informal social - on your own)
<b>Tuesday, March 27</b>	
7:00 AM – 8:15 AM	Committee Meetings
7:00 AM – 5:00 PM	Registration
8:30 AM – 10:00 AM	Concurrent Session # 7
10:00 AM - 10:30 AM	Break Foyer -
10:30 AM – 12:00 PM	Plenary Session #2: Okhee Lee, New York University Student Diversity and Science Education Research in a Global Context: Research Agenda and the Role of NARST
12:00 PM – 2:00 PM	Awards Luncheon
2:15 PM – 3:45 PM	Concurrent Session # 8
4:00 PM - 5:30 PM	Concurrent Session # 9
5:45 PM – 6:45 PM	New Researcher and Junior Faculty Early Career Discussion
6:00 PM – 8:00 PM	Springer Reception (By invitation only)
7:00 PM – 9:00 PM	Equity Dinner Off-site Buca di Beppo Italian Restaurant (Maximum attendance: 90) Dinner, including tax and gratuity, is \$35. Please note: You must register for this event with your Advance Conference Registration.
8:00 PM – 10:30 PM	Social
<b>Wednesday, March 28</b>	
7:00 AM – 8:15 AM	Strand Meetings
7:00 AM – 12:00 PM	Registration
8:30 AM – 10:00 AM	Concurrent Session # 10
10:15 AM - 11:45 AM	Concurrent Session # 11
12:00 PM – 1:00 PM	Lunch On your own - various restaurants
1:00 PM – 2:30 PM	Concurrent Session # 12
2:45 PM - 4:15 PM	Concurrent Session # 13
5:00 PM – 10:00 PM	NARST Executive Board Meeting #3
	JW Marriott Lobby
	White River Registration
	Room 201 and 202
	Griffin Exhibit Hall Griffin Exhibit Hall Griffin Exhibit Hall Room 101 Room 201 and 202
	TGI Friday's 501 W. Washington Street
	White River Registration
	White River Ballroom White River Ballroom A - E
	White River Ballroom F - J
	Room 101 White River Ballroom A - B
	White River Ballroom E
	White River Registration
	Grand Ballroom 7





## **Tools for STEM Education for Elementary and Middle School Educators**

**The first NSTA STEM Forum & Expo** will bring together nationally renowned STEM experts and practitioners and hands-on educators interested in learning about successful approaches and implementation of Science, Technology, Engineering, and Mathematics education into our schools and districts. STEM best practices, content, and integration processes are critical aspects for creating well-trained elementary and middle school educators who will need to radically increase student literacy in these STEM subjects. Join this very important discussion on STEM.

### **Who Should Attend?**

- K-8 educators who want to expand their understanding of STEM and learn how to integrate it into their own classrooms and schools.
- High school and college educators knowledgeable about what secondary and college-level students need to be successful in STEM course work.
- Stakeholders and administrators who must educate their teaching staff on the most current and successful STEM practices.

For more information, visit  
[\*\*www.nsta.org/stemforum\*\*](http://www.nsta.org/stemforum)



# PROGRAM

Saturday, March 24, 2012



**NARST Executive Board Meeting Session #1**  
**7:30am – 5:00pm, Room 201 & 202**

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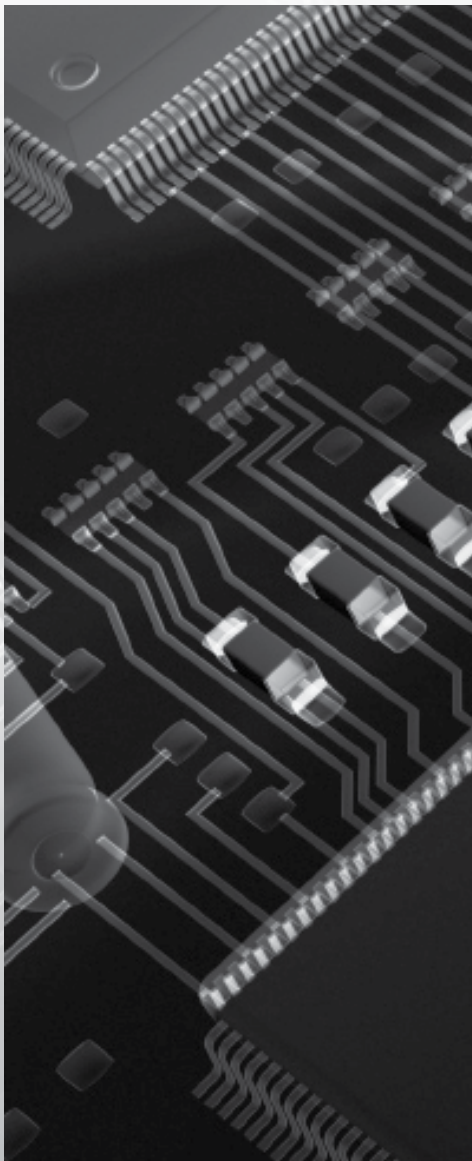
**Conference Registration**  
**2:00pm – 5:00pm, White River Registration**

**FREE**  
**JOURNAL ACCESS**  
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# Science Education

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International Journal of Science Education

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International Journal of Science Education, Part B:  
Communication and Public Engagement

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Journal of Environmental Education

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Mathematical Thinking and Learning

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Research in Science & Technological Education

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Science Activities

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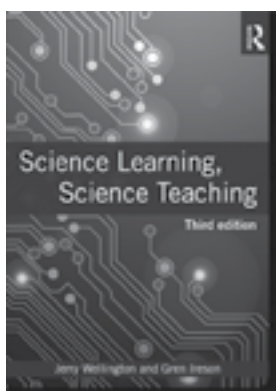
Studies in Science Education

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Journal of the Learning Sciences

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# NEW BOOKS



## Science Learning, Science Teaching 3rd Edition

By Jerry Wellington & Gren Ireson

Pb: 978-0-415-61972-1

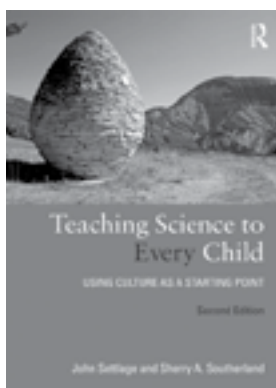


## Science Learning and Instruction

Taking Advantages of  
Technology to Promote  
Knowledge Integration

By Marcia C. Linn & Bat-Sheva Eylon

Pb: 978-0-8058-6055-9



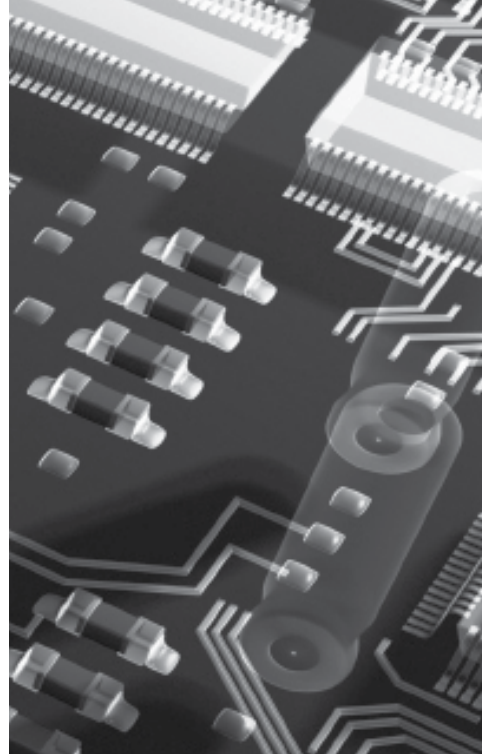
## Teaching Science to Every Child

Using Culture as a  
Starting Point

2nd Edition

by John Settlage & Sherry Southerland

Pb: 978-0-415-89258-2



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Sunday, March 25, 2012



**Conference Registration**

7:00am – 5:00pm, White River Registration

**NARST Executive Board Meeting Session #2**

7:30am – 12:00pm, Room 201 &amp; 202

**Pre-Conference Workshops**

8:00am – 12:00pm

**W1. Pre-Conference Workshop—Equity and Ethics Committee Sponsored (Free)**

Enacting Equity and Social Justice in Science Education Careers

8:00am – 12:00pm, Room 101

**Organizers:**

Alicia Trotman, Michigan State University

Regina Wragg, University of South Carolina

**Participants:**

Julie Bianchini, University of California-Santa Barbara

Heidi Carlone, University of North Carolina-Greensboro

Christopher Emdin, Teachers College, Columbia University

Felicia Moore Mensah, Teachers College, Columbia University

Joi Merritt, Michigan State University

Deb Morrison, University of Colorado at Boulder

Deborah Roberts-Harris, University of New Mexico

Takumi Sato, Michigan State University

Blakely Tsurusaki, University of Washington

Bhaskar Upadhyay, University of Minnesota

**W2. Pre-Conference Workshop—Publications Committee Sponsored (Free)**

Developing High Quality Reviews for the Journal of Research in Science Teaching

8:00am – 12:00pm, Room 102

Angela M. Calabrese-Barton, Michigan State University

Joseph S. Krajcik, Michigan State University

Bob Geier, Michigan State University

**W3. Pre-Conference Workshop—Research Committee Sponsored (\$50 Registration Fee)**

A Cognitive Model for Implementing Knowledge: Moving Research into Practice

8:00am – 12:00pm, Room 103

Dale R. Baker, Arizona State University

Heather Pacheco, Arizona State University

**W4. Pre-Conference Workshop—Research Committee Sponsored (\$25 Registration Fee)**

Introduction to Instrument Development and Evaluation in Science Education

8:00am – 12:00pm, Room 104

Irene Neumann, Leibniz-Institute for Science &amp;

Mathematics Education (IPN)

Knut Neumann, Leibniz-Institute for Science &amp;

Mathematics Education (IPN)

William Boone, Miami University

Ross Nehm, Ohio State University

**Lunch—On Your Own**

12:00pm – 1:00pm

**Concurrent Session #1**

1:00pm – 2:30pm

**Presidential Sponsored Session**

The Challenge of 21st Century Science Education to Offer New Insights for a Diverse Global Community:

Re-Imagining the Use of Participants' Drawings as a Data Collection Strategy

1:00pm – 2:30pm, Room 313

**Presenters:**J. Randy McGinnis, NARST President, University of Maryland,  
jmcginni@umd.edu

Phyllis Katz, University of Maryland

Gili Marbach-Ad, University of Maryland

Wayne Breslyn, University of Maryland

Kelly A. Riedinger, University of North Carolina Wilmington

Nathan Carnes, University of South Carolina

Sue D. Tunnicliffe, Institution of Education, University of London

Michael J. Reiss, Institute of Education, University of London

Chris Astall, University of Canterbury

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

Related Paper Set - Examining Student Learning of Science through Engineering and Engineering Design

1:00pm – 2:30pm, Room 310

**Think-aloud Protocol Analysis as a Measure of Students' Science Learning through Design Assessment**

Todd R. Kelley, Purdue University, trkelley@purdue.edu

Brenda M. Capobianco, Purdue University

## Facilitating and Assessing Science Learning Within an Engineering Design-Focused Project-Based Learning Curriculum

Mike Ryan, Georgia Institute of Technology,  
mike.ryan@ceismc.gatech.edu

Marion Usselman, Georgia Institute of Technology

## Elementary Student Knowledge Tests: A Grade-level Specific Pre/Post Assessment of Science, Technology, and Engineering Design Process Concepts

Heidi Diefes-Dux, Purdue University, hdeifes@purdue.edu  
Melissa Dyehouse, Purdue University

## A Mixed Methods Approach to Measuring Learning through Engineering

Kristen B. Wendell, University of Massachusetts Boston,  
kbwendell@gmail.com  
Merredith Portsmore, Tufts University

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

STEM Topics

1:00pm – 2:30pm, Room 302

### Presenter:

Toni A. Sondergeld, Bowling Green State University

## Video Research as a Roadway to Re-imagining the Promise and Potential of Science Education Research

Rowhea M. Elmesky, Washington University in St Louis,  
relmesky@wustl.edu

## Teacher/Student On-Line Interaction: Role-Playing Scientists to Augment Hands-On Lab. Work in Classrooms

Carol A.B. Rees, Thompson Rivers University, British Columbia,  
Canada, crees@tru.ca

Annemarie Petrask, Huron Perth Catholic District School Board,  
Ontario, Canada

## Development of a Student Self-Evaluation Instrument in Inquiries

Saskia Vanderjagt, Vrije Universiteit, Amsterdam, The Netherlands,  
s.vanderjagt@ond.vu.nl

Lisette E. Vanrens, Vrije Universiteit, Amsterdam, The Netherlands

Herman H. Schalk, Vrije Universiteit, Amsterdam, The Netherlands

Albert Pilot, University of Utrecht, FIsme

Jos J. Beishuizen, Vrije Universiteit, Amsterdam, The Netherlands

## Do We Have a Common STEM Pedagogy? A Comparative Case Study Analysis

Maya Israel, University of Cincinnati, maya.israel@uc.edu

Helen M. Meyer, University of Cincinnati

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

Strand Sponsored Session- Climate Change Education: Curriculum, Controversy, Culture, and Critical Review  
1:00pm – 2:30pm, Room 303

### Presenters:

Anna R. Lewis, University of South Florida, arlewis@usf.edu

Susan Buhr, University of Colorado

Julie Thomas, Oklahoma State University

Anne L. Kern, University of Idaho

Ardice Hartry, UC Berkeley

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

Basic Literacy Skills & Science

1:00pm – 2:30pm, Room 305

### Presenter:

Saouma B. Boujaoude, American University of Beirut

## The Effect of the Science Writing Heuristic on Elementary Students' ITBS Score:

### A Longitudinal Study

ChingMei Tseng, University of Iowa, chingmei.tseng@gmail.com

Lori Norton-Meier, University of Louisville

Brian M. Hand, University of Iowa

## The Influence of Non-Traditional Writing Task and Audience on Students' Understanding of Mixture Concept

Sevgi Kingir, Selcuk University, kingirsevgi@gmail.com

Murat Gunel, Ahi Evran University

## Developing Science Literacy: Investigating Scaffolds that Assist Students in Writing about Science Inquiry Tasks

Timothy A. Collins, Gresham Barlow School District,

collins19@gresham.k12.or.us

Lawrence B. Flick, Oregon State University

## 7th Grade Students' Decisions about Limiting Resources after Writing-to-Learn Instruction

Meena M. Balgopal, Colorado State University,

Meena.Balgopal@colostate.edu

Lynn Gilbert, Conrad Ball Middle School

Pam Breitbarth, Conrad Ball Middle School

Alison M. Wallace, Minnesota State University Moorhead

## The Comparison of Image-text Relations in High School Biology Textbooks between Australia and Taiwan

Yun-Ping Ge, National Changhua University,  
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Len Unsworth, University of New England, Australia  
Chang-Hung Chung, National Changhua University, Taiwan  
Huey-Por Chang, National Changhua University, Taiwan  
Kuo-Hua Wang, National Changhua University, Taiwan

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

Related Paper Set- Systems Thinking in Introductory Biology

1:00pm – 2:30pm, Room 304

### *Discussants:*

Jennifer L. Momsen, North Dakota State University  
Elena Bray Speth, Saint Louis University  
Joseph T. Dauer, Michigan State University

## Building a Rationale for the Integration of Systems Models into College-level Biology Teaching and Learning

Tammy M. Long, Michigan State University, longta@msu.edu  
Jennifer L. Momsen, North Dakota State University  
Elena Bray Speth, Saint Louis University  
Joseph T. Dauer, Michigan State University  
Sara A. Wyse, Bethel University

## Change in Correctness and Complexity of Student-constructed Models During a Course

Joseph T. Dauer, Michigan State University, jdauer@msu.edu  
Tammy M. Long, Michigan State University  
Jennifer L. Momsen, North Dakota State University  
Elena Bray Speth, Saint Louis University  
Kristen Kostelnik, Michigan State University

## From Linear to Complex: How Students Organize Models and Explanations of Causal Relationships in Biological Systems

Elena Bray Speth, Saint Louis University, espeth@slu.edu  
Matthew Dirnbeck, Saint Louis University  
Jennifer L. Momsen, North Dakota State University  
Tammy Long, Michigan State University

## Systems Models, Systems Thinking, and Content Knowledge in an Introductory Biology Course

Jennifer L. Momsen, North Dakota State University,  
Jennifer.Momsen@nds.edu  
Sara A. Wyse, Bethel University  
Elena Bray Speth, Saint Louis University  
Kristen Kostelnik, Michigan State University  
Joseph T. Dauer, Michigan State University  
Tammy Long, Michigan State University

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

Improving Conceptual Understanding

1:00pm – 2:30pm, Room 309

### *Presider:*

Huseyin Colak, Northeastern Illinois University

## Getting to the CoRe of It! Scaffolding Undergraduates Understanding of Geology Using Content Representation Matrices

Meredith A. Park Rogers, Indiana University, mparkrog@indiana.edu  
Heidi L. Wiebke, Indiana University  
Adam V. Maltese, Indiana University  
Joseph A. Harsh, Indiana University  
Ingrid S. Weiland, University of Louisville  
Christina Melki, Indiana University

## How Do Ideas about Conventional Time and Large Numbers Influence Students' Understanding of Deep (Geologic) Time?

Kim A. Check, University of Ciputra, cheek.kim8@gmail.com

## How Do Biology Undergraduates "Explain" Photosynthesis? Investigating Student Responses to Different Constructed Response Question Stems

Michele M. Weston, Michigan State University, westonmi@msu.edu  
Casey Lyons, Michigan State University  
John Merrill, Michigan State University  
Mark Urban-Lurain, Michigan State University  
Kevin Haudek, Michigan State University

## Identification Student Misconceptions of Chemistry Diagrams and the Reinforcement of These Misconceptions by Chemistry Textbooks

Bryna Kumi, University of Maryland, College Park, bclover@umd.edu  
Bonnie L. Dixon, University of Maryland, College Park  
Felicia Bartlett, University of Maryland, College Park

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

1:00pm – 2:30pm, Room 306

### *Presider:*

Sheryl L. Meglamery, University of Nebraska

## Preservice Science Teachers' Use of Inscriptions In Their Peer Teaching Activity

Arzu Tanis Ozcelik, The Pennsylvania State University, axt252@psu.edu  
Scott P. McDonald, The Pennsylvania State University

### Using “Approximations of Practice” to Bridge Theory and Practice in an Elementary Science Methods Course

Ashima M. Shah, Harvard University, ashah@mclean.harvard.edu

### Using Specialized Instruction to Develop Scientific Reasoning Abilities in Teacher Candidates

Kathleen M. Koenig, University of Cincinnati, koenigkn@ucmail.uc.edu

Lei Bao, Ohio State University

Melissa Schen, Wright State University

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

Promoting Language and Literacy in the Science Classroom

1:00pm – 2:30pm, Room 105

#### **Presenter:**

Andrea R. Milner, Adrian College

### We Are All Talking: A Whole-School Approach to Professional Development for Teachers of English Learners

Lauren M. Shea, University of CA - Irvine, lshea@uci.edu

Therese B. Shanahan, University of California - Irvine

### Elementary Teacher Beliefs about the Role of Language Literacy Instruction in a Science Lesson Sequence

Sandie M. Grinnell, Mount Elden Middle School, sgrinnell@fusd1.org

Barbara A. Austin, Wittenberg University

### Synergistically Aligning Cogenerative Dialogues with Culturally Responsive Teaching and Learning

Wesley Pitts, Lehman College, CUNY, wesley.pitts@lehman.cuny.edu

Gillian U. Bayne, Lehman College CUNY

### Teachers’ Integration of Science and Language Instruction in Multilingual Classrooms:

#### Implications for In-service Education

Christina Siry, University of Luxembourg, chrissiry@gmail.com

Joëlle Vlassis, The University of Luxembourg

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

Developing the Pedagogical Knowledge and Practice of Science Teachers

1:00pm – 2:30pm, Room 106

#### **Presenter:**

Andrew W. Shouse, University of Washington

### Professional Development of Secondary Biology Teachers held in an Overseas Country

Do-Yong Park, Illinois State University

Jae Young Han, Chungbuk National University, Chungbuk,

The Republic of Korea

### An Ethnographic Case Study on Teacher’s Involvement in Developing Models of Informal Formative Assessments (IFA) and Understanding the Challenges to Effective Implementations

Asli Sezen, Towson University, asezen@towson.edu

Gregory J. Kelly, Penn State University

### Utilizing Scientific Habits of Mind as a Framework for Professional Development for Inservice Elementary Teachers

Kim D. Abegglen, Hockinson Middle School,

kin.abegglen@hock.k12.wa.us

Amanda M. Gunning, Teachers College

### Taking on the Challenge of STEM: The Journey of Three Middle School Science Teachers

Tara B. O’Neil, University of Hawaii, toneill@hawaii.edu

Lisa Nishizuka, Waimea Canyon Middle School

Susan Togioka, Waimea Canyon Middle School

Justin Yamagata, Waimea Canyon Middle School

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### Strand 9: Reflective Practice

Reflective Practice in Professional Development and Teacher Education

1:00pm – 2:30pm, Room 301

#### **Presenter:**

Tom J. McConnell, Ball State University

### Teacher Professional Development Delivery and its Impact on Higher Education Faculty and their Institutions

Dominique Merle-Johnson, University of Missouri -

Columbia, dmk99@mizzou.edu

Ya-Wen Cheng, University of Missouri

Rose M. Marra, University of Missouri

Anna M. Waldron, University of Missouri

### The Nature of Elementary Science Teachers Reflections When Working with English Language Learners

Cynthia C. Deaton, Clemson University, cdeaton@clemson.edu

### Working Collaboratively with Teacher-researchers to Investigate What Young Children Know and Can Do in Science

Mary E. Hobbs, University of Texas at Austin,

maryhobbs@mail.utexas.edu

Robert A. Williams, University of Texas at Austin

James P. Barufaldi, University of Texas at Austin



## Assessing the Reflective Practice of Prospective Teachers Through Written Reflections

Geraldine L. Cochran, Florida International University,  
gcoch001@fiu.edu  
Eric Brewe, Florida International University  
Laird H. Kramer, Florida International University  
David Brookes, Florida International University

## Strand 10: Curriculum, Evaluation, and Assessment

Related Paper Set - Using Curriculum to Change How Teachers Teach Science and Students Learn Science  
1:00pm – 2:30pm, Room 308

## Developing Research-Based Science Curricula: An Iterative Research and Design Process

Pamela Van Scotter, BSCS, pvanscotter@bscs.org  
Janet Carlson, BSCS  
Susan M. Kowalski, BSCS  
Paul M. Beardsley, BSCS  
Brooke N. Bourdelat-Parks, BSCS  
Stephen R. Getty, BSCS  
Betty Stennett, BSCS

## Key Features of Research-Based Science Curricula: Theory and Application

Brooke N. Bourdelat-Parks, BSCS, bbparks@bscs.org  
Janet Carlson, BSCS  
Pamela Van Scotter, BSCS  
Susan M. Kowalski, BSCS  
Paul M. Beardsley, BSCS  
Stephen R. Getty, BSCS  
Betty Stennett, BSCS

## Using Research-Based Curricula to Change how Teachers Teach Science

Susan M. Kowalski, BSCS, skowalski@bscs.org  
Janet Carlson, BSCS  
Pamela Van Scotter, BSCS  
Paul M. Beardsley, BSCS  
Brooke N. Bourdelat-Parks, BSCS  
Stephen R. Getty, BSCS  
Betty Stennett, BSCS

## Using Research-Based Curricula to Change how Students Learn Science

Paul M. Beardsley, BSCS, pbeardsley@bscs.org  
Janet Carlson, BSCS  
Pamela Van Scotter, BSCS  
Susan M. Kowalski, BSCS  
Brooke N. Bourdelat-Parks, BSCS  
Stephen R. Getty, BSCS  
Betty Stennett, BSCS

## Strand 11: Cultural, Social, and Gender Issues Girls Aspirations in Science: Bridging the Gap between Students and Science 1:00pm – 2:30pm, Room 107

### **Presider:**

Maria S. Rivera Maulucci, Barnard College

## Girls' Gateways to Science and Mathematics Education in Cameroon

Anne E. Emerson, University of California at Santa Barbara,  
aemerson@education.ucsb.edu  
Danielle Boyd Harlow, University of California at Santa Barbara

## The Importance of Individual Interpretations of Cultural Understandings of Gender by Female Undergraduate Science Majors in Explaining Trends of Underrepresentation

Rachel E. Wilson, Appalachian State University, wilsonre3@appstate.edu  
Julie M. Kittleson, University of Georgia

## "It's about Relationships": Girls Imaginings of Science and Self in an Afterschool Program

Allison J. Gonsalves, Universite de Montreal, allison.gonsalves@umontreal.ca  
Alice Carvalho, Universite de Montreal  
Jrene Rahm, Universite de Montreal

## Factors Influencing Female Students' Participation in a Pre-engineering and Engineering Program

Brenda Brand, Virginia Tech, bbrand@vt.edu  
Mary Kasarda, Associate Professor in Mechanical Engineering

## Strand 12: Educational Technology

Strand Sponsored Session - Serious Educational Games: Research Experiences from National Science Foundation Funded Projects  
1:00pm – 2:30pm, Room 101

### **Presider:**

James Minogue, North Carolina State University

### **Presenters:**

Leonard A. Annetta, George Mason University, lannetta@gmu.edu  
Douglas B. Clark, Vanderbilt University  
Diane J. Ketelhut, University of Maryland  
Troy D. Sadler, University of Missouri  
James Minogue, North Carolina State University



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

Teacher Education in HOS, POS & SOS

1:00pm – 2:30pm, Room 102

#### **President:**

Catherine E. Milne, New York University

### Experiencing Research for Teaching Science [ExpeRTS]: Tracking Changes in Future Secondary Science Teachers' Conceptions of Nature of Science, Scientific Inquiry, and Inquiry Science Teaching

Renee S. Schwartz, Western Michigan University, r.schwartz@wmich.edu

Cathy K. Northcutt, Western Michigan University

Susan Stapleton, Western Michigan University

### The Interaction of Knowledge and Pedagogical Decisions in Teaching Nature of Science

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

Stephen A. Bartos, Illinois Institute of Technology

Daniel Z. Meyer, Illinois Institute of Technology

Norman G. Lederman, Illinois Institute of Technology

Allison Antink Meyer, Illinois Institute of Technology

### Developing Preservice Teachers' NOS Conceptions and Commitment to NOS Instruction Using a Process Skill-based Approach

Bridget K. Mulvey, University of Virginia, bkm2x@virginia.edu

Jennifer Maeng, University of Virginia

Randy L. Bell, University of Virginia

### Strand 14: Environmental Education

Related Paper Set - Young People and the Environment: International Perspectives on the Effect of Environmental Education Initiatives

1:00pm – 2:30pm, Room 103

#### **President:**

Peter Van Petegem, University of Antwerp - IOIW

### Eco-school Effectiveness: Children's Environmental Values, Knowledge and Affections

Jelle Boeve-de Pauw, University of Antwerp, jelle.boevedepauw@ua.ac.be

Peter Van Petegem, University of Antwerp - IOIW

### Environmental Education on Global Climate Change: Concept Mapping and the 2-MEV

Daniela Sellmann, University of Bayreuth, daniela.sellmann@uni-bayreuth.de

Franz X. Bogner, University of Bayreuth

### Young Adolescents' Views on Environmental Attitudes, Behaviors, and Identity: Seeking Truth, Adventure and Harmony

Bruce Johnson, University of Arizona, brucej@email.arizona.edu

Amanda Jaksha, University of Arizona

Elsa Schaub, University of Arizona

Constantinos C. Manoli, University of Cyprus

### The Impact of Post-participation Reflection on Environmental Education Program Outcomes

Mat Duerden, Texas A & M University, duerden@tamu.edu

Peter Witt, Texas A & M University

### Strand 15: Policy

Accountability Impacts on Science Education Policies

1:00pm – 2:30pm, Room 104

#### **President:**

Todd L. Hutner, The University of Texas at Austin

### Pre-Service Science Teachers Beliefs about the Organizational Culture of Public Schools and Accountability

Todd L. Hutner, The University of Texas at Austin, thutner@gmail.com

### When Good Intentions and Reality Meet: Large-Scale Reform of Science Teaching in Urban Schools With Predominantly Hispanic ELL Students

Carla C. Johnson, University of Cincinnati, johnsc2@ucmail.uc.edu

Virginia Bolshakova, Utah State University

Tammy Miller, University of Cincinnati

### The Initial Impact of No Child Left Behind With a Focus on Time for Elementary Science and Equity in Science, Math, and Reading

George W. Griffith, Trego County Unified School District #208 WaKeeney, KS, scitcher@hotmail.com

Lawrence C. Scharmann, Florida State University

### When Science is High Stakes: Variations among the States and the Effects on Reading and Math

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

## Concurrent Session #2

### 2:45pm – 4:00pm

#### Awards Committee Sponsored Session

Distinguished Contributions in Research

2:45pm – 4:00pm, Room 313

##### **Presiders:**

Xiufeng Lin, State University of New York at Buffalo

Jonathan F. Osborne, Stanford University

##### **Presenters:**

Norman G. Lederman, Illinois Institute of Technology

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

Related Paper Set - Supporting Argumentation, Explanation, and Modeling Practices in Elementary and Middle School Classrooms

2:45pm – 4:00pm, Room 310

##### **Presider:**

Brian J. Reiser, Learning Sciences, Northwestern University

##### **Discussant:**

Cynthia Passmore, University of California-Davis

#### A Framework for Supporting and Assessing Scientific Practices

Brian J. Reiser, Learning Sciences, Northwestern University,  
reiser@northwestern.edu

Abraham Lo, Learning Sciences, Northwestern University

Cynthia Passmore, University of California-Davis

#### Students' Construction of Mechanistic Models

##### Using Argumentation and Representation

Lisa Kenyon, Wright State University, lisa.kenyon@wright.edu

Amber Todd, Wright State University

#### Middle School Students Arguing About the Construction and Application of Models

Kathleen Crucet-Villavicencio, The University of Texas, Austin,

kathleen.crucet@gmail.com

Leema Berland, University of Texas, Austin

#### Fostering Elementary Students' Productive Engagement in Scientific Modeling

Hamin Baek, Michigan State University, haminbaek@gmail.com

Christina V. Schwarz, Michigan State University

Li Zhan, Michigan State University

Mete Akcaoglu

#### How Do Different Classrooms Interpret Scientific Practices?

Monica Ko, Learning Sciences, Northwestern University,

monlinko2008@u.northwestern.edu

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

Related Paper Set - Connecting Expansive Framing to Transfer in a High School

Biology Classroom

2:45pm – 4:00pm, Room 302

##### **Discussants:**

Maria Varelas, University of Illinois at Chicago

N. Sanjay Rebello, Kansas State University

#### Expansive Framing in a Biology Classroom: What Does it Look Like?

Sarah L. Perez, University of California, Berkeley, salperez128@hotmail.com

Danny X. Tan, University of California, Berkeley

Hernan J. Rosas, University of California, Berkeley

#### Student Recognition of and Responses to Expansive Framing in a Biology Classroom

Xenia S. Meyer, University of California, Berkeley, xenia.meyer@berkeley.edu

Kathleen Zheng, University of California, Berkeley

#### Evidence of Transfer in an Expansively Framed Biology Classroom

Diane P. Lam, University of California, Berkeley, dianelam@berkeley.edu

Lloyd Goldwasser, University of California, Berkeley

Erica Naves, University of California, Berkeley

#### Student Perceptions and Uptake of Expansive Framing to Transfer: Qualitative and Quantitative Analyses

Randi A. Engle, UC-Berkeley, RAEngle@berkeley.edu

Maria Varelas, University of Illinois at Chicago

N. Sanjay Rebello, Kansas State University

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

The Nature of Science in Elementary School Classrooms

2:45pm – 4:00pm, Room 301

##### **Presider:**

Lloyd H. Barrow, University of Missouri

#### How do Elementary School Science Textbooks Present the Nature of Science?

Marianne Phillips, Texas A&M University, San Antonio,

marianne.phillips@tamusa.tamu.edu

Julie Vowell, Texas Wesleyan University

Young H. Lee, University of Houston

Brian Plankis, Indiana University

## Using History of Science to Teach the Nature of Science to Elementary School Students

Khadija Fouad, Indiana University, kfouad@indiana.edu  
Heidi L. Wiebke, Indiana University  
Valerie L. Akerson, Indiana University

## The Portrayal of the Nature of Science in Early Childhood Physical Science Instructional Materials

Brandon Schrauth, Johnston Community School District,  
brandon.schrauth@johnston.k12.ia.us  
Joanne K. Olson, Iowa State University

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

Teaching Core Concepts in Science  
2:45pm – 4:00pm, Room 303

### President:

Patricia Friedrichsen, University of Missouri-Columbia

## Examining the Challenges and Successes of an Accelerated Science and Math Program for High Potential Urban Middle School Students

Toni A. Sondergeld, Bowling Green State University, tsonder@bgsu.edu  
Andrea R. Milner, Adrian College  
Laurence J. Coleman, University of Toledo

## Adolescent Peer-led Teaching: Improving Academic Performance and Retention

Rona M. Robinson-Hill, University of Missouri -  
St. Louis Rona.Robinson-Hill@slps.org

## A Novel Laboratory Method for Teaching K-12 Evolution

Brad Hughes, UCI, bhughes@uci.edu

## Relevant and Popular Lessons and Scientific Literacy: Application of Modules from the European Project PARSEL

Georgios Tsapardis, University of Ioannina, Greece, gtseper@cc.uoi.gr  
Euphrosyni Nakou, Secondary State Education, Greece

## The Impact of a Professional Development Workshop on Rural STEM Teachers' Self-Efficacy and Biofuels Knowledge

Kasey P.S. Goodpaster, Purdue University, scott66@purdue.edu  
Omolola A. Adedokun, Purdue University  
Lisa P. Kirkham, Purdue University  
Peggy A. Ertmer, Purdue University  
Kari L. Clase, Purdue University  
Maureen McCann, Purdue University  
Gabriela C. Weaver, Purdue University

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

Constructivism in Science Learning  
2:45pm – 4:00pm, Room 304

### President:

Yehudit Judy Dori, Technion-Israel Institute of Technology

## Collaborative Group Testing: Communication and the Perceptions of Students in a Biotechnology Course for Non-Majors

Tina M. Roberts, University of Missouri-Columbia, robertsti@missouri.edu  
Marcelle A. Siegel, University of Missouri-Columbia  
Sharyn K. Freyermuth, University of Missouri-Columbia

## Data Interpretation along the Novice – Expert Continuum

Joseph A. Harsh, Indiana University School of Education,  
jharsh@indiana.edu  
Adam V. Maltese, Indiana University

## Is DNA Alive? A Longitudinal Study of Conceptual Change through Targeted Innovative Instruction

Stephen B. Witzig, University of Missouri, sbwitzig@mail.missouri.edu  
Sharyn K. Freyermuth, University of Missouri  
Marcelle A. Siegel, University of Missouri  
Kemal Izci, University of Missouri  
J. C. Pires, University of Missouri

## Constructivism in Context: The Effects of Class Size and Student Motivation on Student Learning and Satisfaction in Four Different Classrooms

Emily Borda, Western Washington University, bordae@wwu.edu  
Mathew Lockett, Western Washington University  
Siri Wuotila, Western Washington University

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

The Nature of Science  
2:45pm – 4:00pm, Room 309

### President:

Dominique Merle-Johnson, University of Missouri - Columbia

## Nature of Science Knowledge and Scientific Argumentation Skills in Taiwanese College Biology Students

MeiChun Lai, The Ohio State University, lai.146@osu.edu  
Karen E. Irving, The Ohio State University

## Understanding the Nature of Science and Nonscientific Modes of Thinking in Gateway Science Courses

Calvin Kalman, Concordia University, Calvin.Kalman@concordia.ca  
 Marina Milner-Bolotin, University of British Columbia  
 Tetyana Antimirova, Ryerson University, Toronto  
 Mark W. Aulls, McGill University  
 Da-Min Meng, Hefei University of Technology  
 Elizabeth S. Charles, Dawson College Montreal  
 Xiang Huang, Concordia University Montreal  
 Ahmed Ibrahim, McGill University Montreal  
 Gyounggho Lee, Seoul National University  
 Xihui Wang, McGill University Montreal

## Improving Student Learning Outcomes by Using Differentiated Activities

Muhsin Menekse, Arizona State University, muhsin@asu.edu  
 Michelene Chi, Arizona State University

## Strand 6: Science Learning in Informal Contexts

Strand Sponsored Session-Current Trends and Directions in Research about Learning and Teaching in Informal Contexts

2:45pm – 4:00pm, Room 305

### *Discussant:*

Sandra T. Martell, National Science Foundation, smartell@uwm.edu

### *Presenters:*

Jennifer DeWitt, King's College London  
 Preeti Gupta, New York Hall of Science  
 David E. Kanter, New York Hall of Science  
 Leonie J. Rennie, Curtin University, Western Australia  
 Monya Ruffin, National Science Foundation

## Strand 7: Pre-service Science Teacher Education

Pre-Service Teachers' Physics Content Knowledge

2:45pm – 4:00pm, Room 306

### *Presider:*

Vanessa Kind, Durham University

## Effects of Calculator Based Laboratory Usage on Pre-Service Physics Teachers' Teaching Practices

Fatma Caner, Marmara University, canerfatma@gmail.com  
 Feral Ogan-Bekiroglu, Marmara University  
 Hanife Hakyolu

## Physics Teacher Candidates' Views about Science and Scientific Knowledge after High School Physics Curricula Revisions

Kübra Eryurt, keryurt@metu.edu.tr  
 Özlem Oktay

## Enhancing Pre-service Science Teachers' Perceived Self-efficacy about Argumentation through Modeling and Mastery Experiences

Feral Ogan-Bekiroglu, Marmara University, feralogan@yahoo.com  
 Mehmet Aydeniz, The University of Tennessee

## Students' Goals and Expectations in a Physics Course for Education Majors

Jon D. H. Gaffney, University of Kentucky, jon.gaffney@uky.edu

## Strand 8: In-service Science Teacher Education

Related Paper Set - Virginia Initiative for Science Teaching and Achievement (VISTA) - First Year Statewide Implementation

2:45pm – 4:00pm, Room 105

### *Presider:*

Donna R. Sterling, George Mason University

## Refining Inquiry Based Science Instruction Through Professional Development Using the VISTA Model

Anne Mannarino, College of William and Mary, amannarino@wm.edu  
 Mollianne G. Logerwell, George Mason University  
 Victoria Reid, College of William and Mary  
 Elizabeth Edmondson, Virginia Commonwealth University

## Constructing the Science Methods Course as a Shared Instructional Product

Juanita Jo Matkins, College of William and Mary, jjmatk@wm.edu  
 Donna R. Sterling, George Mason University  
 Jacqueline Theresa McDonnough, Virginia Commonwealth University  
 Wendy M. Frazier, George Mason University

## Investigating the Impact of a New Science Coordinator/Liaison Academy

Elizabeth Edmondson, Virginia Commonwealth University, ewedmondson@vcu.edu  
 Eric M. Rhoades, George Mason University  
 Karla Ver Bryck Block, George Mason University  
 Donna R. Sterling, George Mason University  
 Victoria Reid, College of William and Mary

## Virginia Science Education at the Crossroads: Connecting Science Education Faculty to a Professional Community

Jacqueline Theresa McDonnough, Virginia Commonwealth University, jtmcdonnough@vcu.edu  
 Donna R. Sterling, George Mason University  
 Juanita Jo Matkins, College of William and Mary  
 Wendy M. Frazier, George Mason University



## Outcomes of the Virginia Initiative for Science Teaching and Achievement (VISTA) Professional Development

Jennifer Maeng, University of Virginia, jlc7d@virginia.edu  
Randy L. Bell, University of Virginia

## Strand 8: In-service Science Teacher Education

Changing the Practice of Science Teachers

2:45pm – 4:00pm, Room 106

### **Presider:**

Sheryl L. McGlamery, University of Nebraska

## The Development of Domain-specific Expertise when Experienced Chemistry Teachers Participate in a Community of Practice

Ria Dolfing, Utrecht University, Utrecht, r.dolfing@uu.nl

Onno De Jong, Utrecht University, Utrecht

Astrid M. W. Bulte, Utrecht University, Utrecht

Albert Pilot, Utrecht University, Utrecht

Jan D. Vermunt, Utrecht University, Utrecht

## Relationship, Time and Instructional Focus: Maximizing the Effects of Science Coaching

Ruth A. Anderson, FACET Innovations, LLC,

randerson@facetinnovations.com

Jim Minstrell, FACET Innovations

Sue Feldman, Education Service District 112, Washington State

## The Effect of the GK-12 Program on Teachers: Evaluating Reciprocal Coaching as a Differentiated Professional Development Strategy for Experienced Teachers

Kirstin C. Busch, University of Texas at Austin, kirstinbusch@utexas.edu

## Talking about Student Learning: Science and Mathematics Teachers' Collaborative Inquiry Processes

Tamara H. Nelson, Washington State University Vancouver,

tnelson1@vancouver.wsu.edu

David Slavit, Washington State University Vancouver

Angie Deuel, Washington State University Vancouver

## Strand 10: Curriculum, Evaluation, and Assessment

Studies in Engineering and Design Education

2:45pm – 4:00pm, Room 308

### **Presider:**

Kristin L. K. Koskey, The University of Akron

## The Impact of Engineering Curriculum Units on Students' Attitudes towards Engineering and Science

Cathy P. Lachapelle, Museum of Science, Boston, clachapelle@mos.org

Preeya Phadnis, Museum of Science, Boston

Jennifer Jocz, Museum of Science, Boston

Christine M. Cunningham, Museum of Science, Boston

## Investigating the Impact of a Lego-based, Engineering-oriented Curriculum Compared to an Inquiry-based Curriculum on Fifth Graders' Content Learning of Simple Machines

Ismail Marulcu, Erciyes University, imarulcu@erciyes.edu.tr

Mike Barnett, Boston College

## Using and Comparing Paper and Media to Improve Student Reflection in Science and Design Courses

Tamecia R. Jones, Purdue University, tameciajones@purdue.edu

Monica E. Cardella, Purdue University

Senay Purzer, Purdue University

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

Language and Culture of Science: National and International Contexts

2:45pm – 4:00pm, Room 107

### **Presider:**

Rowhea M. Elmesky, Washington University in St. Louis

## Place-legitimized Kenyan Scientific Knowledge and Its Relevance to Science Education

Nicole Beeman-Cadwallader, Indiana University, nbeeman@umail.iu.edu

Gayle A. Buck, Indiana University

## Exploring NOS with Immigrant Somali Youth in a Charter School Biology Curriculum

Nancy Albrecht, University of Minnesota, albr0137@umn.edu

Allison Kirchoff, Independent Consultant

Gillian Roehrig, University of Minnesota

Bhaskar Upadhyay, University of Minnesota

## Mother Tongue Policy and Science Teaching in Nigeria : A Conflict Between Policy Provision and Reality

Peter A. Okebukola, Lagos State University, Lagos, Nigeria, pokebukola@yahoo.com

Tunde Owolabi, Lagos State University, Lagos, Nigeria

Foluso O. Okebukola, Lagos State University, Lagos, Nigeria

**Strand 12: Educational Technology**

Biotechnology, Genetics & DNA Sequencing through Technology

2:45pm – 4:00pm, Room 101

**Presider:**

Eva Erdosne Toth, West Virginia University

**Exploring the Impact of Animation-based Genetic Instruction on Students' Perceived Cognitive Load and Learning Outcomes**

Chyi Yang, New Taipei City Tucheng Junior High School,  
chy151757@gmail.com

Ting-Kuang Yeh, Science Education Center

Wen-Ta Yang, China Medical University

Chun-Yeh Chang, Science Education Center

**Helping Students Conduct Complex Research by Using a Scaffolding Software Tool**

Andrew K. Vershon, Rutgers University, vershon@waksman.rutgers.edu

Susan E. Coletta, Rutgers University

Jeffrey D. Charney, Evaluator

Douglas Lowensbery, WestEd

Barbara C. Buckley, WestEd

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

Socioscientific Issues & Argumentation

2:45pm – 4:00pm, Room 102

**Presider:**

Sibel Erduran, University of Bristol

**The Transfer of Nature of Science Understandings into Unfamiliar Contexts**

Rola Khishfe, rk19@aub.edu.lb

**Cross-Cultural Comparisons of Epistemological Beliefs on Socioscientific Issues**

Dana L. Zeidler, University of South Florida, zeidler@usf.edu

Benjamin C. Herman, University of South Florida

Mitch Ruzek, University of South Florida

**'Visualizing' Evidence and Scientific Methods, and Implications for Science Education**

Sibel Erduran, University of Bristol, sibel.erduran@bristol.ac.uk

Maria Evagorou, University of Nicosia

**Strand 14: Environmental Education**

Enhancing the Development of Ecological Literacy in K-16 Education

2:45pm – 4:00pm, Room 103

**Presider:**

Bruce Johnson, University of Arizona

**Writing-to-Learn Activities as a Measure of Ecological Literacy in College Students**

Alison M. Wallace, Minnesota State University Moorhead,  
wallacea@mnstate.edu

Meena M. Balgopal, Colorado State University

**Developing a Questionnaire as a Research Tool to Characterize Students' Perception of Renewable Energy**

Tami Fishel, Ben Gurion University of the Negev, Israel, tamartir@bgu.ac.il

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

Hanan Ginat, Dead Sea and Arava Science Center

**Sustainability through the Lens of Earth Education: Children's Ecological Understandings and Environmental Attitudes**

Constantinos C. Manoli, University of Cyprus, manoli@ucy.ac.cy

Bruce Johnson, University of Arizona

Andreas Ch Hadjichambis, Cyprus Centre for Environmental Research and Education

Demetra Hadjichambi, University of Cyprus

Yiannis Georgiou, Cyprus Centre for Environmental Research and Education

Hara Ioannou, Cyprus Centre for Environmental Research and Education

**Lessons from the Tree: How the Tree that Owns Itself Taught its Town**

Debra B. Mitchell, University of Georgia, dbmitchl@uga.edu

Rachel Luther, University of Georgia

Michael Mueller, University of Georgia

**Strand 15: Policy**

Symposium - Globalization and Science Instruction

2:45pm – 4:00pm, Room 104

**Presider:**

Joseph S. Krajcik, Michigan State University

**Discussant:**

Peter W. Hewson, University of Wisconsin, Madison, USA

**Presenters:**

Reinders H. Duit, IPN - Leibniz Institute for Science and Math Education, Kiel, Germany

John L. Bencze, OISE - University of Toronto, Canada

Lyn Carter, Australian Catholic University, Melbourne, Australia

Kyunghee Choi, Ewha Womans University Seoul, South Korea

Hyunju Lee, Ewha Womans University, Seoul, South Korea

Sonya N. Martin, Drexel University, Philadelphia, USA

Christina Siry, University of Luxembourg, Luxembourg

Sung-Won Kim, Ewha Womans University Seoul, South Korea

Peter W. Hewson, University of Wisconsin, Madison, USA

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## Break

**4:00pm – 4:30pm, Foyer – White River Ballroom**

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## Plenary Session #1

Towards an Empirically-Grounded Theory of Action for Improving the Quality of Teaching Subject Matter at Scale

**4:30pm – 6:00pm, White River Ballroom A – E**

### ***Presider:***

J. Randy McGinnis, NARST President, University of Maryland

### ***Keynote Presenters:***

Paul Cobb, Vanderbilt University

Kara Jackson, McGill University

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## Evening/Social Events

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### 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, Room 101**

### ***Presiders:***

Corinne Lardy, San Diego State University, [corinne\\_lardy@yahoo.com](mailto:corinne_lardy@yahoo.com)

Mike U. Smith, Mercer University

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### Research Interest Group (RIG) Meeting The Continental and Diasporic Africa in Science Education

The goal of this meeting is to (a) encourage science educators to engage in research aimed at meeting the needs of people of African descent and (b) provide intellectual, professional, and personal space for science educators engaged in such research.

**6:00pm – 7:00pm, Room 103**

### ***Presiders:***

Mary M. Atwater, The University of Georgia

Felicia M. Mensah, Teachers College, Columbia University

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### Presidential/Welcome Reception

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

**7:00pm – 9:30pm, White River Ballroom F – J**

Monday, March 26, 2012





The INDY 5000 (5K) Science Education  
Fun Run / Walk  
6:00am – 7:15am, JW Marriott Lobby

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Conference Registration  
7:00am – 5:00pm, White River Registration

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Committee Meetings  
7:30am – 8:15am

Awards Committee Chairs & Co-Chairs Meeting  
7:30am – 8:15am, Room 301

Equity and Ethics Committee Meeting  
7:30am – 8:15am, Room 302

External Policy and Relations Committee Meeting  
7:30am – 8:15am, Room 303

Research Committee Meeting  
7:30am – 8:15am, Room 304

Membership and Election Committee Meeting  
7:30am – 8:15am, Room 305

International Committee Meeting  
7:30am – 8:15am, Room 306

Program Committee Meeting  
7:30am – 8:15am, Room 308

Publications Advisory Committee Meeting  
7:30am – 8:15am, Room 309

## Concurrent Session #3 8:30am – 10:00am

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### External Policy Committee & Strand 15: Policy Sponsored Session

Symposium - Session 1: Next Generation Science  
Standards: Tracking the Federal Research Agenda  
8:30am – 10:00am, Room 104

#### *Presiders:*

Andrew Shouse, University of Washington  
Christopher Wilson, BSCS

#### *Presenters:*

Martin Storksdieck, NRC Board of Science Education  
Philip L. Bell, University of Washington  
Elizabeth A. Davis, University of Michigan  
Deborah C. Smith, Pennsylvania State University

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### Publications Advisory Committee Sponsored Session

Symposium - Discussion with the Editors of Various  
Science Education Journals  
8:30am – 10:00am, Room 103

#### *Presiders:*

Carolyn S. Wallace, Indiana State University  
Jan H. Van Driel, ICLON Leiden University, The Netherlands

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

Related Paper Set - Using Learning  
Progressions Research to Teach for  
Environmental Science Literacy  
8:30am – 10:00am, Room 310

### Analyzing Students Learning Performances in Terms of Practices for Developing Accounts

Hui Jin, Ohio State University, [hjin@che.osu.edu](mailto:hjin@che.osu.edu)  
Li Zhan, Michigan State University  
Dante Cisterna, Michigan State University  
Charles W. Anderson, Michigan State University

### Students' Learning Performance and its Relation to Teaching Practice

Li Zhan, Michigan State University, [zhanli@msu.edu](mailto:zhanli@msu.edu)  
Dante Cisterna, Michigan State University  
Charles W. Anderson, Michigan State University

### Developing and Validating Scoring Procedures for Students' Written Accounts of Carbon-transforming Processes

Jennifer H. Doherty, Michigan State University, dohertyjh@gmail.com  
Karen Draney, University of California, Berkeley

### Analyzing College Students' Learning about Carbon-transforming Processes

Jonathon Schramm, Michigan State University, schram25@msu.edu  
Jennifer H. Doherty, Michigan State University  
Charles W. Anderson, Michigan State University

### Using a Water Systems Learning Progression to Design and Test Formative Assessments and Tools for Reasoning

Beth A. Covitt, University of Montana, beth.covitt@umontana.edu  
Kristin L. Gunckel, University of Arizona

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

Related Paper Set - Models and Modeling as a Foundation for Science Education  
8:30am – 10:00am, Room 302

#### *Discussant:*

Christina Schwarz, Michigan State University

### Introducing the Models Pyramid: Building Foundation, Structure, and Substance for Science Education

Cynthia Passmore, University of California, Davis, cpassmore@ucdavis.edu  
Julia Svoboda, University of California, Davis

### Authentic Scientific Practices Emerge from a Model-centered Physics Course

Wendell Potter, University of California, Davis, whpotter@ucdavis.edu  
Cassandra Paul, University of California, Davis  
Julia Svoboda, University of California, Davis

### Teachers Use of Models to Give Coherence and Meaning to Scientific Content

Rich Hedman, Sacramento State University, hedmanrd@csus.edu  
Connie Hvidsten, Biological Science Curriculum Study  
Arthur Beauchamp, University of California, Davis  
Cynthia Passmore, University of California, Davis

### Modeling and the Substance of a Sophisticated Epistemology of Science

Julia Svoboda, University of California, Davis, jmsvoboda@ucdavis.edu  
Cynthia Passmore, University of California, Davis

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

The Language of Science  
8:30am – 10:00am, Room 301

### Development of the Blended / Tiered Approach to Scaffolding Academic Vocabulary within Inquiry Science Instruction for English Language Learners

David T. Crowther, University of Nevada, Reno, crowther@unr.edu

### Science Language and Conceptual Understanding in Second Grade: Promoting Gains Across Levels of English Proficiency

Sheryl L. Honig, Northern Illinois University, shonig@niu.edu

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

Symposium - Global Warming Climate Change: Perspectives on Student Learning and Adaptation of Instructional Materials

8:30am – 10:00am, Room 313

#### *President:*

J. Randy McGinnis, NARST President, University of Maryland

#### *Presenters:*

Anita Roychoudhury, Purdue University, aroychou@purdue.edu  
Daniel Shepardson, Purdue University  
Bruce Patton, The Ohio State University  
Melissa George, Tecumseh Junior High School  
Susie Burton, Tecumseh Junior High School  
Joel Wilson, Frankfort Middle School  
Nicole Goodwine, Benton Middle School

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

The Pedagogy of Argumentation  
8:30am – 10:00am, Room 303

#### *President:*

Vanessa Kind, Durham University

### Mapping Model to Argument -based Inquiry as an Approach to Support Middle School Teachers in Teaching Climate, Weather, and Energy Topics

Morgan B. Yarker, University of Iowa, morgan-e-brown@uiowa.edu  
Charles O. Stanier, University of Iowa  
Cory T. Forbes, University of Iowa  
Soonhye Park, University of Iowa

### Using Laboratory Activities that Emphasize Argumentation and Argument to Help High School Students Learn how to Engage in Scientific Inquiry and Understand the Nature of Scientific Inquiry

Victor D. Sampson, Florida State University, vsampson@fsu.edu

Jonathon Grooms, Florida State University

Patrick J. Enderle, Florida State University

Sherry A. Southerland, Florida State University

### Effective Teaching Strategies to Promote Argumentation Skills about Socioscientific Issues

Vaile Dawson, Curtin University of Technology, vdawson@curtin.edu.au

Grady J. Venville, University of Western Australia

### Constructing and Negotiating Claims and Evidence in Scientific Inquiry Investigations

Aeran Choi, Kent State University, aeran-choi@hotmail.com

Jeonghee Nam, Pusan National University

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

Science and Mathematics Integration

8:30am – 10:00am, Room 304

#### **Presenter:**

Penny J. Gilmer, Florida State University

### A Faculty Learning Community for Integrating Quantitative Statistical Analysis into Undergraduate Biology: Preliminary Impacts and Lessons Learned

Loran Carleton Parker, Purdue University, carleton@purdue.edu

Annwesa Dasgupta, Purdue University

Omolola A. Adedokun, Purdue University

James Forney, Purdue University

Dennis J. Minchella, Purdue University

### College Students' Views of the use of Mathematics in Physics: A Case Study of Two Cohorts

N. Sanjay Rebello, Kansas State University, srebello@phys.ksu.edu

Carina M. Rebello, University of Missouri

### Secondary Preparation for College Calculus: A Phenomenography of Mathematics Professors' and Mathematics Teachers' Perspectives

Carol H. Wade, Harvard University, cwade@cfa.harvard.edu

Zahra Hazari, Clemson University

Gerhard Sonnert, Harvard University

Phil Sadler, Harvard University

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

Students' Reasoning and Science Learning

8:30am – 10:00am, Room 309

#### **Presenter:**

Janell Nicole Catlin, Teachers College, Columbia University

### Students' Reasoning and the Level of Interactivity in Science Content Courses for Future Elementary Teachers

Dean A. Zollman, Kansas State University, dzollman@phys.ksu.edu

Mojgan Matloob-Haghanikar, Winona State University

Sytil Murphy, Shepherd University

### Exploring the Role of Non-Adaptive Reasoning in Students' Evolutionary Explanations

Elizabeth P. Beggrow, The Ohio State University, beggrow.7@osu.edu

Ross H. Nehm, The Ohio State University

### The Development and Validation of Critical Thinking, Multiple Choice Items for Introductory College Biology

Lauren J. Ivans, University of Georgia, LJIVans@uga.edu

Julie M. Kittleson, University of Georgia

### Correcting Misconceptions in an Introductory Biology Course

Camille E. Naaktgeboren, College of Southern Nevada, Microbiology

Instructor, Camille.Naaktgeboren@csn.edu

Barbara A. Austin, Wittenberg University

### Strand 6: Science Learning in Informal Contexts

Professional Development for Educators: Identity

Development and Learning in Informal Institutions

8:30am – 10:00am, Room 305

#### **Presenter:**

Anita Welch, North Dakota State University

### The Long Term Impact of Working as a Floor Facilitator in a Science Center

Preeti Gupta, New York Hall of Science, pgupta@nysci.org

### Characterizing Farmworker Pesticide Educators in a Southeastern State: An Examination of Informal Science Educators' Beliefs about Teaching, Pesticides, and Self

Catherine E. LePrevost, North Carolina State University, celeprev@ncsu.edu

Margaret R. Blanchard, North Carolina State University

Gregory Cope, North Carolina State University

### Experience, Capacity and Identity: Understanding Teachers at the Boundary between Schools and Informal Science Institutions

James F. Kisiel, California State University, Long Beach, jkisiel@csulb.edu

### “Wow! Look at That!”: The Impact of Professional Development in Informal Science Contexts on Teachers’ Discourse

Gary M. Holliday, University of Akron, gholliday@mac.com

Norman G. Lederman, Illinois Institute of Technology

Judith S. Lederman, Illinois Institute of Technology

## Strand 7: Pre-service Science Teacher Education

Chemistry Teacher Preparation

8:30am – 10:00am, Room 306

### *President:*

Lloyd H. Barrow, University of Missouri

### Developing Topic Specific PCK in Pre-service Chemistry Teachers

Elizabeth M. Mavhunga, Wits University, Elizabeth.Mavhunga@wits.ac.za

Marissa S. Rollnick, Wits University

### Differences in the Degree of Scientific Realism of Secondary Pre-Service Chemistry and Physics Teachers

Norman F. Riehs, University of Duisburg-Essen, norman.riehs@uni-due.de

Stefan Rumann, University of Duisburg-Essen

### Development of Pre-service Chemistry Teachers’ Pedagogical Content Knowledge for Teaching Nature of Science

Betul Demirdogen, Middle East Technical University, dbetul@metu.edu.tr

Deborah L. Hanuscin, University of Missouri

Esen Uzuntiryaki, Middle East Technical University

Fitnat Koseoglu, Gazi University

## Strand 8: In-service Science Teacher Education

Related Paper Set - Supporting and Retaining High Quality Secondary Science Teachers: Evidence from the Knowles Science Teaching Foundation

8:30am – 10:00am, Room 105

### *President:*

Nicole Gillespie, Knowles Science Teaching Foundation

### *Discussant:*

Mark St. John, Inverness Research

### Recruitment and Selection of High Quality Teacher Candidates

Jodie Galosy, Knowles Science Teaching Foundation, jgalosy@kstf.org

Howard Glasser, Knowles Science Teaching Foundation

Erin Rizor, Knowles Science Teaching Foundation

Nicole Gillespie, Knowles Science Teaching Foundation

Mark St. John, Inverness Research

### Progress and Challenges in Developing a Professional Learning Community to Support Teacher Learning and Retention

Zora Wolfe, Knowles Science Teaching Foundation, zwolfe@kstf.org

Paul Wendel, Knowles Science Teaching Foundation

Jodie Galosy, Knowles Science Teaching Foundation

### Key Practices for Supporting the Development of Pedagogical Content Knowledge

Roseanne Rostock, Knowles Science Teaching Foundation,

rrostock@kstf.org

Michele Cheyne, Knowles Science Teaching Foundation

Jodie Galosy, Knowles Science Teaching Foundation

Nicole Gillespie, Knowles Science Teaching Foundation

### Developing a Continuum for Teacher Leadership

Carol Rulli, Knowles Science Teaching Foundation, crulli@kstf.org

Jodie Galosy, Knowles Science Teaching Foundation

Erin Rizor, Knowles Science Teaching Foundation

## Strand 8: In-service Science Teacher Education

Promoting the Teaching of Inquiry

8:30am – 10:00am, Room 106

### *President:*

Carol L. Stuessy, Texas A&M University

### Science by Doing: Enhancing Teachers’ Skills in Inquiry-Based Teaching through a Resource-Supported Professional Learning Approach

Leonie J. Rennie, Curtin University, lrennie@curtin.edu.au

Denis Goodrum, Australian Academy of Science

Amelia Druhan, Australian Academy of Science

### Tracking Teachers’ Change in Teaching Science as Inquiry: Different Teachers, Different Journeys

Daniel K. Capps, University of Maine, danielkcapps@gmail.com

Barbara A. Crawford, University of Georgia

### Middle and High School Science Teachers’ Inquiry Lesson Development and Implementation

Sue Ellen DeChenne, University of Nebraska - Lincoln,

sdechenne2@unlserve.unl.edu

Gina Kunz, University of Nebraska - Lincoln

Gwen Nugent, University of Nebraska - Lincoln

Linlin Luo, University of Nebraska - Lincoln

Brandi Berry, University of Nebraska - Lincoln

Katherine Craven, University of Nebraska - Lincoln

April Riggs, University of Nebraska - Lincoln

### A Teacher Professional Development Model Focused on Authentic Science Practices in the Classroom

Barbara A. Crawford, University of Georgia, barbarac@uga.edu

Daniel K. Capps, The University of Maine

Maya Patel, Ithaca College

Xenia S. Meyer, University of California, Berkeley

Robert Ross, The Paleontological Research Institution



## Strand 10: Curriculum, Evaluation, and Assessment

Strand Sponsored Symposium - New Generation of Science Curriculum and Assessment: International Perspectives

8:30am – 10:00am, Room 308

### **Presider:**

Ling L. Liang, LaSalle University, USA

### **Presenters:**

Gavin W. Fulmer, National Science Foundation, USA

Michael J. Reiss, Institute of Education, University of London, UK

Lingbiao Gao, South China Normal University, China

Larry D. Yore, University of Victoria, Canada

Joseph S. Krajcik, Michigan State University, USA

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

Cultural and Linguistic Diversity: Implications for Career Choices and Classroom Learning

8:30am – 10:00am, Room 107

### **Presider:**

Christina Siry, University of Luxembourg

## A Case Study Exploring Latina Girls' Perceptions of Pursuing a Career in Biology

Yeni Violeta Garcia, University of Northern Colorado,  
yeni.garcia@unco.edu

## Immigrant Generation as Predictor for Pursuing Careers in Life Sciences, Physical Sciences and Engineering

Florin D. Lung, Clemson University, florinlung@gmail.com

Geoff Potvin, Clemson University

Gerhard Sonnert, Harvard-Smithsonian Center for Astrophysics

Philip M. Sadler, Harvard-Smithsonian Center for Astrophysics

## Microcosmos: A Culturally Relevant Science-Learning Environment for 2nd Generation Latino Elementary Students

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

Consuelo J. Morales, University of Michigan, Ann Arbor

Teresa Satterfield

## How One Teacher Promoted Science Discourse among English Learners: Describing Pedagogical Successes and Continued Challenges

Lauren H. Swanson, Whittier College Whittier, California,

lswanson@whittier.edu

## Strand 12: Educational Technology

Cognitive Reasoning with Technology

8:30am – 10:00am, Room 101

### **Presider:**

Barbara C. Buckley, WestEd

## Levels of Reasoning among Girls Engaged in Technology-Enhanced Science Inquiry in an Urban Elementary Classroom

Amy Trauth-Nare, Indiana University, amtrauth@indiana.edu

Gayle A. Buck, Indiana University

Nicole Beeman-Cadwallader, Indiana University

## Being Smart About SmartGraphs: An Experimental Trial in Physical Science Classrooms

Rachel E. Kay, The Concord Consortium, RKay@concord.org

Andrew Zucker, The Concord Consortium

Carolyn Staudt, The Concord Consortium

## Avatar Attributes and a Third Space: Supporting Positive Affect in Learning Science through Virtual Digital Assistants

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

Jennifer London, North Carolina State University

Gail M. Jones, North Carolina State University

John Bedward, North Carolina State University

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

Chemistry Education

8:30am – 10:00am, Room 102

## Why Has the Bohr-Sommerfeld Model of the Atom been Ignored by General Chemistry Textbooks?

Liberato Cardellini, Universita Politecnica delle Marche, Italy,

lcardellini@univpm.it

Mansoor Niaz, Universidad de Oriente, Venezuela

## Midgley, Tetraethyl Lead and CFCs: A Historical Case Study for Chemical Education

Paulo A. Porto, Instituto de Química - Universidade de São Paulo (Brasil),

palporto@iq.usp.br

Hélio E. B. Viana, Universidade Federal da Bahia (Brasil)

## How Chemistry Works? Reflections on Triadic Approaches and a Contribution From Peircean Semiotics

Karina A.F.D Souza, Instituto Federal de São Paulo,

karina\_souza@ifsp.edu.br

Paulo A. Porto, Instituto de Química - Universidade de São Paulo

### The Role of 5E Learning Cycle Model on Students' Conceptual Understanding of Solubility Equilibrium Concepts

Nurdane Aydemir, [nurdaneyazici@gmail.com](mailto:nurdaneyazici@gmail.com)

Omer Geban

Murat Aydemir

## Concurrent Session #4 10:15am – 11:45am

### Equity and Ethics Committee Sponsored Session Re-Imagining Our Research by Using New Theoretical Frameworks in Science Education

10:15am – 11:45am, Room 313

#### **Presiders:**

Felicia M. Mensah, Teachers College, Columbia University

Julie A. Bianchini, University of California, Santa Barbara

#### **Presenters:**

Heidi Carlone, University of North Carolina-Greensboro

Pauline Chinn, University of Hawaii-Manoa

Alberto J. Rodriguez, San Diego State University

Randy Yerrick, University of New York-Buffalo

Eileen C. Parsons, University of North Carolina-Chapel Hill

### External Policy Committee & Strand 15: Policy Sponsored Session

Session 2: Opting In: State Education Agencies and the Next Generation Science Standards

10:15am – 11:45am, Room 104

#### **Presiders:**

Andrew W. Shouse, University of Washington

Christopher Wilson, BSCS

#### **Presenters:**

Tom Keller, National Research Council

Stephen Pruitt, Achieve

Peter McLaren, Rhode Island Department of Education

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

Biology Instruction and Assessment

10:15am – 11:45am, Room 310

**Presider:** Anat Yarden, Weizmann Institute of Science

### Reliability and Validity of Scores on the Transformative Experience Questionnaire on Matter and Genetics

Kristin L. K. Koskey, The University of Akron, [koskey@uakron.edu](mailto:koskey@uakron.edu)

Toni A. Sondergeld, Bowling Green State University

Victoria C. Stewart, The University of Toledo

Kathryn Vuchak, The University of Akron

Kevin J. Pugh, University of Northern Colorado

### Eighth Grade Students' Conceptions of Energy Flow through Ecosystems

Ashlie M. Beals, University of Kentucky, [ambeal0@uky.edu](mailto:ambeal0@uky.edu)

Rebecca M. Krall, University of Kentucky

### Students' Systemic Reasoning of Food Webs at Lower Elementary Level (Grades 1-4)

Hayat Hokayem, Michigan State University, [alhokaye@msu.edu](mailto:alhokaye@msu.edu)

Amelia Wenk Gotwals, Michigan State University

### Feeling of Certainty: Uncovering a Missing Link between Knowledge and Acceptance of Evolution

David L. Haury, The Ohio State University, [haury.2@osu.edu](mailto:haury.2@osu.edu)

Minsu Ha, The Ohio State University

Ross H. Nehm, The Ohio State University

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

Argumentation and Discussion

10:15am – 11:45am, Room 302

**Presider:** David L. Fortus, Weizmann Institute of Science

### The Influence of Students' Acceptance of Evolution on SSI Negotiation

Samantha R. Fowler, Clayton State University, [Samanthafowler@clayton.edu](mailto:Samanthafowler@clayton.edu)

Dana L. Zeidler, University of South Florida

### Beyond "Doing the Lesson": The Nature of Argumentation in a Fifth-Grade Classroom

Ying-Chih Chen, University of Minnesota, [chen2719@umn.edu](mailto:chen2719@umn.edu)

Brian M. Hand, University of Iowa

Soonhye Park, University of Iowa

### Comparing Students' Written and Verbal Scientific Arguments

Amanda M. Knight, Boston College, [knightam@bc.edu](mailto:knightam@bc.edu)

Katherine L. McNeill, Boston College

### For whom is Argument and Explanation a Necessary Distinction?

Leema Berland, University of Texas, Austin, [leema.berland@mail.utexas.edu](mailto:leema.berland@mail.utexas.edu)

Katherine L. McNeill, Boston College

**Strand 3: Science Teaching--Primary School  
(Grades preK-6): Characteristics and Strategies**  
Language and Literacy in the Elementary Classroom  
**10:15am – 11:45am, Room 301**

**Presider:**

Sarah J. Carrier, North Carolina State University

**Lexical Complexity of Science Read-aloud Texts  
and Discussion**

Rory J. Glass, University of Albany, rcbglass@aol.com

**Using Pictorial Models in Elementary Science  
Read-Alouds to Communicate Science across  
Grade Levels**

Michael Mastroianni, University at Albany, SUNY, mastroim@gmail.com

Seema Rivera, Suny Albany

Rory J. Glass, University of Albany

Alandeom W. Oliveira, University at Albany, SUNY

Francine Wizner, University at Albany, SUNY

**Reading Pictorial Models in Elementary Read-  
Alouds**

Seema Rivera, University at Albany, SUNY, SR681696@albany.edu

Michael Mastroianni, University at Albany, SUNY

Alandeom W. Oliveira, University at Albany, SUNY

Rory J. Glass, University at Albany, SUNY

Vincent Amodio, University at Albany, SUNY

Francine Wizner, University at Albany, SUNY

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

Related Paper Set - Multiple Approaches to Video as  
a Tool for Exploring Teachers' Pedagogical Content  
Knowledge

**10:15am – 11:45am, Room 303**

**Presider:**

Alicia C. Alonzo, Michigan State University

**Discussant:**

Julie A. Luft, The University of Georgia

**Exploring Teachers' Pedagogical Content  
Knowledge in Formative Assessment  
Conversations**

Kristin Mayer, Michigan State University, kristi.mayer@gmail.com

Alicia C. Alonzo, Michigan State University

**Exploring Teachers' Pedagogical Content  
Knowledge through Enactments of a Newton's  
Third Law Demonstration**

Sarah Guile, Michigan State University, guilesar@msu.edu

Alicia C. Alonzo, Michigan State University

**Exploring Teachers' Pedagogical Content  
Knowledge Elicited with Video Clips from Their  
Own Classroom Instruction**

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

Alicia C. Alonzo, Michigan State University

**Exploring Teachers' Pedagogical Content  
Knowledge Elicited with Video Clips Focused on  
Student Thinking**

Alicia C. Alonzo, Michigan State University, alonzo@msu.edu

Jiwon Kim, Michigan State University

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

Conceptual Understanding - Biology

**10:15am – 11:45am, Room 304**

**Presider:**

Peter A. Okebukola, Lagos State University

**Investigating the Relationship between College  
Students' Acceptance of Evolution and Tree  
Thinking Understanding**

Kristy L. Halverson, University of Southern Mississippi,

kristy.halverson@usm.edu

Emily Walter, University of Missouri

Carrie J. Boyce, University of Southern Mississippi

**Undergraduate Biology Students' Conceptions of  
the Term 'Animal'**

Andrea Bierma, Western Michigan University, andrea.m.kryger@wmich.edu

Renee S. Schwartz, Western Michigan University

**Microbiology Instruction: Students' Perceptions of  
Risks Related to Microbial Illness**

Gail M. Jones, NC State University, Gail\_Jones@ncsu.edu

Grant E. Gardner, East Carolina University

Tammy M. Lee, East Carolina University

Sarah Robert, NC State University

Kayla Poland, NC State University

**College Freshmen Students' Conceptions of  
Natural Selection and Evolution**

Mustafa B. Aktan, Hacettepe University, mbaktan@hacettepe.edu.tr



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

Learning through Experiences

10:15am – 11:45am, Room 309

### **Presider:**

Geoff Potvin, Clemson University

### **Undergraduate Science Course Reform: Impacts on Faculty and Students**

Dennis W. Sunal, The University of Alabama, dwsunal@bama.ua.edu

Cynthia Sunal, The University of Alabama

Mason Cheryl, San Diego State University

Dean A. Zollman, Kansas State University

### **Learning through Undergraduate Research: Practice of Inquiry and Understandings about Nature of Science and Nature of Scientific Inquiry**

Maya Patel, Ithaca College, Cornell University, mpatel@ithaca.edu

Barbara A. Crawford, University of Georgia

Deborah Trumbull, Cornell University

### **Teaching Teamwork & Communication: Faculty Beliefs in Engineering Education**

Andrea M. Motto, Virginia Tech, andreamotto@vt.edu

Holly Matusovich, Virginia Tech

Marie Paretti, Virginia Tech

### **Metacognition and Learning Gain in Foundation Chemistry: A Case Study**

Marietjie Potgieter, University of Pretoria, marietjie.potgieter@up.ac.za

Kgadi Mathabathe, Department of Science, Mathematics and Technology Education, University of Pretoria

Salome Human-Vogel, Department of Educational Psychology, University of Pretoria

## Strand 6: Science Learning in Informal Contexts

Related Paper Set - Designing for Science Learning: Accounting for the Role for Families and Parents in Supporting Youth

10:15am – 11:45am, Room 305

### **Presider:**

Heather Toomey Zimmerman, Pennsylvania State University

### **Discussant:**

Lynn D. Dierking, Oregon State University

### **Understanding How Families use Observational Tools during Nature Center Hikes**

Heather Toomey Zimmerman, Pennsylvania State University, heather@psu.edu

Lucy R. McClain, Penn State University

Michele Crowl, Pennsylvania State University

Lynn D. Dierking, Oregon State University

### **Connecting School Science Learning with At-home Activities: Documenting Learning through a Science Backpack Program**

Carrie T. Tzou, University of Washington, tzouct@northwestern.edu

Elyse Litvack, Maple Elementary

### **Tools for Talk: Strategies for Supporting the Observational Capacity of Families**

Catherine Eberbach, Rutgers University, catherine.eberbach@gse.rutgers.edu

### **Disciplinary Talk by Design: Identifying Expert and Novice Patterns of Parent-child Engagement with Exhibits**

Sasha Palmquist, Institute for Learning Innovation, spalmquist@gmail.com

### **Exploring the Impact of Family Involvement on Youth Engagement in a Creative Robotics Workshop**

Debra Bernstein, TERC, debra\_bernstein@terc.edu

Emily Hamner, Carnegie Mellon University

## Strand 7: Pre-service Science Teacher Education

Elementary Science Teacher Preparation I

10:15am – 11:45am, Room 306

### **Presider:**

Gail L. Dickinson, Texas State University

### **Preservice Elementary Teachers in Service Learning Settings: Developing Ideas about Teaching, Learning and Teacher Identity**

Carolyn S. Wallace, Indiana State University, carolyn.wallace@indstate.edu

Charles Eick, Auburn University

### **Encouraging Elementary Teacher Candidates' Understandings of Ambitious Science Instruction**

Julianne A. Wenner, The University of Georgia, jakent@uga.edu

Julie M. Kittleson, The University of Georgia

Janna Dresden, The University of Georgia

### **Learning to Support Elementary Students' Scientific Reasoning: Preservice Elementary Teachers and the Evidence-Explanation Continuum**

Laura Zangori, University of Iowa, laura-zangori@uiowa.edu

Cory T. Forbes, University of Iowa

Mandy Biggers, University of Iowa

### **Pre-service Elementary Teachers' Learning to Integrate Science and Language Instruction for Linguistically Diverse Students**

Youngjin Song, University of Northern Colorado, youngjin.song@unco.edu

Elizabeth Franklin, University of Northern Colorado

Teresa Higgins, University of Northern Colorado

## **Strand 8: In-service Science Teacher Education** Development and Characteristics of Science Teacher Leaders

**10:15am – 11:45am, Room 105**

### **Presider:**

Jodie Galosy, Knowles Science Teaching Foundation

## **The Relationship between Effectual Reasoning and Implementing Innovations among K-12 Science Teachers**

Anita M. Martin, University of Illinois, [abmartin@illinois.edu](mailto:abmartin@illinois.edu)

Fouad Abd-El-Khalick, University of Illinois

Ray Price, University of Illinois

Elisa Mustari, University of Illinois

## **Science, Technology, Engineering, Mathematics, and World Language Teachers: Fostering Teacher Leaders for the 21st Century**

Wendy M. Frazier, George Mason University, Fairfax,

Virginia, [wfrrazier@gmu.edu](mailto:wfrrazier@gmu.edu)

Rebecca K. Fox, George Mason University, Fairfax, Virginia

Mollianne G. Logerwell, George Mason University, Fairfax, Virginia

## **Exploring Ninth-Grade Science Teachers' Path of Leadership for Implementing Educational Reform Efforts: A Case Study**

Carina M. Rebello, University of Missouri, [cp5xc@mail.mizzou.edu](mailto:cp5xc@mail.mizzou.edu)

Ya-Wen Cheng, University of Missouri

Somnath Sinha, University of Missouri

Deborah L. Hanuscin, University of Missouri-Columbia

## **Developing Science Teacher Leaders through Long-Term Professional Development: A Cross-Case Analysis of Four Teachers**

Janelle M. Bailey, University of Nevada, Las Vegas, [Janelle.Bailey@unlv.edu](mailto:Janelle.Bailey@unlv.edu)

Abeera P. Rehmat, University of Nevada, Las Vegas

Doug Lombardi, University of Nevada, Las Vegas

Edward Keppelmann, University of Nevada, Reno

## **Strand 8: In-service Science Teacher Education** Research Experiences for Science Teachers

**10:15am – 11:45am, Room 106**

### **Presider:**

Donna R. Sterling, George Mason University

## **When are Teachers Prepared to Implement Reform Science Practices?**

Katrina Roseler, Florida State University, [kr09e@my.fsu.edu](mailto:kr09e@my.fsu.edu)

Giang Nguyen

Barry Golden, University of Tennessee

## **The Impact of RET's on Elementary and Secondary Grade Level of Teachers' Views of Scientific Inquiry**

Sibel Uysal Bahbah, [suysal@fsu.edu](mailto:suysal@fsu.edu)

Barry Golden

Beth Kostka

Semra Mirici

Giang Nguyen

## **Assessing the Value of Research Experiences for Teachers: Building Knowledge, Skills, Credibility, and Identity**

Sanlyn R. Buxner, University of Arizona, [buxner@email.arizona.edu](mailto:buxner@email.arizona.edu)

## **Challenges and Benefits of Implementing Authentic Inquiry-Based Instruction through a Research Experience for Teachers Program**

Lisa C. Benson, Dept of Engineering and Science Education,

Clemson University, [lbenson@clemson.edu](mailto:lbenson@clemson.edu)

Carol H. Wade, Harvard/Smithsonian Center for Astrophysics

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

Curriculum and Implementation

**10:15am – 11:45am, Room 308**

### **Presider:**

Mary M. Atwater, The University of Georgia

## **Conceptual Demand of Science Curricula: Studying Practical Work in High School Biology and Geology**

Silvia Ferreira, University of Lisbon, Portugal, [silviacrferreira@gmail.com](mailto:silviacrferreira@gmail.com)

Ana M. Morais, University of Lisbon, Portugal

## **A Framework of Active Learning by Concept Mapping**

Wang-Kun Chen, Jinwen University of Science and Technology,

[wangkun@just.edu.tw](mailto:wangkun@just.edu.tw)

Ping Wang, Ching Yun University

## **A Case for Reconceptualizing Coherence in Science Curricula**

Tiffany-Rose Sikorski, University of Maryland, College Park,

[tsikorsk@umd.edu](mailto:tsikorsk@umd.edu)

## **Connecting Curriculum Materials and Teachers: Elementary Science Teachers' Enactment of a Reform-based Curricular Unit**

Amber M. Schultz, University of Michigan, [aschul@umich.edu](mailto:aschul@umich.edu)

Anna Maria Arias, University of Michigan

Elizabeth A. Davis, University of Michigan

Annemarie S. Palincsar, University of Michigan

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

Urban Children and Science: Identity, Representation, and Implications for Science Education

10:15am – 11:45am, Room 107

**President:**

Gale A. Seiler, McGill University

**Language, Identity, & Cognition: Disaggregating Science Instruction for Urban Students**

Bryan A. Brown, Stanford University, brbrown@stanford.edu

**The Electricity Went Out and My Teacher Said,**

Bhaskar Upadhyay, University of Minnesota, bhaskar@umn.edu

Nancy Albrecht, University of Minnesota

Kristina Maruyama Tank, University of Minnesota

Geoffrey Maruyama, University of Minnesota

Martin Adams, University of Minnesota

Timothy Sheldon, University of Minnesota

Brian Fortney, University of Texas at Austin

**Recognition in the Classroom: Examining the Physics Identity Development of Marginalized Students through Case Studies**

Carrie E. Beattie, Clemson University, cbeatti@g.clemson.edu

Zahra Hazari, Clemson University

Cheryl A.P. Cass, North Carolina State University

**Students Awareness and Varied Use of Classroom as Social Construct**

Adriane M. Slaton, slatonad@msu.edu

**Strand 12: Educational Technology**

Games, Simulations, Virtual Environments, & GIS

10:15am – 11:45am, Room 101

**President:**

Karen E. Irving, The Ohio State University

**Investigating Students' Ideas about Buoyancy and the Influence of Haptic Feedback**

James Minogue, North Carolina State University, james\_minogue@ncsu.edu

David Borland, Universitat de Barcelona and IDIBAPS Barcelona, Spain

**Integrating Geographic Information Systems in a Science Methods Course-Preservice Teachers Examining STS Issues**

Josephine Shireen Desouza, Ball State University, Muncie, Indiana,

jmdesouza@bsu.edu

**Immersing Preservice Science Teachers in Serious Educational Games**

Leonard A. Annetta, George Mason University, lannetta@gmu.edu

Richard L. Lamb, George Mason University

James Minogue, North Carolina State University

Rebecca Cheng, George Mason University

David B. Vallett, George Mason University

Shawn Y. Holmes, North Carolina State University

Elizabeth Folta, College of Environmental Science & Forestry

**Virtual Learning Environment Preference, Perception of Helpfulness, and Achievement in Taiwanese Earth Science Students**

Ming-Chao Lin, National Taiwan Normal University, 89344006@ntnu.edu.tw

Shane Tutwiler, Harvard University

Chun-Yen Chang, National Taiwan Normal University

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

Strand Sponsored Session - Teaching and Assessment of Inquiry and Nature of Science with Early Childhood Students

10:15am – 11:45am, Room 102

**President:**

Norman G. Lederman, Illinois Institute of Technology

**Presenters:**

Valarie L. Akerson, Indiana University

Judith S. Lederman, Illinois Institute of Technology

Leon Walls, University of Vermont

Gayle A. Buck, Indiana University

Erin Peter Burton, George Mason University

**Strand 14: Environmental Education**

Science Teacher Education as a Context for Environmental Literacy Improvement

10:15am – 11:45am, Room 103

**President:**

Bryan H. Nichols, University of South Florida

**Conceptualizing In-service Secondary School Science Teachers' Knowledge Base for Climate Change Content**

Devarati Bhattacharya, University of Minnesota, Minneapolis, devarati@umn.edu

Engin Karahan, University of Minnesota, Minneapolis

Younkyeong Nam, University of Minnesota, Minneapolis

Jeremy Wang, University of Minnesota, Minneapolis

Shiyu Liu, University of Minnesota, Minneapolis

Benjamin Tierney, University of Minnesota, Minneapolis

Keisha Varma, University of Minnesota

Gillian Roehrig, University of Minnesota

### **Pre-service Elementary Teachers' Outdoor Experiences: How Do These Translate into Beliefs on Taking Students Outdoors?**

Erica N. Blatt, College of Staten Island, CUNY, erica.blatt@csi.cuny.edu

### **Exploring Teachers' Barriers to Implementing System Dynamics Tools for Sustainability Education**

Heather J. Skaza, University of Nevada-Las Vegas, skazah@unlv.nevada.edu

Kent J. Crippen, University of Florida

Kristoffer Carroll, Clark County School District

### **Exploring Science Teacher Attitudes towards Instruction Through Foods, Investigations, Soils, and Healthy Habits (FISHH)**

Christopher D. Murakami, University of Missouri,

cdm7@mail.missouri.edu

Parker E. Stuart, University of Missouri

Stephen B. Witzig, University of Missouri

Anna M. Waldron, University of Missouri

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### **NARST Business Meeting**

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

12:00pm – 1:00pm, Room 201 – 202

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## **Concurrent Session #5**

### **1:15pm – 2:45pm**

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#### **Equity and Ethics Committee Sponsored Session**

Symposium - Developing a NARST Code of Ethics

1:15pm – 2:45pm, Room 103

#### **Presenters:**

Sarah Barrett, York University, sbarrett@edu.yorku.ca

Julie A. Bianchini, University of California, Santa Barbara

Brian S. Fortney, University of Texas at Austin

J. Randy McGinnis, University of Maryland

Felicia M. Mensah, Teachers College, Columbia University

Matthew Weinstein, University of Washington, Tacoma

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#### **International Committee Sponsored Session**

Symposium - Contributions from the European Science Education Research Association (ESERA): Addressing Diversity in Science Education through Research about Cultural Diversity of Students, Brain-type and Motivation, Multiple Workplace Policies and Multiple Representations

1:15pm – 2:45pm, Room 313

#### **Presiders:**

Sibel Erduran, University of Bristol

Manuela Welzel-Breuer, ESERA, Germany

### **Dialogic Research in a Diverse Globalizing World: Ways of Valuing Local Voices in Multi-Partner Design Research Including both Developing and Developed Countries**

Michiel van Eijck, Eindhoven University of Technology, The Netherlands,  
Ralf van Griethuijsen, Eindhoven University of Technology,

The Netherlands

SweeChin Ng, Tunku Abdul Rahman College, Malaysia

SiewChee Choy, Tunku Abdul Rahman College, Malaysia

Saouma B. Boujaoude, American University of Beirut, Lebanon

Sugra Chunawala, Tata Institute of Fundamental Research, India

Chitra Natarajan, Tata Institute of Fundamental Research, India

Huseyin Bag, Pamukkale University, Turkey

Ayse Savran Gencer, Pamukkale University, Turkey

Helen Haste, University of Bath, UK/Harvard Graduate School of Education, USA

Nasser Mansour, University of Exeter, UK

Alun Morgan, University of Exeter, UK

Keith Postlethwaite, University of Exeter, UK

### **Brain Type- a Cross Cultural Constant of Motivation to Learn Science?**

Albert Zeyer, University of Zurich, Switzerland,

Ayla Çetin-Dindar, Middle East Technical University, Ankara, Turkey

Ahmad Nurulazam Md Zain, Universiti Sains, Malaysia

Mojca Juriševič, University of Ljubljana, Slovenia

Iztok Devetak, University of Ljubljana, Slovenia

Freia Odermatt, University of Zurich, Switzerland

### **Balancing Multiple Policies in the Workplace: Teachers' Experiences of Science Curriculum Reform**

Jim Ryder, University of Leeds, UK,

Indira Banner, University of Leeds, UK

Jim Donnelly, University of Leeds, UK

### **Representational Competence and Understanding of Scientific Experiments, Phenomena and Concepts: At a Crossroad of Progress for the Science Education of the 21st Century**

Jochen Scheid, University of Landau, Germany,

Rosa Hettmannsperger, University of Landau, Germany

Jochen Kuhn, University of Landau, Germany

Wolfgang Schnotz, University of Landau, Germany

Andreas Müller, University of Geneva, Switzerland



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

Related Paper Set - Immersion into Argument-based Inquiry: Understanding Critical Elements for Classroom Practice

1:15pm – 2:45pm, Room 310

### **Discussants:**

Brian M. Hand, University of Iowa

### **The Effect of the SWH Implementation in Turkish School System: Results from a Scale up Research Project**

Murat Gunel, AHT Euran University, mgunel@yahoo.com

Recai Akkus, Abant Izzet Baysal University, Turkey

Melike Ozer-Keskin, Gazi University, Turkey

Nilay Keskin-Samanci, Gazi University, Turkey

### **The Impacts of Writing in Argument-Based Inquiry on Science Learning**

Hyeongjeong Kil, Pusan National University, hj9620@hanmail.net

Jeonghee Nam, Pusan National University

### **Modeling Scientific Communication with Multimodal Writing Tasks: Impact on Students at Different Grade Levels**

Mark McDermott, Wartburg College, mark.mcdermott@wartburg.edu

Audrey Sturtz, Manson-NW Webster High School

Jake Mohling, Humboldt Middle School

### **Examining Professional Development Programs and PD Leaders' Orientation to Immersive Argument-based Inquiry Practices**

Mary Grace Villanueva, University of Iowa, marygrace-villanueva@uiowa.edu

Brian M. Hand, University of Iowa

### **Argument as a Linchpin between Learning, Teaching, and Science: Conceptualizing Science Instruction as Argument**

Andy Cavagnetto, Binghamton University, acavagne@binghamton.edu

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

Related Paper Set - High School Science Teacher Professional Cultures that Successfully Retain Teachers and Prepare Students in Science

1:15pm – 2:45pm, Room 302

### **Presider:**

Carol L. Stuessy, Texas A&M University

### **Discussant:**

Timothy Scott, Texas A&M University

## Conceptualize, Contact, Collect, Connect: Using Mixed Methods to Characterize the High School Science Teacher Professional Culture

Todd D. Bozeman, Texas A&M University, dbozeman71@tamu.edu

Carol L. Stuessy, Texas A&M University

Caroline V. Rosado, Texas A&M University

Tyrone Blocker, Texas A&M University

## Recruit, Induct, Engage, Renew: School Support in a Healthy High School Science Teacher Professional Culture

Ra'sheedah Richardson, Texas A&M University, sheedah@tamu.edu

Laura E. Ruebush, Texas A&M University

Toni Ivey, Oklahoma State University

## Activity, Job Satisfaction, Mobility: Teachers as Contributors and Consumers of the Science Teacher Professional Continuum

Sara E. Spikes, Texas A&M University, sspikes@tamu.edu

Todd D. Bozeman, Texas A&M University

## Achievement Gap: Working Conditions and Science Teacher Professional Culture in Low- and High-Achieving Schools

Carol L. Stuessy, Texas A&M University, c-stuessy@tamu.edu

Victoria Hollas, Texas A&M University

## Implications for Higher Education and the Preparation of High School Science Teachers

Timothy Scott, Texas A&M University, tim@science.tamu.edu

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

Science as Inquiry

1:15pm – 2:45pm, Room 301

### **Presider:**

Fouad Abd-El-Khalick, University of Illinois at Urbana-Champaign

## Dichotomous Inquiry Practices: Characterizing Teaching Practice based on Essential Features of Inquiry

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

ChingMei Tseng, University of Iowa

Jee Kyung Suh, University of Iowa

Cory T. Forbes, University of Iowa

Mandy Biggers, University of Iowa

Laura Zangori, University of Iowa

## Characteristics of Scientifically-oriented Questions and the Nature of Inquiry in Elementary

### Classrooms: A Multiple-case Study

Claudia P. Aguirre-Mendez, The University of Iowa, claudiapatriciac-aguirre-mendez@uiowa.edu

Natida Promyod, University of Iowa

Cory T. Forbes, University of Iowa

Mandy Biggers, University of Iowa

Laura Zangori, University of Iowa

## Cultural Themes as the Center of Inquiry Science Curricula in American Indian Head Start Classrooms

Mia Dubosarsky, University of Minnesota, dubo0053@umn.edu

Gillian Roehrig, University of Minnesota

Stephan Carlson, University of Minnesota

Jennifer Jones, University of Minnesota

Barb Murphy, University of Minnesota

Linda Frost, University of Minnesota

## The Impact of Equitable and Inquiry-based Science Teaching on American Indian Students' Test Scores

Bruna Irene Grimberg, grimberg@montana.edu

Edith Gummer

Judith Devine

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

Related Paper Set - Promoting Reform through

Instructional Materials that Educate

1:15pm – 2:45pm, Room 303

### Part 1 of the Intervention: Educative Curriculum Materials

Janet Carlson, BSCS, jcarlson@bscs.org

Joseph A. Taylor, Biological Science Curriculum Study

April L. Gardner, Biological Science Curriculum Study

Julie Gess-Newsome, Willamette University

### Part 2 of the Intervention: Curriculum-based, Transformative Professional Development

April L. Gardner, Biological Science Curriculum Study, agardner@bscs.org

Janet Carlson, BSCS

Julie Gess-Newsome, Willamette University

## Linking the Intervention to the Evidence (or Linking the Evidence to the Intervention)

Molly Stuhlsatz, BSCS, mstuhlsatz@bscs.org

Joseph A. Taylor, Biological Science Curriculum Study

April L. Gardner, Biological Science Curriculum Study

Julie Gess-Newsome, Willamette University

Janet Carlson, BSCS

Christopher Wilson, BSCS

## Considering Personal and Contextual Influences

Julie Gess-Newsome, Willamette University, jgessnew@willamette.edu

April L. Gardner, Biological Science Curriculum Study

Janet Carlson, BSCS

Joseph A. Taylor, Biological Science Curriculum Study

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

Argumentation in Science Learning

1:15pm – 2:45pm, Room 304

### Presider:

Vicente A. Talanquer, University of Arizona

## Using a Science Laboratory Course to Enhance Undergraduate Students' Arguments Related to Socioscientific Issues

Jonathon Grooms, The Florida State University, jgrooms@fsu.edu

Victor D. Sampson, Florida State University

## Exploring the Impact of Argumentation on College Students' Conceptual Understanding of The Properties and Behavior of Gases

Mehmet Aydeniz, The University of Tennessee, maydeniz@utk.edu

Pinar S. Cetin, Bolu Abant Izzet Baysal University

Aybuke Pabuccu, Bolu Abant Izzet Baysal University

Ebru Kaya, Selcuk University

## Negotiation and Argumentation among Engineering Students

Nicholas Fila, Purdue University, nfila@purdue.edu

Senay Purzer, Purdue University

## Disjunction as a Facilitator to Enhance Argumentation Quality in Problem-Based Learning

Chia-Hui Hung, National Taiwan Normal University,

beautycathy1121@gmail.com

Chen-Yung Lin, National Taiwan Normal University

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

College Faculty Development

1:15pm – 2:45pm, Room 309

### Presider:

Grant E. Gardner, East Carolina University

## Faculty Development via Sharing and Documenting Course Activities for Flexible Adoption/Adaptation across Multiple Institutions

Dedra N. Demaree, Oregon State University,

demareed@physics.oregonstate.edu

Sissi L. Li, Oregon State University

Nam-Hwa Kang, Oregon State University

Dennis Gilbert, Lane Community College

Gregory Mulder, Linn-Benton Community College

Corinne Manogue, Oregon State University

## Developing the Grass-Roots Choir: STEM Faculty Agency In Undergraduate Reform

Jana Bouwma-Gearhart, University of Kentucky, jlb226@uky.edu

## Constructing College Chemistry Instructors' Worldviews

Mary Chang, mkhchang@hawaii.edu

## Preparation of University Graduate Teaching Assistants: Challenges, Expectations and Participation in Professional Development Activities

Gili Marbach-Ad, University of Maryland, gilim@umd.edu

Kathryn L. Schaefer, University of Maryland

Katerina V. Thompson, University of Maryland

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## Strand 6: Science Learning in Informal Contexts

Tools and Technologies Facilitating Informal Learning

1:15pm – 2:45pm, Room 305

### *Presider:*

Leonie J. Rennie, Curtin University of Technology

## Evaluation of an Out-of-School Time (OST) Genetics Program using a Multidimensional Conceptual Change Perspective

Marty D. Coon, Van Andel Education Institute, marty.coon@vai.org

## Merging Playfulness with the Formal Science Curriculum in an Outdoor Learning Environment

Nir Orion, Weizmann Institute of Science, nir.orion@weizmann.ac.il

Molly L. Yunker, Weizmann Institute of Science

## The Range of Science Instructional Materials used in a Statewide Afterschool Program

Ruchi T. Bhanot, SRI International, ruchi.bhanot@sri.com

Christopher J. Harris, SRI International

Ann House, SRI International

Carlin Llorente, SRI International

## Bridging Inquiry across Settings Using Mobile and Curricular Supports

Clara Suzanne Cahill, University of Michigan, claracah@umich.edu

Shannon E. Schmoll, University of Michigan

Ibrahim Delen, University of Michigan

Wan-Tzu Lo, University of Michigan

Alex Kuhn, University of Michigan

Brenna McNally, University of Michigan

Chris Quintana, University of Michigan

Joseph S. Krajcik, Michigan State University

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## Strand 7: Pre-service Science Teacher Education

Elementary Science Teacher Preparation II

1:15pm – 2:45pm, Room 306

### *Presider:*

Josephine Shireen Desouza, Ball State University

## Preservice Elementary Teachers use of Discourse Moves to Support the Social Construction of Science Concepts

Elisebeth Boyer, Penn State University, eboyer@psu.edu

Carla Zembal-Saul, Penn State University

## Re-thinking Early Field Experiences For the Purpose of Preparing Elementary Preservice Teachers Pedagogical Content Knowledge

Vanashri Nargund-Joshi, Indiana University, Bloomington,

vnargund@indiana.edu

Meredith A. Park Rogers, Indiana University

Heidi L. Wiebke, Indiana University, Bloomington

Valarie L. Akerson, Indiana University

## Response-shift Bias of Internal and External Standards in Elementary Science Pre-service Teachers

Tina Cartwright, Marshall University, tina.cartwright@marshall.edu

Jon Atwood, Marshall University

## Structured Communities, Science Instruction Development, and the Use Of Digital Media in A Pre-Service Elementary Teacher Education Program

Steven D. Wall, University of North Carolina at Chapel Hill,

dodd220@aol.com

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

Julie E. Justice, University of North Carolina at Chapel Hill

Jennifer Jones-Gorham, University of North Carolina at Chapel Hill

Kat Nichols, University of North Carolina at Chapel Hill

Ashley Boyd, University of North Carolina at Chapel Hill

Jonathan Bartels, University of North Carolina at Chapel Hill

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## Strand 8: In-service Science Teacher Education

Models for Promoting Teacher Learning

1:15pm – 2:45pm, Room 105

### *Presider:*

Tamara H. Nelson, Washington State University Vancouver

## Teacher-learning Processes During Professional Development: Conceptual Change and Metacognitive Analyses

Hedi B. Lauffer, University of Wisconsin-Madison, hfbaxter@wisc.edu

Peter W. Hewson, University of Wisconsin-Madison

### Perspectives on Teaching and Learning to Teach from Students and Teachers in a Teacher-Developed Situated PD Model

Rachel Ruggirello, Washington University in St. Louis, [ruggirello@wustl.edu](mailto:ruggirello@wustl.edu)  
Phyllis Balcerzak, Washington University  
Vicki May, Washington University in St. Louis  
Jill Mcnew, Washington University

### Change in Teachers' Instructional Practices Over Time: The Effects of Master's Program on Science Instruction

Yasemin Copur Gencturk, University of Illinois at Urbana-Champaign, [ycopur2@illinois.edu](mailto:ycopur2@illinois.edu)  
Barbara Hug, University of Illinois at Urbana-Champaign

### Is it Possible to Explicitly Stimulate Pedagogical Discontentment in Science Teachers through a Graduate Course?

Margaret R. Blanchard, North Carolina State University, [meg\\_blanchard@ncsu.edu](mailto:meg_blanchard@ncsu.edu)  
Jason W. Osborne, Old Dominion University  
Jennifer L. Albert, North Carolina State University

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

Teacher Conceptions of Life Science

1:15pm – 2:45pm, Room 106

#### **President:**

Jan H. Van Driel, Leiden University

### In-service Biology Teachers' Perceptions and Adaptation of Evolution Issue into the Curriculum

Yilmaz Kara, Karadeniz Technical University, [yilmazkaankara@yahoo.com](mailto:yilmazkaankara@yahoo.com)

### The Impact of a Science Teacher Professional Development Program on Evolution Knowledge, Misconceptions, and Acceptance

Brian C. Baldwin, Kean University, [bbaldwin@kean.edu](mailto:bbaldwin@kean.edu)  
Minsu Ha, The Ohio State University  
Ross H. Nehm, The Ohio State University

### Characteristics of Teachers and Professional Development that Predict Growth in Life Science Content Knowledge

Thomas R. Tretter, University of Louisville, [tom.tretter@louisville.edu](mailto:tom.tretter@louisville.edu)  
Stephanie B. Philipp, University of Louisville  
Sherri L. Brown, University of Louisville

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

Construct, Item, and Instrument Validation Studies

1:15pm – 2:45pm, Room 308

#### **President:**

Cari F. Herrmann Abell, AAAS/Project 2061

### Investigating Development on a Force and Motion Learning Progression

Irene Neumann, Leibniz Institute for Science and Mathematics Education, [ineumann@ipn.uni-kiel.de](mailto:ineumann@ipn.uni-kiel.de)  
Gavin W. Fulmer, National Science Foundation  
Ling L. Liang, La Salle University  
Knut Neumann, Leibniz Institute for Science Education (IPN) Kiel

### Item Context: How Organisms Used to Frame Natural Selection Items Influence Student Response Choices

Sara C. Heredia, University of Colorado, Boulder, [sara.heredia@colorado.edu](mailto:sara.heredia@colorado.edu)  
Erin M. Furtak, University of Colorado  
Deborah L. Morrison, University of Colorado

### The AUI: A Valid Instrument to Measure High School Students' Knowledge of Flu Transmission and Management

William L. Romine, University of Missouri, [romine.william@gmail.com](mailto:romine.william@gmail.com)  
Lloyd H. Barrow, University of Missouri  
William R. Folk, University of Missouri

### Utilizing Ordered Multiple Choice Items to Assess Students' Understanding of the Matter Concept

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

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

Investigating Women's Identities and Career Trajectories in Science

1:15pm – 2:45pm, Room 107

#### **President:**

Femi Otulaja, University of Witwatersrand

### How Did They Do It? Career and Family Together Among Successful Women Science Educators in Both Formal and Informal Settings

Phyllis Katz, University of Maryland, [pkatz15@gmail.com](mailto:pkatz15@gmail.com)

### Exploring the Longitudinal Professional Development of Teachers to Teach for Diversity through Sociotransformative Constructivism (sTc)

Alberto J. Rodriguez, San Diego State University, [arodrigu@mail.sdsu.edu](mailto:arodrigu@mail.sdsu.edu)

### Female Physicist Doctoral Experiences and Career Choice Factors

Katherine P. Dabney, University of Virginia, [kd3c@virginia.edu](mailto:kd3c@virginia.edu)  
Vanessa Wyss, Ball State University  
Robert H. Tai, University of Virginia



### **African American Female Faculty Members: Factors Influencing their Recruitment, Retention and Promotion at Traditionally White Institutions**

Natasha Johnson, The University of Georgia Athens, GA,  
yjohnson@uga.edu

Mary M. Atwater, The University of Georgia

Malcolm B. Butler, University of South Florida, St Petersburg

Eileen C. Parsons, University of North Carolina at Chapel Hill

Tonjua B. Freeman, The University of Georgia

### **Strand 12: Educational Technology**

Transforming Teaching with Technology

1:15pm – 2:45pm, Room 101

#### ***Presider:***

Janell Nicole Catlin, Teachers College, Columbia University

### **The Effect of Using Representations of Reified Objects in a Simulation on Students' Conceptual Understanding**

Georgios Olympiou, University of Cyprus, olympiog@ucy.ac.cy

Zacharias C. Zacharia, University of Cyprus

Ton de Jong, University of Twente

### **Using Technology to Address Non-Traditional Learning Objectives in an Undergraduate General Chemistry Course**

Ted M. Clark, The Ohio State University, clark.789@osu.edu

Robert P. Griffiths, The Ohio State University

### **High School Students' Development of ICT Fluency/Workforce Skills by Designing a Virtual Science Center**

Camille Ferguson, EDC's Center for Children and Technology, cferguson@edc.org

Preeti Gupta, New York Hall of Science

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

Standards in the History, Philosophy & Sociology of  
Science

1:15pm – 2:45pm, Room 102

#### ***Presider:***

Catherine E. Milne, New York University

### **Teaching Physics as One of the Humanities the History of Harvard Project Physics, 1962-1970**

David Meshoulam, University of Wisconsin-Madison,

meshoulam@wisc.edu

### **Comprehensiveness and Completeness of Nature of Science in State Standards: Update and Report Card**

William F. McComas, University of Arkansas, mcomas@uark.edu

Carole K. Lee, University of Maine Farmington

Sophia J. Sweeney, Northeastern State University

### **Is the Integration of Engineering Design Into K-12 Science Curriculum Prudent?**

Miancheng Guo, Illinois Institute of Technology, mguo7@hawk.iit.edu

Norman G. Lederman, Illinois Institute of Technology

### **Strand 15: Policy**

Curriculum Development

1:15pm – 2:45pm, Room 104

#### ***Presider:***

Michelle P. Cook, Clemson University

### **Science Teachers' Views of Factors that Affect Urban Physics Accessibility and Participation**

Angela M. Kelly, Stony Brook University, angela.kelly@stonybrook.edu

### **Consequences of School Improvement: Examination of the Association between School Improvement and Student Science Achievement**

Adam V. Maltese, Indiana University, amaltese@indiana.edu

Craig D. Hochbein, University of Louisville

### **Challenges in Transition to a Large-Scale Reform in Chemical Education**

Shirly Avargil, Israel Institute of Technology, Haifa, Israel,  
savargil@technion.ac.il

Orit Herscovitz, Israel Institute of Technology, Haifa, Israel

Yehudit Judy Dori, Department of Education in Technology and Science

### **Self-Efficacy, Organizational Culture and Change: Engaging Science and Mathematics Faculty in a New Policy-Based Initiative**

Abdulkadir Demir, Georgia State University, abdulcadir\_d@yahoo.com

Chad Ellett, CDE Research Associates, Inc.

Lisa M. Martin-Hansen, Georgia State University

Judy Awong-Taylor, Georgia Gwinnett College

Nancy Vandergift, University of Georgia

### **Re-imagining Nature of Science: Implications for Policy and Research**

Zoubeida R. Dagher, University of Delaware, zoubeida@udel.edu

**Break**

2:45pm – 3:15pm, Griffin Exhibit Hall

**Concurrent Session #6****All strand poster sessions.****3:15pm – 5:15pm****Poster Session A**

3:15pm – 4:15pm, Griffin Exhibit Hall

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

Poster Session A

3:15pm – 4:15pm, Griffin Exhibit Hall

**A1. The Effect of Studying Socio-scientific Issues on Pre-service Teachers' Understanding of the Nature of Science**

Kristin L. Cook, Indiana University, kshockey@indiana.edu

Gayle A. Buck, Indiana University

**A3. What Can the Matter Be? Introducing Problematizing, a Strategy to Engender Inquiry in Chemistry Learning**

Catherine E. Milne, New York University, cem4@nyu.edu

Jan Plass, New York University

Bruce Homer, Graduate Center, City University of New York

Trace Jordan, New York University

Ruth Schwartz, New York University

Dixie Ching, New York University

Mubina Kahn, New York University

Yolanta Kornack, Graduate Center, City University of New York

Anna G. Brady, New York University

**A5. Exposing Differences between Korean and American College Students' Evolution Concepts and Attitudes**

Seulae Ku, Korea National University of Education, damakoo@gmail.com

Minsu Ha, The Ohio State University

Heeyoung Cha, Korea National University of Education

**A7. Cognitive Processes Used by High and Low Prior Knowledge Students When Interpreting Graphics**

Michelle P. Cook, Clemson University, mcook@clemson.edu

**A9. Situational Interest and Cognitive Conflict as Factors Influencing Conceptual Change**

Lawrence C. Scharmann, Florida State University (USA),

lscharmann@fsu.edu

Hunsik Kang, Chuncheon National University of Education (Korea)

Sukjin Kang, Jeonju National University of Education (Korea)

Taehee Noh, Seoul National University (Korea)

**A11. Analysis of Associations among the Factors Affecting on Secondary School Students' Conception about Evolution**

Mihyun Joo, Guri Girls Middle School, joojulie@hanmail.net

Minsu Ha, The Ohio State University

Seulae Ku, Korea National University of Education

Heeyoung Cha, Korea National University of Education

Jeong-rae Kim

Eun-young Hwang

**A13. Impact of Evolution Instruction on Understanding and Acceptance of Evolutionary Theory and the Nature of Relationships among Understanding, Acceptance, and Religiosity**

Hasan Deniz, University of Nevada Las Vegas, hasan.deniz@unlv.edu

Peter G. Schrader, University of Nevada Las Vegas

Joshua Keilty, The Alexander Dawson School Las Vegas

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

Poster Session A

3:15pm – 4:15pm, Griffin Exhibit Hall

**A15. Analysis of Inquiry Studies by Using Interactive-Constructive-Active Framework**

Muhsin Menekse, Arizona State University, muhsin@asu.edu

Micheline Chi, Arizona State University

Omid Vasefi, Arizona State University

**A17. Facilitating Student Creativity in Scientific Inquiry: An Exploration of Secondary Chemistry Classrooms**

Allison Antink Meyer, Illinois Institute of Technology, aantink@hawk.iit.edu

Norman G. Lederman, Illinois Institute of Technology

**A19. High School Youths' Reactions to and Perceptions of STEM Project-Based Learning**

Leah A. Bricker, University of Washington, lbricker@u.washington.edu

Katie Van Horne, University of Washington

**A21. Authentic vs. Vicarious: An Analysis of Environmental Education in Different Learning Contexts**

Jeffrey Nordine, Trinity University, jnordine@trinity.edu

Courtney Lambert Crim, Trinity University

**A23. The Interplay between Student and Material Agency in Ecological Investigations**

Michelle Cotterman, Vanderbilt University,  
michelle.e.cotterman@vanderbilt.edu  
Richard Lehrer, Vanderbilt University  
Leona Schauble, Vanderbilt University/Peabody College

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

3:15pm – 4:15pm, Griffin Exhibit Hall

**A25. Teacher Strategies to Implement the Argument-Based Inquiry Approach**

Aeran Choi, Kent State University, aeran-choi@hotmail.com  
Vanessa Klein, Kent State University  
Susan Hershberger, Miami University

**A27. Classroom Perspectives: Observation of the Implementation of a Fourth Grade Immersion Science Inquiry Curriculum**

Irene U. Osisioma, California State University Dominguez Hills, Carson California, iosisioma@csudh.edu  
Shirley Lal, California State University Dominguez Hills, Carson California

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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, Griffin Exhibit Hall

**A29. Examining High School Students' Understandings of Molecular Genetics**

Amber Todd, Wright State University, rosenberg.5@wright.edu  
Lisa Kenyon, Wright State University

**A33. Rethinking Expertise in Physics: An Investigation of Expertise in High School Physics Teachers**

Kara Krinks, Vanderbilt University, kara.krinks@vanderbilt.edu  
Pratim Sengupta, Vanderbilt University

**A35. Using PISA 2006 Data to Explore the Relationship between Inquiry Teaching and Student Science Achievement**

Feng Jiang, University of Arkansas, fjiang@uark.edu  
William F. McComas, University of Arkansas

**A37. Instructional Strategies for Nano-science and Technology: A Case Study of Three Experienced Teachers**

Kun-Yi Shih, National Changhua University of Education, Taiwan, latticewine@gmail.com  
Huey-Por Chang, National Changhua University of Education, Taiwan  
Kuo-Hua Wang, National Changhua University of Education, Taiwan

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

Poster Session A

3:15pm – 4:15pm, Griffin Exhibit Hall

**A39. Anyone Can Draw a Scientist, but How Realistic is this Portrayal? A Study Examining Change in Preservice Students' Conceptions of Scientists Using Multimedia Films**

Catherine Koehler, University of New Haven, ckoehler@newhaven.edu  
Ian C. Binns, University of North Carolina-Charlotte  
Mark Bloom, Texas Christian University

**A41. Transforming Cambodian University Science from Lecture to Inquiry: Cultural Barriers and Student Responses**

Gail L. Dickinson, Texas State University, San Marcos, dickinson@txstate.edu  
Heather C. Galloway, Texas State University, San Marcos  
Maureen Lemke, Texas State University, San Marcos  
David Ford, Royal University of Phnom Penh

**A43. The Focus and Relationships Negotiated During Undergraduate Science Instructor Mentoring**

Cynthia C. Deaton, Clemson University, cdeaton@clemson.edu  
Benjamin Deaton, Anderson University

**A45. Engaging STEM Students from the Beginning: An Interdisciplinary Approach to Introductory Biology and Chemistry Laboratories**

John R. Geiser, Western Michigan University, john.geiser@wmich.edu  
Renee S. Schwartz, Western Michigan University  
Leonard Ginsberg, Western Michigan University  
Donald Schreiber, Western Michigan University

**A47. Undergraduate Biology Students' Conceptions of Fungi**

Andrea Bierema, Western Michigan University, andrea.m.kryger@wmich.edu  
Renee S. Schwartz, Western Michigan University

**A49. Learning about Error with a Virtual Laboratory: Evidence from a Biomedical Engineering Course**

Eva Erdosne Toth, West Virginia University, eva.toth@mail.wvu.edu  
Cerasela-Zoica Dinu, West Virginia University, Department of Chemical Engineering

**A51. Assessment of Argumentation Skills through Individual Written Instruments and Lab Reports in Introductory Biology**

Melissa Schen, Wright State University, melissa.schen@wright.edu

**A53. Exploring the EEG Dynamic during Physics Problem Solving**

Hsiao-Ching She, Institute of Education, National Chiao Tung University, hcshe@mail.nctu.edu.tw

Wen-Chi Chou, Institute of Education, National Chiao Tung University  
Tzyy-Ping Jung, Institute of Neurocomputation, University of San Diego, USA

**A55. College Students' Mental Models and Predictions: An Example of Heat Convection**

Guo-Li Chiou, National Chiao Tung University, Taiwan, gc2158@columbia.edu

**A57. Interviews and Content Representation for Teaching Condensed Matter Bonding: An Affective Component of PCK?**

Andoni Garriz, Universidad Nacional Autonoma de Mexico, andoni@servidor.unam.mx

Norma A. Ortega-Villar, Universidad Nacional Autonoma de Mexico

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

Poster Session A

3:15pm – 4:15pm, Griffin Exhibit Hall

**A59. Dealing with Troubles by Pedagogical Repairs in Science Internship**

Pei-Ling Hsu, University of Texas at El Paso, phsu3@utep.edu

**A61. After School Science Club: Learning Science Inside the Box Outside-of-School-Time**

Kim Sadler, Middle Tennessee State University, ksadler@mtsu.edu

Leigh Gostowski, Middle Tennessee State University

Linda Gilbert, Murfreesboro City Schools

Emily Newton, Middle Tennessee State University

David Green, Middle Tennessee State University

**A63. The Relevance of the Science Curriculum: Scientific Concepts in Online Public Discussion Concerning Animal Experimentation**

Ayelet Baram-Tsabari, Technion - Israel Institute of Technology, ayelet@technion.ac.il

Esther Laslo, Technion - Israel Institute of Technology

**A65. What Do Zoological Institution's Websites Communicate to the Public about Education Programs?**

Patricia Patrick, Texas Tech University, trish.patrick@ttu.edu

**A67. Exploring a Summer Camp Based on Robotics Activities Prepared for Underrepresented Groups: A Pilot Study**

Niyazi Erdogan, Texas A&M University, niyazierdogan@tamu.edu

Mehmet Ayar, Texas A&M University

Sencer Corlu, Texas A&M University

Mary M. Capraro, Texas A&M University

Alpaslan Sahin, Texas A&M University

**A69. Taiwanese Children's Conceptions and Relations to Nature: Using the Contextual Model of Learning as the Theoretical Framework**

Amy H. Dai, University of Maryland, amydai@umd.edu

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

3:15pm – 4:15pm, Griffin Exhibit Hall

**A71. Developing Preservice Teachers' Science Teaching in an Elementary Science Methods Course: An Activity-Theoretical Perspective**

Amanda Benedict-Chambers, University of Michigan, mbenedi@umich.edu

**A73. Subject Matter Equivalencies: Are All Majors Equal?**

Beth W. Kubitskey, Eastern Michigan University, mkubitske1@emich.edu

**A75. Constructing Views of Theory-Practice Relationships in a Content-Specific Methods Course for Prospective Teachers**

Gabriel M. Viana, Universidade Federal de Minas Gerais, Brazil, gabrielmenezesviana@gmail.com

Danusa Munford, College of Education - Universidade Federal de Minas Gerais, Brazil

Luciana Moro, Biosciences Institute - Universidade Federal de Minas Gerais, Brazil

Márcia F. Serra, College of Education - Universidade Federal do Rio de Janeiro, Brazil

**A77. Promoting Science Learning through Reading: Practices in the Classroom of a Prospective Science Teacher**

Natalia A. Ribeiro, Universidade Federal de Minas Gerais, Brazil, nataliaalmeidaribeiro@gmail.com

Danusa Munford, Universidade Federal de Minas Gerais, Brazil

Diego O. Silva, Universidade Federal de Minas Gerais, Brazil

Ana Paula S Souto, Universidade Federal de Minas Gerais, Brazil

**A79. Partners in Denial? A Link Found between Ecological Worldview and Attitudes toward Teaching Evolution**

Bryan H. Nichols, University of South Florida, bryanhnichols@gmail.com



### **A81. Are We Failing to Prepare 21st Century Teachers for Diversity Lost?: Climate's Influence on Evolution**

Norman Thomson, University of Georgia, nthomson@uga.edu  
 Deborah Tippins, University of Georgia  
 Rene Bobe, University of Georgia  
 Anna Scott, Athens Academy Upper School  
 Leonard Bloch, University of Georgia  
 Bahadır Namdar, University of Georgia  
 Sarah Hakala, University of Georgia

### **A83. The Influence of Theory and Research on Science Teacher Preparation Program Design**

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

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

Poster Session A

**3:15pm – 4:15pm, Griffin Exhibit Hall**

### **A85. Training Teacher Leaders in Science and Math: The Science and Math Fellows Program**

Andre M. Green, The University of South Alabama, green@usouthal.edu  
 Andrea M. Kent, The University of South Alabama  
 Phillip Feldman, The University of South Alabama  
 James Van Haneghan, The University of South Alabama  
 Shelly Rider, The University of South Alabama

### **A87. Re-Imagining Research Now: A Community Partnership Engaged in Improving Science Education**

Alan B. Sowards, Stephen F. Austin State University, asowards@sfasu.edu  
 Cheryl T. Boyette, Informal Science Educators Association Boyette Consulting  
 Alison Pierce, Humble ISD  
 Lisa K. Doughty, Waste Management

### **A89. An Integrated Approach to In-service STEM Education in a Title One Elementary School**

Carolyn A. Parker, The John Hopkins University, carolyn.parker@jhu.edu  
 Francine W. Johnson, The John Hopkins University

### **A91. Unexpected Allies: Advancing Scientific Literacy in an Interdisciplinary Context**

Billy McClune, Queen's University Belfast, wmcclune@qub.ac.uk  
 Ruth Jarman, Queen's University Belfast

### **A93. High School Chemistry Teachers' Assessment Literacy**

Shannon M. Burcks, University of Missouri-Columbia, burckssm@missouri.edu  
 Marcelle A. Siegel, University of Missouri-Columbia  
 Kemal Izci, University of Missouri Columbia  
 Stephen B. Witzig, University of Missouri-Columbia  
 Steven W. Keller, University of Missouri-Columbia

### **A95. Building Middle School Science Teachers' Understanding about Scientific Inquiry Using Secondary Research**

Jamie Mikeska, Michigan State University, jamiemik@yahoo.com  
 Patricia S. Bills, Michigan State University  
 Kenne Dibner, Michigan State University  
 Suzanne Wilson, Michigan State University  
 James Short, American Museum of Natural History  
 Robyn Carlson, Michigan State University  
 Suzanne Elgendy, American Museum of Natural History

## **Strand 9: Reflective Practice**

Poster Session A

**3:15pm – 4:15pm, Griffin Exhibit Hall**

### **A97. How Teachers Make Sense of Their Beliefs to Be Congruent with Practice: Sensible System Framework**

Nattida Promyod, University of Iowa, nattida-promyod@uiowa.edu  
 Soonhye Park, University of Iowa

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

Poster Session A

**3:15pm – 4:15pm, Griffin Exhibit Hall**

### **A99. Designing Student Assessments for Understanding, Constructing and Critiquing Arguments in Science**

Katherine L. McNeill, Boston College, kmcneill@bc.edu  
 Seth Corrigan, Lawrence Hall of Science  
 Jacqueline Barber, Lawrence Hall of Science  
 Megan Goss, Lawrence Hall of Science  
 Amanda M. Knight, Boston College

### **A101. Performance Assessment of Science Competencies That Normally Go Unassessed**

Penny J. Gilmer, Florida State University, gilmer@chem.fsu.edu  
 Albert Oosterhof, Florida State University  
 Danielle Sherdan, Florida State University  
 Adam LaMee, Florida State University

### **A103. Translation and Validation of the Reformed Teaching Observation Protocol (RTOP) into Turkish**

Mustafa S. Topcu, Mugla University, msamitopcu@gmail.com  
 Tugba Temiz, Yuzuncu Yil University

### **A105. Assessing Interdisciplinary Understanding in Science: The IT3 Framework**

Ji Shen, University of Georgia, jishen@uga.edu  
 Shannon Sung, University of Georgia  
 Wendell F. Rogers, Jr., University of Georgia

### **A107. Developing Computer Model-Based Formative Assessments for High School Chemistry**

Xiufeng Liu, State University of New York At Buffalo (SUNY),  
xliu5@buffalo.edu  
Noemi Waight, University at Buffalo  
Roberto Gregorious, Canisius College  
Erica L. Smith, University of Buffalo

### **A109. Leveraging Formative Assessment to Foster Scientific Argumentation among Students in a Middle School Classroom**

Gayle A. Buck, Indiana University Bloomington, gabuck@indiana.edu  
Amy Trauth-Nare, Indiana University  
Jianlan Wang, Indiana University

### **A111. Towards a Measure of Representational Competence (RC) in Science**

Christine D. Tippet, University of Victoria, christee@shaw.ca  
Sandra Nitz, IPN

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

Poster Session A

**3:15pm – 4:15pm, Griffin Exhibit Hall**

### **A113. A Call for Environmental Justice Education for Pre-Service and In-Service Teachers**

Jodi Devonshire, University of Missouri-St. Louis,  
jodidevonsire@gmail.com

### **A115. Becoming an Activist Science Teacher: a Longitudinal Case Study of an Induction Intervention**

Sarah Barrett, York University, sbarrett@edu.yorku.ca

### **A117. A “B” Isn’t Good Enough: Gendered Expectations for ELL Students’ Science Achievement and Participation**

Kathryn Scantlebury, University of Delaware, kscantle@udel.edu  
Beth A. Wassell, Rowan University  
Sonya N. Martin, Seoul National University

### **A119. (Re)Visions of Science and Science Teaching: Students of Color Transforming Their Ideas of Teaching Science in Urban Schools**

Felicia M. Mensah, Teachers College, Columbia University,  
moorefe@tc.columbia.edu  
Iesha Jackson, Teachers College, Columbia University

### **A121. Narratives and Interactional Self-construction: Why are All the Cree Students Chatting Together About Science?**

Gale A. Seiler, McGill University, gale.seiler@mcgill.ca

### **A123. Using the 5R Instructional Model to Develop Content Knowledge and Language in Science for ELLs**

Molly H. Weinburgh, Texas Christian University, m.weinburgh@tcu.edu  
Cecilia Silva, Texas Christian University

## **Strand 12: Educational Technology**

Poster Session A

**3:15pm – 4:15pm, Griffin Exhibit Hall**

### **A125. Video Games in Middle School Science: Overcoming Spore’s Flaws to Promote Conceptual Understanding**

Peter G. Schrader, University of Nevada, Las Vegas, pg.schrader@unlv.edu  
Hasan Deniz, University of Nevada, Las Vegas  
Joshua Keilty, The Alexander Dawson School at Rainbow Mountain

### **A127. From Tree to Map: Using Digital Tools to Update Metaphors for Evolution**

Sonia H. Stephens, University of Central Florida, sonias@knights.ucf.edu

### **A129. Enhancing Lifelong Learning among STEM Graduate Students via Distance Learning**

Rania Hussein-Farraj, Technion-Israel Institute of Technology, rania1r2@technion.ac.il  
Miri Barak, Technion, Israel Institute of Technology  
Yehudit Judy Dori, Israel Institute of Technology, Haifa, Israel

### **A131. How Wetlab and Database-Centered Research Experiences Influence High School Students’ Perceptions of Authentic Scientific Practice**

Maureen Munn, University of Washington, mmmunn@uw.edu  
Randy Knuth, Knuth Research Inc.  
Katie Van Horne, University of Washington  
Hiroki Oura, University of Washington  
Andrew W. Shouse, University of Washington

### **A133. Developing Technological Pedagogical Content Knowledge in an Experiential Environmental Science Course Using Geospatial Technologies**

Rita Hagevik, The University of North Carolina at Pembroke,  
rita.hagevik@uncp.edu  
Patty Stinger-Barnes, The University of Tennessee  
Jessica Horton, The University of Tennessee

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

Poster Session A

**3:15pm – 4:15pm, Griffin Exhibit Hall****A135. Science Teachers' Views about Teaching Socioscientific Issues: Understandings, Experiences and Suggestions**

Ahmet Kilinc, ahmet\_tr@yahoo.com

Dilber Bahceci

Umit Demiral

Nagihan Tanik

Baris Eroglu

Kasim Yildirim

Ozkan Gorgulu

Ozlem Afacan

Mutlu Pinar Demirci Guler

Arzu Sonmez

**A137. Understanding Research Paradigms: Trends in Science Education Research**

Sebastian P. Szyjka, sp-szyjka@wiu.edu

**A139. (Re)Examining Standards: Challenging Epistemological Assumptions of the National Education Science Standards**

Jesse T. Bazzul, OISE University of Toronto, jesse.bazzul@utoronto.ca

**A141. What Can We Learn About the Public's Understanding of the Nature of Science from a Popular, Open-access 'AskScience' Website?**

Leigh S. Arino De La Rubia, Tennessee State University,

leigh.arinodelarubia@gmail.com

**A143. What Makes Chemistry Unique? An Exploratory Study of Graduate Students' Conceptions**

Paulo A. Porto, Instituto de Química - Universidade de São Paulo (Brasil),

palporto@iq.usp.br

Anieli F. G. Lemes, Instituto de Química - Universidade de São Paulo (Brasil)

**Strand 14: Environmental Education**

Poster Session A

**3:15pm – 4:15pm, Griffin Exhibit Hall****A145. Perceptions of Animals in Primary School Children**

Clara Vasconcelos, Faculdade de Ciências da Universidade do Porto,

cvascon@fc.up.pt

António Almeida, Centro de Geologia da Universidade do Porto, Portugal

**A149. Preservice Elementary Science Teachers' Conceptions of Sustainability: A Phenomenographic Approach**Rita Hagevik, The University of North Carolina at Pembroke,  
rita.hagevik@uncp.edu

Jessica Horton, The University of Tennessee

Dorothy Blanks, The University of Tennessee

**A151. Which One Predict University Students' Pro-environmental Behavior More? Nature Relatedness or Environmental Motive Concern?**

Guliz Karaarslan, Agri Ibrahim Cecen University

Birgul Cakir, Agri Ibrahim Cecen University

Elvan Sahin, Middle East Technical University

Hamide Ertepinar, Middle East Technical University

Ozlem Oktay, Middle East Technical University

**Strand 15: Policy**

Poster Session A

**3:15pm – 4:15pm, Griffin Exhibit Hall****A153. Estimating the Influence of Course-Taking Patterns and English Language Proficiency on Science Achievement**

Zoe E. Buck, University of California, Santa Cruz, zbuck@ucsc.edu

Saul Maldonado, University of California, Santa Cruz

Edward G. Lyon, University of California, Santa Cruz

Eduardo Mosqueda, University of California, Santa Cruz

**Poster Session B****4:15pm – 5:15pm, Griffin Exhibit Hall****Strand 1: Science Learning, Understanding and Conceptual Change**

Poster Session B

**4:15pm – 5:15pm, Griffin Exhibit Hall****B2. Using Visualizations to Help Younger Student Understand Inheritance**

Joi Merritt, Michigan State University, jmerritt@msu.edu

Michelle Williams, Michigan State University

**B4. A Model Centric Ontology for Physics**

Eric Brewe, Florida International University, ebrewe@fiu.edu

**B6. Children Learning to Explain Astronomy across Moving Frames of Reference: Kinesthetic and Visualization Strategies**

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

Alicia Kocareli, Arcadia University

Cynthia Slagle, Colonial School District



**B8. How to Assess Modeling Ability? A Comparison of Different Concept Mapping Practices at Primary School**

Jörg Großschedl, IPN, Kiel Germany  
 Kristina Brandstädter, IPN, Kiel Germany, brandstaedter@ipn.uni-kiel.de  
 Cornelia Sommer, IPN, Kiel Germany  
 Ute Harms, IPN, Kiel Germany

**B10. Immersive Visual Learning of Moon Phases and Seasons in a Planetarium Setting**

Thomas R. Tretter, University of Louisville, tom.tretter@louisville.edu  
 E. Scott Ingle, University of Louisville

**B12. Learners' Strategies for Size Estimation**

Cesar Delgado, The University of Texas at Austin,  
 cesar\_delgado@austin.utexas.edu  
 Hye Sun You, The University of Texas at Austin

**B14. Student Views of Formative Assessment in High School Chemistry**

Rachelle A. Haroldson, University of Minnesota, haro0032@umn.edu

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

Poster Session B

4:15pm – 5:15pm, Griffin Exhibit Hall

**B16. Using Second Life in a Formal STEM Classroom to Learn how to Represent Annotated Genomes and Develop a Sense of Community**

Kari L. Clase, Purdue University, klclase@purdue.edu  
 Kristy L. Halverson, University of Southern Mississippi  
 Sandra Bohn, University of Southern Mississippi  
 Robin Heyden, Educational Consultant

**B18. Comparing Epistemic Features of Student and Teacher Talk during Argument-based Instruction**

Andri Christodoulou, King's College London, andri.christodoulou@kcl.ac.uk  
 Jonathan F. Osborne, School of Education, Stanford University

**B20. The Language of Science Teaching in High School Students' Internship**

Pei-Ling Hsu, University of Texas at El Paso, phsu3@utep.edu

**B22. Relations between Epistemological Beliefs and Science Learning Abilities in Korean Sixth Grade Elementary School Students**

Jeong Ae Won, Daejeon Sunam Elementary School, jeongaewon@gmail.com  
 Seounghye Paik, Korea National University of Education  
 Jungeun, Kim, Korea National University of Education  
 Suhui, Son, Korea National University of Education

**B24. Characteristics of Real Life Contexts and their Influence on Student Interest in Learning Chemistry**

Helena Van Vorst, helena.vanvorst@uni-due.de  
 Sabine Fechner  
 Elke Sumfleth

**B26. Review of Research on Inquiry-Based Laboratory Activities in Science Education in the Last Decade**

Sevgi Aydin, Yuzuncu Yil University, sevgi.aydin45@hotmail.com

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

4:15pm – 5:15pm, Griffin Exhibit Hall

**B28. Elementary Human Health and Biology**

Ann W. Wright, Professor of Biology Canisius College, wrighta@canisius.edu  
 Sue D. Tunnicliffe, Institute of Education, University of London

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

Poster Session B

4:15pm – 5:15pm, Griffin Exhibit Hall

**B30. Beyond Classrooms: Mediating Consequential Science during Dam Removal and Habitat Restoration**

Timothy K. O'Mahony, University of Washington, tko2@u.washington.edu

**B32. Earth Science Teachers' Knowledge of the Water System and Its Reflections in Their Lesson Plans**

Younkyeong Nam, University of Minnesota, namxx020@umn.edu  
 Gillian Roehrig, University of Minnesota  
 Fred N. Finley, University of Minnesota

**B34. Changing NOS Views of a Preservice Teacher after being Actively Involved in a Research Study**

Huseyin Colak, Northeastern Illinois University, h-colak@neiu.edu  
 Evert Cuesta, Northeastern Illinois University

**B36. Making Connections: Comparison Tasks and Analogical Mapping as a Scaffold for Argumentation**

Brandon Emig, North Carolina State University, bremig@ncsu.edu  
 Scott P. McDonald, Pennsylvania State University

**B38. Understanding the PCK and Practices of Early Career Science Teachers in Diverse Settings: A Longitudinal Multiple Case Study**

Irasema B. Ortega, University of Alaska-Anchorage,  
iortega2@uaa.alaska.edu

Julie A. Luft, The University of Georgia

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

Poster Session B

**4:15pm – 5:15pm, Griffin Exhibit Hall**

**B40. Model-Based Inquiry Instruction: Promoting Knowledge Generation in Biology**

Vivien M. Chabalengula, Southern Illinois University, mweene@siu.edu  
Frackson Mumba, Southern Illinois University

**B42. Does BEMA Actually Measure Anything? Searching for the Construct of Brief Electricity and Magnetism Assessment**

Lin Ding, School of Teaching and Learning, The Ohio State University,  
ding.65@osu.edu

Hui Jin, The Ohio State University

**B44. Mass Media as a Pedagogical Tool to Increase Awareness of Nutrition in Advertising**

Penny Shumaker Jeffrey, NC State University, penny\_jeffrey@ncsu.edu  
Gail M. Jones, North Carolina State University

**B46. Assessing the Impact of a Values Affirmation Task across Biology, Biochemistry, and Physics**

Jennifer L. Momsen, North Dakota State University,  
Jennifer.Momsen@ndsu.edu

Erika Offerdahl, North Dakota State University

Warren Christensen, North Dakota State University

Shanda Lauer, North Dakota State University

Lisa Montplaisir, North Dakota State University

Mila Kryjevskaja, North Dakota State University

**B48. Illinois Researchers in Partnership with Science Educators (iRISE): A New Model for Training Science and Engineering Graduate Students in Education and Outreach**

Sharlene M. Denos, University of Illinois, Urbana-Champaign,  
denos@illinois.edu

Tang Wee Teo, National Institute of Education

**B50. Analysis of Students' Argumentation**

Hui-Ju Huang, California State University Sacramento, hhuang@csus.edu  
Y. Kirk Lin, National Taiwan University

**B52. Validation of Science Motivation Questionnaires with Korean College Students**

Kongju Mun, Ewha Womans University, mkj@ewha.ac.kr

Sung-Youn Choi, Ewha Womans University

Sung-Won Kim, Ewha Womans University

**B54. Exploring Students' Model Building Practices while Solving Representational Translation Tasks in Organic Chemistry**

Jeffrey T. Olimpo, University of Maryland, College Park, jeolimp@umd.edu  
Bonnie L. Dixon, University of Maryland, College Park

**B56. Engaging Undergraduates in the Scientific Enterprise through a Summer Research Experience**

Parker E. Stuart, University of Missouri-Columbia,  
pes4kc@mail.missouri.edu

Stephen B. Witzig, University of Missouri-Columbia

Deanna Lankford, University of Missouri - Columbia

Christopher D. Murakami, University of Missouri-Columbia

Anna M. Waldron, University of Missouri-Columbia

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

Poster Session B

**4:15pm – 5:15pm, Griffin Exhibit Hall**

**B58. Holding a Science Fair on the Web: Epistemological & Ethical Considerations**

G. Michael Bowen, Mount Saint Vincent University, gmbowen@yahoo.com

John L. Bencze, University of Toronto

Susan Jagger, University of Toronto

**B60. Children in Science Fairs: Interviews with Parents**

G. Michael Bowen, Mount Saint Vincent University, gmbowen@yahoo.com

John L. Bencze, University of Toronto

Dianne Fraser, Mount Saint Vincent University

**B62. Leveraging Out of School Learning Opportunities: A Visit to the Jet Propulsion Laboratory**

Athena R. Ganchorre, University of Arizona, athenag@u.arizona.edu

**B64. Working on the Public's Perception and Understanding of Science and Scientists through a Popular, Open-access 'AskScience' Website**

Leigh S. Arino De La Rubia, Tennessee State University,

leigh.arinodelarubia@gmail.com

Tobias Landberg, Murray State University

Eric Ray, Corpus Christi Museum of Science and History

Alex Shaver, Iowa State University

Alexander Blake, University of Arizona

Bradley Biladeau, University of Idaho

Alexander Klotz, McGill University

Andreas Lundberg,

**B66. Talking About Science: The Discursive Experiences of Science Center Staff**

Andrea M. Motto, Virginia Tech, ammotto@vt.edu

## Strand 7: Pre-service Science Teacher Education

Poster Session B

4:15pm – 5:15pm, Griffin Exhibit Hall

### B68. Breaking Tradition: The Impact of Community Based Learning Courses on Teacher Preparation

Eunmi O. Yang, Stonehill College, emyangk@hotmail.com  
Briana K. Burke, Stonehill College

### B70. Differences between Intensified, Non-Intensified, and Non-Educational Student Teachers' Professional Knowledge in Chemistry

Stefan Mutke, University of Duisburg-Essen, Germany, stefan.mutke@uni-due.de  
Oliver Töpner, University of Duisburg-Essen, Germany

### B72. Simulated Interaction Model (SIM): An Innovative Approach for Preparing and Researching Preservice Science Teachers

Jeffrey J. Rozelle, Syracuse University, jrozelle@syr.edu  
Benjamin H. Dotger, Syracuse University  
Sharon Dotger, Syracuse University  
Joanna O. Masingila, Syracuse University

### B74. Implementing a Residency-model for Science Teacher Preparation

Nanette I. Dietrich, Millersville University, ndietrich@millersville.edu  
Oliver Dreon, Millersville University

### B76. Multidisciplinary Methods: Inquiry into Science and Art

Michelle A. Fleming, University of Wisconsin Oshkosh, flemingm@uwosh.edu

### B78. Pre-service Teachers Perceptions of Rural and Urban Students and Schools

Helen M. Meyer, University of Cincinnati, helen.meyer@uc.edu  
Anna E. Hutchinson, University of Cincinnati

### B80. Prospective Elementary Teachers' Reflections on Learning-To-Teach Science Experiences

Lucy Avraamidou, University of Nicosia, avraamidou.l@unic.ac.cy

## Strand 8: In-service Science Teacher Education

Poster Session B

4:15pm – 5:15pm, Griffin Exhibit Hall

### B82. An Examination of Beginning Science Teacher Identity Constructions through an Online Mentoring Program: A Two-Year Qualitative Study

Eunjin Bang, Iowa State University, ejbang@iastate.edu  
Julie A. Luft, The University of Georgia

### B84. Characterizing District-wide Teachers' Science Learning Networks: Silos and Barriers to Change and Innovation

Fouad Abd-El-Khalick, University of Illinois at Urbana-Champaign, fouad@illinois.edu  
Caroline Haythornthwaite, University of British Columbia  
Kirstin Phelps, University of Illinois at Urbana-Champaign  
Anita M. Martin, University of Illinois at Urbana-Champaign

### B86. Physics Teachers' Collective Agency: A Case in Curriculum Reform

Guopeng Fu, University of British Columbia, fgpubc@interchange.ubc.ca  
Samson Madera Nashon, University of British Columbia

### B88. Committed to Teaching: Beliefs of Persisting Beginning Secondary Science Teachers

Sissy S. Wong, University of Houston, sissywong@uh.edu  
Irasema B. Ortega, University of Alaska Anchorage  
Jonah B. Firestone, Arizona State University  
Krista Adams, University of Nebraska-Lincoln  
Julie A. Luft, The University of Georgia

### B90. Exploring Teachers' Epistemological Belief in Relation to Their Practice and Students' Critical Thinking Skills

Niphon Chanlen, University of Iowa, niphon-chanlen@uiowa.edu

### B92. Assessing Changes in Understandings of Scientific Inquiry and Teaching Across Three Research Experiences for Teachers

Sanlyn R. Buxner, University of Arizona, buxner@email.arizona.edu

## Strand 9: Reflective Practice

Poster Session B

4:15pm – 5:15pm, Griffin Exhibit Hall

### B94. A Three Part Reflective Exercise for Generating Concept Specific Instructional Ideas

Daniel Z. Meyer, Illinois Institute of Technology, meyerd@iit.edu

### B96. Confronting Myths of the Science Teacher Educator: Becoming a "Facilitator" Instead of "Expert"

Nicole Beeman-Cadwallader, Indiana University, nbeeman@umail.iu.edu  
Gayle A. Buck, Indiana University  
Amy Trauth-Nare, Indiana University

## Strand 10: Curriculum, Evaluation, and Assessment

Poster Session B

4:15pm – 5:15pm, Griffin Exhibit Hall

### B98. The Inclusion of Key Nature of Science Concepts in Saudi 10th Grade Biology Textbooks

Ibrahim M. Alasmari, King Saud University, Saudi Arabia, ibr411@hotmail.com

Fahad S. Alshaya, King Saud University, Saudi Arabia

Saeed M. Alshamrani, King Saud University, Saudi Arabia

### B100. The Psychometric Properties of the Refined Materials Concept Inventory (MCI)

James Corkins, Mesa Community College and Arizona State University, james.corkins@gmail.com

### B102. Science and Social Exclusion: Exploring the Promise of Pedagogy

Anastasios Siatras, School of Education, Aristotle University of Thessaloniki, Greece, asistras@auth.gr

### B104. Middle-schoolers' Science Learning Measured by Close and Proximal Assessments Based on the Framework for K-12 Science Education: Implications for Standards-based Accountability and Teacher Performance Evaluations

Kathryn F. Drago, University of Michigan, kdrago@umich.edu

### B106. Evaluating the Assessment of Student Learning related to Novel Instructional Materials

Georgia W. Hodges, The University of Georgia, georgia.hodges@gmail.com

J. Steve Oliver, The University of Georgia

Kyung-a Kwon, The University of Georgia

Al Cohen, The University of Georgia

B.J. Wimpey, The University of Georgia

Tom Robertson, The University of Georgia

Jim Moore, The University of Georgia

Jared Jackson, The University of Georgia

### B108. Development of the Critical Engineering Literacy Test (CELT)

Senay Purzer, Purdue University, spurzer@purdue.edu

Michael Fosmire, Purdue University

Ruth E.H. Wertz, Purdue University

So Yoon Yoon, Purdue University

### B110. Alignment between Standards and Alternative Assessment Based TIMSS-07 Questions: A Comparison among California State (US), Turkey, and Singapore

Yilmaz Kara, Karadeniz Technical University, karayilmaz@hotmail.com

Salih Cepini, Karadeniz Technical University

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

Poster Session B

4:15pm – 5:15pm, Griffin Exhibit Hall

### B112. Children of Elite Advocating for Disadvantaged Others: Factors Influencing their Actions on Socioscientific Issues

John L. Bencze, OISE, University of Toronto, larry.bencze@utoronto.ca

Nathalie Lemelin, Lower Canada College, Montreal

### B114. Sociocultural Predictors of Girls' Intention to Pursue STEM Careers

Theresa A. Cullen, University of Oklahoma, tacullen@ou.edu

H. Michael Crowson, University of Oklahoma

### B116. Journeys of Black Scholars in the Academy: Re-Imaging Research and Teaching

Mary M. Atwater, University of Georgia, atwater@uga.edu

Tonjua B. Freeman, University of Georgia

Malcolm B. Butler, University of South Florida Eileen C. Parsons, University of North Carolina-Chapel Hill

### B118. Enhancing Urban Students' Theories of Intelligence as Part of Positive Identity Development

Obed Norman, Howard University, onorman6@gmail.com

Sylvester McKay, Morgan State University

Avis D. Jackson, Morgan State University

Mercy Wangu Ndege, Morgan State University

Samantha L. Strachan, Morgan State University

Nicola Norman, Morgan State University

### B120. The Roles of Epistemology and Positionality in Teaching Assistants' Development of Inquiry Teaching Practices

Cara L. Gormally, Georgia Tech, cara.gormally@biology.gatech.edu

Angela Johnson, St. Mary's College of Maryland

Jaweer Brown, EngenderHealth

### B122. Fukushima Disaster: Online Debate and its Implication in Socio-Scientific Argumentation

Bahadır Namdar, University of Georgia, baha@uga.edu

Ji Shen, University of Georgia

### B124. Single-sex Physics Instruction: One Way to Foster Girls' and Boys' Interest?

Knut Neumann, Leibniz Institute for Science Education (IPN) Kiel, neumann@ipn.uni-kiel.de

Andreas Borowski, University Duisburg-Essen



**Strand 12: Educational Technology**

Poster Session B

4:15pm – 5:15pm, Griffin Exhibit Hall

**B126. Designing an Effective Science Education Computer Game through the Light of Commercial Computer Game Design Principles**

Elif Ozturk, Texas A&amp;M University, elifo@tamu.edu

Gokhan Ozturk, Texas A&amp;M University

**B128. Relating Student Actions to Learning Gains: Using Immersive Virtual Worlds to Support Understanding of Ecological Systems**

Amy M. Kamarainen, University of Wisconsin, amkamarainen@gmail.com

Shari Jackson Metcalf, Harvard University

Shane Tutwiler, Harvard University

Tina Grotzer, Harvard University

Chris Dede, Harvard University

**B130. Investigating Students' Patterns of Use of Supports in an Electronic Science Inquiry Unit**

Kasey McCall, University of Michigan, kaseyl@umich.edu

LeeAnn M. Sutherland, University of Michigan

Namsoo Shin, University of Michigan

**B132. Exploring Student-created Animations to Show Level of Understanding on the Nature of Matter Learning Progression**

Jennifer L. Albert, NC State University, jennifer\_albert@ncsu.edu

Margaret R. Blanchard, North Carolina State University

Eric N. Wiebe, North Carolina State University

**B134. Teachers' Implementation of a Game-Based Biotechnology Curriculum**

Jennifer L. Eastwood, Oakland University, eastwood@oakland.edu

Troy D. Sadler, University of Missouri

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

Poster Session B

4:15pm – 5:15pm, Griffin Exhibit Hall

**B136. Investigating Gender Differences regarding Informal Reasoning, Epistemological Beliefs and Metacognition**

Ozgul Yilmaz-Tuzun, Middle East Technical University, ozgul@metu.edu.tr

Nilay Ozturk, Middle East Technical University

**B138. How Views of a Nobel Laureate can Influence In-service Teachers' Understanding of Nature of Science?**

Mansoor Niaz, Universidad de Oriente, Venezuela, niazma@gmail.com

**B140. Consistency of Practical and Formal Epistemologies of Science Held by Participants of a Research Apprenticeship**

Stephen R. Burgin, University of Florida, sburgin@ufl.edu

Troy D. Sadler, University of Missouri

**B142. Science Teacher Practice and the Development of Student Scientific Creativity**

Allison Antink Meyer, Illinois Institute of Technology, aantink@hawk.iit.edu

Norman G. Lederman, Illinois Institute of Technology

**Strand 14: Environmental Education**

Poster Session B

4:15pm – 5:15pm, Griffin Exhibit Hall

**B146. A Climate Change Education Partnership's Efforts to Research and Improve Coastal Regions Climate Change Education**

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

Allan Feldman, University of South Florida

Vanessa Vernaza-Hernández, University of South Florida

Larry Plank, Hillsborough County Public Schools

**B148. Urban Students' Perceptions of Scientists, Stewards, & the Environment**

Stephanie Hathcock, Old Dominion University, shath005@odu.edu

Daniel L. Dickerson, Old Dominion University

**B150. Are Middle Level Students able to Name an Organism when Provided with Characteristics and Habitat?**

Patricia Patrick, Texas Tech University, trish.patrick@ttu.edu

**Strand 15: Policy**

Poster Session B

4:15pm – 5:15pm, Griffin Exhibit Hall

**B152. Policy Implications of Teacher STEM Grant Proposals**

Mary W. Stroud, University of Cincinnati, stroudmw@mail.uc.edu

Maya Israel, University of Cincinnati

Helen M. Meyer, University of Cincinnati

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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, Room 101**

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

Jomo Mutegi, Indiana University - Purdue University Indianapolis,

[jmutegi@iupui.edu](mailto:jmutegi@iupui.edu)

Kathryn F. Drago, University of Michigan

Eileen C. Parsons, The University of North Carolina

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### JRST Editorial Board Meeting/Reception

Meeting open/Reception by invitation

**6:30pm – 8:30pm, Rooms 201 and 202**

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### NARST Environmental Education Gathering and Dinner.

**Meet in lobby at 6:30pm, dinner at 7:00pm.**

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### Graduate Student and Early Career Scholars

Informal Social

**7:00pm – 8:00pm, Room**

**TGI Friday's**

**501 W. Washington Street**

**(accessible through the hotel parking lot)**

Tuesday, March 27, 2012





**Conference Registration**

7:00am – 5:00pm, White River Registration

**Committee Meetings**

7:00am – 8:15am

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

7:00am – 8:15am, Room 301

**Equity and Ethics Committee Meeting**

7:00am – 8:15am, Room 302

**External Policy and Relations Committee Meeting**

7:00am – 8:15am, Room 303

**Research Committee Meeting**

7:00am – 8:15am, Room 304

**Membership and Election Committee Meeting**

7:00am – 8:15am, Room 305

**International Committee Meeting**

7:00am – 8:15am, Room 306

**Program Committee Meeting**

7:00am – 8:15am, Room 308

**Publications Advisory Committee Meeting**

7:00am – 8:15am, Room 309

**Concurrent Session #7****8:30am – 10:00am****Program Committee Sponsored Session**

Virtual Presentations with Scholars in Nigeria, Ethiopia and South Africa: Focus on Strands

11 and 12

**8:30am – 10:00am, Room 105****Presiders:**Sharon Lynch, George Washington University  
Anita Welch, North Dakota State University

Background: During the 2011 NARST International Annual Conference, the Program Committee proposed to offer a small number of virtual presentations during 2012 Conference aimed at NARST scholars living in developing countries. Scholars whose proposals were accepted will present their work from remote sites.

The rationale for this experiment was that attending a NARST Conference could be prohibitive for many such scholars for reasons such as travel restrictions and cost. The International Committee provided a definition of countries that would qualify for the session (according to a UNDP definition of .700 and below).

This session will feature three virtual presentations given by scholars from three countries in Africa who submitted acceptable proposals. The virtual presentations will be conducted using SKYPE, allowing interactivity with audience and presenters, along with a second screen for their PowerPoint presentations. As this is a pilot study, we hope that technologies involved are all up to the challenge, as are the presenters, presiders, and audience. After the session, all participants will be able to provide feedback on the technological aspects of the session and the potential having a virtual component of the NARST Annual International Conference in the future.

**Multiple Intelligences Profile of Nigerian Science Students: Implications for Teaching and Learning**

Immaculata Egerue, Lagos State University, Nigeria, pokebukola@gmail.com

Peter Okebukola, Lagos State University, Nigeria

Tunde Owolabi, Lagos State University, Nigeria

**Effects of Computer Simulations on Undergraduate Science Students Physics Achievement**

Aklilu Tilahun Tadesse, Arba Minch University, Ethiopia,

aklilu\_tt@yahoo.com

Bereket Gebre, Arba Minch University, Ethiopia

Melak Mesfin Ayenaw, Arba Minch University, Ethiopia

Tesfay Medhin Teamir, Arba Minch University, Ethiopia

**Talking Science in the Mother Tongue: Possibilities and Challenges for Substantive Learner Engagement**

Audrey Msimanga, University of the Witwatersrand, Johannesburg, South Africa

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

Strand Sponsored Session - How Best Can Multiple External Representations be Harnessed for Improving Learning in Biology?

**8:30am – 10:00am, Room 310****Presider:**

David F. Treagust, Curtin University, Australia

**Presenters:**

Chi-Yan Tsui, Curtin University, Australia

Anat Yarden, Weizmann Institute of Science, Israel

Phyllis Griffard, Weill Cornell Medical College in Qatar, Qatar

Kristy L. Halverson, University of Southern Mississippi, USA

Konrad Shoenborn, Linköping University, Sweden

Renee S. Schwartz, Western Michigan University, USA

Siu Ling Wong, University of Hong Kong, Hong Kong

Barbara C. Buckley, WestEd, USA

Kai Niebert, Leibniz University Hannover, Germany

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

Related Paper Set - Understanding the Role of Context and Activity in Students' Argumentation Practice

8:30am – 10:00am, Room 302

### **Presider:**

Leema Berland, University of Texas, Austin

## Variation in how Individuals Argue about Scientific and Socioscientific Questions

Sarah Rogers, University of Texas, Austin, sarahjaner@utexas.edu

Kirstin C. Busch, University of Texas, Austin

Leema Berland, University of Texas, Austin

## Learning to Argue and Arguing to Learn: A Longitudinal Study of the Impact of Argument-based Instruction on Undergraduate Chemistry Students' Written Arguments

Joi P. Walker, Florida State University, walkerj@tcc.fl.edu

Victor D. Sampson, Florida State University

## Engaging Students in Developing the Means of Knowing through Argument

Eve I. Manz, Vanderbilt University, eve.i.manz@vanderbilt.edu

## Coordination of Discursive Practice and Material Resources: Leveraging Students to Engage in Epistemic Discussions

Suna Ryu, UCLA, sunaryu@ucla.edu

William A. Sandoval, University of California, Los Angeles

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

Building Scientific Explanations

8:30am – 10:00am, Room 301

### **Presider:**

Felicia M. Mensah, Teachers College, Columbia University

## Supporting Elementary Students in Making and Recording Scientific Observations

Anna Maria Arias, University of Michigan, aarias@umich.edu

Elizabeth A. Davis, University of Michigan

Annemarie S. Palincsar, University of Michigan

## The Establishment of Whole-class Dialogue Patterns by one Experienced Teacher using Argument-based Inquiry (ABI)

Matthew J. Benus, Indiana University Northwest, mbenus@iun.edu

## Supporting Fourth Graders' Ability to Interpret Graphs through Real-time Graphing Technology: An Exploratory Study

Mehmet F. Dulger, UNLV, dulgerm@unlv.nevada.edu

Hasan Deniz, UNLV

## Exploring Scientific Explanations: Promoting Students' Sense-making in Elementary Classrooms

Mandy Biggers, University of Iowa, mandy-biggers@uiowa.edu

Laura Zangori, University of Iowa

Cory T. Forbes, University of Iowa

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

Enhancing Scientific Literacy

8:30am – 10:00am, Room 304

### **Presider:**

Eva Erdosne Toth, West Virginia University

## Fostering Scientific Literacy in Bioengineering Hybrid Courses

Yehudit Judy Dori, Israel Institute of Technology, yjdori@technion.ac.il

Hagit Yarden, Technion, Israel Institute of Technology

Amira Allouche, Technion, Israel Institute of Technology

## The Effect of Plain-English Instruction on Student Achievement and Classroom Culture in College Science Vocabulary

Emily G. Schoerning, emily-richter@uiowa.edu

## Impact of Social Media as an Instructional Component on Content Knowledge, Attitudes, and Public Engagement Related to Global Climate Change

Sallie E. Greenberg, University of Illinois at Urbana-Champaign, greenberg@isgs.illinois.edu

Fouad Abd-El-Khalick, University of Illinois at Urbana-Champaign

## Rhetorical Moves as a Basis for Teaching Undergraduate Life Science Students to read Primary Literature

Miriam A. Ossevoort, University of Groningen, The Netherlands, m.a.ossevoort@rug.nl

Edwin B. Van Lacum, University of Groningen, The Netherlands

Martin J. Goedhart, University of Groningen, The Netherlands

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

Developing Interests and Identities towards Science  
Outside of School

8:30am – 10:00am, Room 305

**Presider:**

Kathleen A. Fadigan, Pennsylvania State University

**Identity Development of Middle School  
Students as Learners of Science during  
Learning Conversations at an Informal  
Science Education Camp**

Kelly A. Riedinger, University of North Carolina Wilmington,  
riedingerk@uncw.edu

**The Influence of Science Summer Camps  
on STEM Career Interest among Sixth-  
Eighth Graders**

Xiaoqing Kong, University of Virginia, xk4wa@virginia.edu  
Robert H. Tai, University of Virginia

**The Impact of Summer Research-Based Program  
on Students' Attitudes and Interests in STEM  
Related Disciplines**

Natalie A. Tran, California State University, Fullerton, natran@fullerton.edu  
Andreas Gebauer, California State University, Bakersfield  
Palmira Hernandez, California State University, Bakersfield  
Mark Vizcarra, California State University, Bakersfield

**The Effect Out-of-School-Time Programs on  
Career Choices in STEM**

Jaimie L. Miller-Friedmann, Harvard University, jlmiller@cfa.harvard.edu  
Gerhard Sonnert, Harvard University  
Katherine P. Dabney, University of Virginia  
Philip M. Sadler, Harvard University

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

Symposium - A Retrospective and Prospective View of  
Two Studies on Science Teacher Education From 1993-  
2011: SALISH and IMPACT

8:30am – 10:00am, Room 306

**Discussant:**

Robert E. Yager, University of Iowa

**Presenters:**

Patricia Simmons, North Carolina State University,  
patricia\_simmons@ncsu.edu  
John Tillotson, Syracuse University  
Monica Young, Syracuse University  
Deborah Barry, Syracuse University  
Lauren Jetty, Syracuse University  
Glenn Dolphin, Syracuse University

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

Topic Specific Content Knowledge and Laboratory  
Experiences

8:30am – 10:00am, Room 309

**Presider:**

Marissa S. Rollnick, Wits University

**An Exploration of Preservice Science Teachers'  
Written Argumentation in Science Laboratory Work**

Dilek Karisan, yuzuncu yil university, dilekkarisan@gmail.com  
Mustafa S. Topcu, yuzuncu yil university

**Development of Pre-service Science  
Teachers' Metacognition in an Inquiry  
Based Laboratory Course**

Birgul Cakir, Agri Ibrahim Cecen University, birgulmetu@gmail.com  
Hamide Ertepinar, Middle East Technical University  
Ozgul Yilmaz-Tuzun, Middle East Technical University

**A Study of Secondary Science Student Teachers'  
Conceptions of Heat Transfer**

Karthigeyan Subramaniam, University of North Texas, Karthigeyan.  
Subramaniam@unt.edu  
David Wojnowski, University of North Texas  
Pamela Harrell, University of North Texas

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

Various Representations of Science in the Classroom

8:30am – 10:00am, Room 313

**Presider:**

Wayne Breslyn, University of Maryland

**Critical Analysis of a Science-IKS Classroom  
Discourse Relative to the Production of an African  
Staple Food**

Simasiku C. Siseho, University of the Western Cape,  
simasiku.siseho@gmail.com  
Meshach B. Ogunniyi, University of the Western Cape

**A Case-to-case Synthesis of a Longitudinal Project  
Exploring Language Strategies in Middle School  
Science**

Christine D. Tippet, chris.tee@shaw.ca  
Larry D. Yore, University of Victoria

**Beginning Secondary Science Teachers and Their  
Use of Technology in the Classroom During Their  
First Two Years**

Eunjin Bang, Iowa State University, ejbang@iastate.edu  
Julie A. Luft, The University of Georgia

### **Empowering Teachers through a Professional Learning Program that Focussed on a Representation Intensive Pedagogical Approach**

Gail D. Chittleborough, Deakin University, gail.chittleborough@deakin.edu.au  
Peter Hubber, Deakin University

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

Teacher Conceptions of Physical and Earth and Space Science

8:30am – 10:00am, Room 106

**Presider:** Manuela Welzel-Breuer, University of Education Heidelberg

### **Where is Earth Science? Mining for Opportunities in Biology, Chemistry and Physics**

Julie Thomas, Oklahoma State University, julie.thomas@okstate.edu  
Toni Ivey, Oklahoma State University

### **Petrified Wood's Effectiveness as an Interdisciplinary Science Portal: A Research Investigation with Inservice Teachers**

Renee M. Clary, Mississippi State University, rclary@geosci.msstate.edu  
James H. Wandersee, Louisiana State University

### **The Development of Experienced 9th-Grade Physics Teachers' Knowledge for Using Representations to Teach Energy**

Andrew B. West, University of Missouri, westab@missouri.edu  
Mark J. Volkmann, University of Missouri

### **Effects of an Astronomy Science Summer Camp on Astronomy Content Knowledge of In-service Physics, Science and Elementary Teachers**

Sezen Apaydin, Canakkale Onsekiz Mart University, apaydinsezen@gmail.com  
Ayhan Karaman, Canakkale Onsekiz Mart University

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

Item and Instrumentation Studies

8:30am – 10:00am, Room 308

**Presider:**

Ann W. Wright, Canisius College

### **Using Rasch Theory to Establish Construct-related Evidence for an Educational Assessment—Brief Electricity and Magnetism Assessment**

Lin Ding, The Ohio State University, ding65@osu.edu

### **Chemistry Concept Inventory: Is it Appropriate for Summative Assessment?**

Ling L. Liang, La Salle University, liangl@lasalle.edu  
Xiufeng Liu, State University of New York At Buffalo (SUNY)  
Mihwa Park, State University of New York At Buffalo (SUNY)

### **In Search of Instructional Sensitivity: The Measurement Problem in Large Scale Studies of Professional Development Programs**

Christopher Wilson, BSCS, cwilson@bscs.org  
Kathleen J. Roth, BSCS  
Joseph A. Taylor, BSCS  
Nancy Landes, BSCS  
Molly Stuhlsatz, BSCS

### **An Analysis of Science Concept Inventories and Diagnostic Tests: Commonalities and Differences**

Dane L. Schaffer, University of Missouri, dlszh3@mail.missouri.edu

### **Strand 11: Cultural, Social, and Gender Issues Globalization and Neoliberal Ideology: Implications for Science Education**

8:30am – 10:00am, Room 107

**Presider:**

Matthew Weinstein, UW Tacoma Education Program

### **Western teachers of Science/Teachers of Western Science: Perceptions of the Western Science Teacher Abroad**

Lydia E. Carol-Ann Burke, OISE, University of Toronto, carolann.burke@utoronto.ca

### **Global Capitalism and Neoliberal Ideology in Science Education: Towards Fundamental Change**

Jesse T. Bazzul, University of Toronto/OISE, jesse.bazzul@utoronto.ca  
John L. Bencze, Ontario Institute for Studies in Education/University of Toronto

### **Examining Power and Accountability Issues in a U.S. STEM School**

Tang Wee Teo, National Institute of Education (Singapore), teotangwee@gmail.com

### **Science, Science Education and the Politics of Neoliberal Exceptionality**

Matthew Weinstein, University of Washington-Tacoma, mattheww@u.washington.edu

### **Strand 12: Educational Technology Modeling and Model-Based Reasoning through Technology**

8:30am – 10:00am, Room 101

**Presider:**

Sandra T. Martell, University of Wisconsin-Milwaukee

### **Enhancing Engineering Education through Hands-On Models and Computer-Based Simulations**

Amy R. Pallant, The Concord Consortium, apallant@concord.org  
Rachel E. Kay, The Concord Consortium  
Charles Xie, The Concord Consortium



### **A Study on Enhancing the Thought Experiment in Modeling-based Science Teaching to Improve the Learning Effect**

Jen-Chin Lin, [jclin@nknuc.nknu.edu.tw](mailto:jclin@nknuc.nknu.edu.tw)

### **Evaluation of an Ecological Niche Modeling Tool for Climate Change Education**

Vanessa L. Peters, University of Michigan, [vlpeters@umich.edu](mailto:vlpeters@umich.edu)

Nancy B. Songer, The University of Michigan

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

Symposium - How can Science Educators Improve Evolution Education in America and the World?

**8:30am – 10:00am, Room 102**

#### ***Presider:***

Leonard Bloch, University of Georgia

#### ***Presenters:***

Charles Allen, Grace Unlimited Butler University Indiana University- Purdue

Warren D. Allmon, Cornell University

Barbara A. Crawford, University of Georgia

Jeremy Peacock, Monroe Area High School

Mike U. Smith, Mercer University

### **Strand 14: Environmental Education**

Environmental Education in Practice

**8:30am – 10:00am, Room 103**

### **Field-based Geoscience Education for Students with Physical Disabilities**

Christopher Atchison, Georgia State University, [catchison@gsu.edu](mailto:catchison@gsu.edu)

### **A Longitudinal Study of Environmental and Outdoor Education: A Cultural Change**

Tali Tal, Technion, [rtal@cc.technion.ac.il](mailto:rtal@cc.technion.ac.il)

Orly Morag, Technion

### **Environmental Science Education in K-12 School Programs: Recent Research**

Elizabeth Hufnagel, The Pennsylvania State University, [exh5064@psu.edu](mailto:exh5064@psu.edu)

William S. Carlsen, The Pennsylvania State University

Gregory J. Kelly, The Pennsylvania State University

### **Student Science Achievement and the Integration of Indigenous Knowledge in the Classroom and on Standardized Tests**

Julian Benson, University of New Hampshire,

[julian.benson@wildcats.unh.edu](mailto:julian.benson@wildcats.unh.edu)

Eleanor D. Abrams, University of New Hampshire

### **Co-Sponsored Session by Strand 14:**

### **Environmental Education and Strand 15: Policy**

Science Education and Climate Change: Policy in K-12 Education in Diverse Global Contexts

**8:30am – 10:00am, Room 303**

#### ***Presider:***

Sarah J. Carrier, North Carolina State University

#### ***Presenters:***

Charles W. Anderson, Michigan State University

J. Randy McGinnis, University of Maryland

Teddie Phillipson Mower, University of Louisville

Elly Walsh, University of Washington

Chris McDonald, University of Maryland

### **Strand 15: Policy**

Globalization of Science Reforms

**8:30am – 10:00am, Room 104**

#### ***Presider:***

Gavin W. Fulmer, National Science Foundation

### **Consequences of the Globalization of Science**

#### **Testing: A European Case Study**

Jens Dolin, University of Copenhagen, [dolin@ind.ku.dk](mailto:dolin@ind.ku.dk)

Robert H. Evans, University of Copenhagen

Lars B. Krogh, Aarhus University

### **There's More to Science than Recall: An Analysis**

Anna MacPherson, Stanford University, [annamac@stanford.edu](mailto:annamac@stanford.edu)

Jonathan F. Osborne, Stanford University

### **A Country Specific Insights into the Impact of International Comparative Studies on Educational Reforms**

Imbi Henno, Tallinn University, [imbi.henno@tlu.ee](mailto:imbi.henno@tlu.ee)

Priit Reiska, Tallinn University

### **Science Curriculum Policy-making in Ontario:**

#### **Global Influences, Localized Political and**

#### **Economic Landscapes and Curriculum Reform**

Marietta Bloch, Roehampton University, [mars\\_bloch@edu.yorku.ca](mailto:mars_bloch@edu.yorku.ca)

### **Break**

**10:00am – 10:30am, Foyer – White River Ballroom**

**Plenary Session #2**

Student Diversity and Science Education Research in a Global Context: Research Agenda and the Role of NARST

**10:00am – 12:00pm, White River Ballroom A – E**  
**Introducer:**

J. Randy McGinnis, NARST President, University of Maryland

**Presider:**

Sharon Lynch, NARST President-Elect, George Washington University

**Keynote Presenter:**

Okhee Lee, New York University

**Awards Luncheon**

**12:00pm – 2:00pm, White River Ballroom F – J**

**Concurrent Session #8**

**2:15pm – 3:45pm**

**International Sponsored Session**

Symposium - Linking Science Educators Program in Rwanda: Supporting Learner-Centered Approaches in Rwandan Science Classrooms

**2:15pm – 3:45pm, Room 313**

**Presider:**

Sibel Erduran, University of Bristol

**Presenters:**

Sibel Erduran, University of Bristol, sibel.erduran@bristol.ac.uk

Paul Denley, University of Bath, UK

Alphonse Uworwabayeho, Kigali Institute of Education, Rwanda

Mengesha Ayene, Bahir Dar University, Ethiopia

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

Related Paper Set - Learning about Ecosystems:

Conceptualizing and Designing Learning Environments

**2:15pm – 3:45pm, Room 310**

**Causal Tensions in Reasoning about Ecosystems Dynamics: A Theoretical Analysis of Supportive Instructional Contexts**

Tina Grotzer, Harvard University, Tina\_Grotzer@pz.harvard.edu

Shane Tutwiler, Harvard University

**Fostering and Assessing Model-Based Learning with SimScientists Ecosystems**

Barbara C. Buckley, WestEd, bbuckle@wested.org

Edys Quellmalz, WestEd

Matthew Silbergitt, WestEd

**Structure, Behavior, and Function: A Lens for Observing Complex Ecosystem Relations**

Cindy E. Hmelo-Silver, Rutgers University,

cindy.hmelo-silver@gse.rutgers.edu

Catherine Eberbach, Rutgers University

Rebecca Jordan, Rutgers University

Ashok Goel, Georgia Institute of Technology

**Engaging Students in Modeling to Develop Understanding of Ecosystems**

Michelle Cotterman, Vanderbilt University,

michelle.e.cotterman@vanderbilt.edu

Eve I. Manz, Vanderbilt University

Richard Lehrer, Vanderbilt University

Leona Schauble, Vanderbilt University/Peabody College

Deborah Lucas, Vanderbilt University/Peabody College

Mayumi Shinohara, Vanderbilt University/Peabody College

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

Attitudes and Identities

**2:15pm – 3:45pm, Room 302**

**Presider:**

Lynn D. Dierking, Oregon State University

**Are Undergraduates' Attitudes toward Science Affected by Epistemological Beliefs?**

Gavin W. Fulmer, National Science Foundation, gfulmer@nsf.gov

**Place and the Structuring of Science Identities in a Science Center**

Jennifer D. Adams, Brooklyn College, jdadams215@gmail.com

Preeti Gupta, New York Hall of Science

**An Ethnographic Analysis of How Students' Perceived Identities Shape Science Classroom Discourse**

Minjung Ryu, University of Maryland, College Park, mryu@umd.edu

Tiffany-Rose Sikorski, University of Maryland, College Park

**Development and Validation of an Instrument to Assess Precollege Arabic Speaking 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

Heather Freissen, College of the North Atlantic

Michael Culbertson, University of Illinois at Urbana-Champaign



**Strand 3: Science Teaching--Primary School  
(Grades preK-6): Characteristics and Strategies**  
Elementary Science Teacher Education  
2:15pm – 3:45pm, Room 301

**Presider:**

Carolyn S. Wallace, Indiana State University

**Fostering Teachers' Curricular Knowledge and  
Curriculum Design Capabilities About Modeling-  
Centered Scientific Inquiry**

Marios Papaevripidou, University of Cyprus, mpapa@ucy.ac.cy  
C. P. Constantinou, University of Cyprus  
Zacharias C. Zacharia, University of Cyprus

**Preservice Elementary Teachers' and Mentors'  
Evidence Based Reflection Using a Web-Based  
Video Analysis Tool (VAT)**

Eulsun Seung, Indiana State University, esseung@gmail.com  
Soonhye Park, University of Iowa

**Elementary Teachers' Enactment of Science  
Curriculum Materials: Investigating Early  
Learners' Engagement in Scientific Practices**

Cory T. Forbes, University of Iowa, cory-forbes@uiowa.edu  
Mandy Biggers, University of Iowa  
Laura Zangori, University of Iowa

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

Assessment and Review Strategies

2:15pm – 3:45pm, Room 303

**Presider:**

J. Steve Oliver, The University of Georgia

**Analyzing Biology Teachers' Pedagogical Content  
Knowledge and Content Knowledge by Using a  
Paper and Pencil Test**

Melanie Jüttner, Biology Education, University of Munich,  
melanie.juettner@lrz.uni-muenchen.de  
Birgit Jana Neuhaus, Biology Education, University of Munich

**Developing an Instrument to Examine the  
Relationship between Pedagogical Content  
Knowledge and Science Teaching Orientations**

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

**Exploring the Potentials and Challenges  
of Integrating Formative Assessment in  
Examination-Oriented Science Classrooms**

Xinying Yin, Indiana University, yinx@indiana.edu  
Gayle A. Buck, Indiana University

**Facet-based Assessment of Teacher Knowledge  
and Skills of Formative Assessment**

Jim Minstrell, FACET Innovations, JimMinstrell@FACETInnovations.com  
Min Li, University of Washington  
Ruth A. Anderson, FACET Innovations, LLC

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

The Impact of Research Experiences

2:15pm – 3:45pm, Room 304

**Presider:**

Ann W. Wright, Canisius College

**Learning to do Research in a Research Experience  
for Undergraduates (REU) Program**

Allan Feldman, University of South Florida, afeldman@usf.edu  
Dilek Ozalp, University of South University

**How do Summer Undergraduate Research  
Experiences Compare to Other Models?**

Omolola A. Adedokun, Purdue University, oadedok@purdue.edu  
Ann Bessenbacher, Purdue University  
Loran Carleton Parker, Purdue University  
Amy C. Childress, Purdue University  
Lisa P. Kirkham, Purdue University  
Dorothy Teegarden, Purdue University  
Wilella D. Burgess, Purdue University

**A Longitudinal Study of how Graduate Students in  
Field Ecology Acquire Research Expertise**

Mika Leon-Beck, The Hebrew University of Jerusalem, Israel, mikabeck@gmail.com  
Jeff Dodick, The Hebrew University of Jerusalem, Israel

**The Impact of a Summer Research Program on  
Rising College Freshmens' Integration Into a  
Science Community of Practice**

Grant E. Gardner, East Carolina University, gardnerg@ecu.edu  
Jennifer H. Forrester, The University of Wyoming  
Penny Shumaker Jeffrey, North Carolina State University

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

Symposium - Undergraduate Science Assessment: Current Innovations and Future Obstacles and Opportunities

2:15pm – 3:45pm, Room 309

### **Presider:**

Marcelle A. Siegel, University of Missouri-Columbia

### **Presenters:**

Janet Coffey, Gordon & Betty Moore Foundation University of Maryland, College Park

Sandra K. Enger, The University of Alabama in Huntsville

Ellen Osmundson, CRESST, The University of California-Los Angeles

Sarah B. Woodruff, Ohio's Evaluation and Assessment Center for Mathematics and Science Education

Jerome M. Shaw, University of California - Santa Cruz

Dennis W. Sunal, The University of Alabama

Robert E. Yager, The University of Iowa

Marcelle A. Siegel, University of Missouri-Columbia

Jennifer Clasegens, Northern Arizona University

Michelle Sinapuelas, University of California-Berkeley

## Strand 6: Science Learning in Informal Contexts

Families Encouraging Science Learning and Participation

2:15pm – 3:45pm, Room 305

### **Presider:**

Janell Nicole Catlin, Teachers College, Columbia University

## An Exploratory Study of Parent Involvement by Take-Home Science Activities in Taiwan

Yi-Ting Cheng, Nation Chenghua University of Education, tonia0213@yahoo.com.tw

Huey-Por Chang, National Changhua University of Education

## Family Meaning-Making and Identity Negotiation at Telescope Observing Events

Matthew Wenger, University of Arizona, Tucson, mwenger@email.arizona.edu

## The Association of Parental Hobbies and Male Physicists' Interest in Science

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

Robert H. Tai, University of Virginia

## Documenting Family Interactions at Touch Tanks: Is the Talk More Important than the Touch?

Shawn Rowe, Oregon State University, shawn.rowe@oregonstate.edu

James F. Kiesel, California State University, Long Beach

## Strand 7: Pre-service Science Teacher Education

Pre-service Teacher Beliefs and Efficacy

2:15pm – 3:45pm, Room 306

### **Presider:**

Sherry S. Herron, University of Southern Mississippi

## An Exploration of the Relationship between Preservice Teachers' Teacher Efficacy Beliefs and Constructivist-based Teaching Practice

Tugba Temiz, Yuzuncu Yil University, tugbaaaygun@yahoo.com

Mustafa S. Topcu, Mugla University

## Impact of a Content Area Practicum Experience on Pre-Service Science Teacher Content and Pedagogical Efficacy

Timothy A. Goodale, College of Coastal Georgia, tgoodale@ccga.edu

## Understanding Preservice Teacher Belief Systems with the Use of a Complex Systems Model

Brian S. Fortney, The University of Texas at Austin,

bfortney@austin.utexas.edu

## Strand 8: In-service Science Teacher Education

Mentoring and the Induction Years

2:15pm – 3:45pm, Room 105

### **Presider:**

Martina Nieswandt, University of Massachusetts, Amherst

## Qualitative Indicators of Successful Induction: Case Studies of Four Beginning Secondary Science Teachers' Meaning Making and Identities-in-Practice

Angela W. Webb, Louisiana State University, awwebb@lsu.edu

## Mentoring Science and Mathematics Teachers Using the Plus/Delta: Assessing an Induction Experience

Sheryl L. Mcglamery, University of Nebraska at Omaha, smcglamery@unomaha.edu

Sandra L. Shillingstad, University of Nebraska at Omaha

## Teacher-to-Teacher Mentoring: A Model for Meaningful Professional Development that Facilitates Teacher Change

Jason Petula, Penn State Harrisburg, jason.petula@psu.edu

## **Beginning Secondary Science Teachers' Beliefs, Practices, and Experiences: A Five-Year Mixed Methods Study**

Julie A. Luft, The University of Georgia, [jaluft@uga.edu](mailto:jaluft@uga.edu)  
 Jonah B. Firestone, Arizona State University  
 Charles B. Weeks, Arizona State University  
 Sissy S. Wong, University of Houston  
 Krista Adams, University of Nebraska  
 Irasema B. Ortega, University of Alaska

## **Strand 8: In-service Science Teacher Education Curriculum as a Basis for Professional Development** **2:15pm – 3:45pm, Room 106**

### ***Presider:***

Eva Erdosne Toth, West Virginia University

## **In-service Teachers' Attitudes and Beliefs about Climate Change**

Shiyu Liu, University of Minnesota, [liux0631@umn.edu](mailto:liux0631@umn.edu)  
 Jeremy Wang, University of Minnesota  
 Keisha Varma, University of Minnesota  
 Gillian Roehrig, University of Minnesota

## **The Effect of Curriculum-based Professional Development on Science Instruction: Findings from a Randomized Control Trial**

Joesph Taylor, BSCS, [jtaylor@bscs.org](mailto:jtaylor@bscs.org)  
 Stephen R. Getty, BSCS  
 Susan M. Kowalski, BSCS  
 Christopher Wilson, BSCS  
 Janet Carlson, BSCS

## **A Model for Teacher Learning in the Context of a Curriculum Renewal**

Fer Coenders, University of Twente, [fer.coenders@utwente.nl](mailto:fer.coenders@utwente.nl)  
 Cees Terlouw, Saxion Universities of Applied Sciences

## **Content vs. Process within Systemic Reform: The Narrative Construction of a Science Teaching Identity**

Richard H. Kozoll, DePaul University, [rkozoll@depaul.edu](mailto:rkozoll@depaul.edu)

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

Assessment Development and Application in Undergraduate Sciences  
**2:15pm – 3:45pm, Room 308**

## **Fostering the Development of Quantitative Life Skills through Introductory Science: Can it be Done?**

Katherine B. Follette, University of Arizona, [kate.follette@gmail.com](mailto:kate.follette@gmail.com)  
 Donald McCarthy, University of Arizona  
 Erin Dokter, University of Arizona

## **Building New Assessments for the “New Biology”: Establishing Content Validity for a Genomics and Bioinformatics Test**

Chad Campbell, The Ohio State University, [campbell.742@osu.edu](mailto:campbell.742@osu.edu)  
 Ross H. Nehm, The Ohio State University  
 Brian Morton, Barnard College, Columbia University

## **Using Machine-Learning Methods to Detect Key Concepts and Misconceptions of Evolution in Students' Written Explanations**

Minsu Ha, The Ohio State University, [ha.101@osu.edu](mailto:ha.101@osu.edu)  
 Ross H. Nehm, The Ohio State University

## **Guiding Attention on Physics Problems Using Visual Cues Modeled After Experts' Eye Movements**

Adrian C. Madsen, Kansas State University, [adrianc@phys.ksu.edu](mailto:adrianc@phys.ksu.edu)  
 Amy Rouinfar, Kansas State University  
 Allison Coy, Kansas State University  
 Adam Larson, Kansas State University  
 Lester C. Loschky, Kansas State University  
 N. Sanjay Rebello, Kansas State University

## **Strand 11: Cultural, Social, and Gender Issues** Religion, Evolution, and Indigenous Science: National and International Contexts **2:15pm – 3:45pm, Room 107**

### ***Presider:***

Bhaskar Upadhyay, University of Minnesota

## **Islam and Evolutionary Science: Secondary Students' Conceptions of Evolution from Five Countries**

Anila Asghar, McGill University, [anila.asghar@mcgill.ca](mailto:anila.asghar@mcgill.ca)  
 Joshua Rosenau, National Center for Science Education  
 Jason R. Wiles, Syracuse University  
 Saouma B. Boujaoude, American University of Beirut  
 Mino Derayeh, York University  
 Quinn O., McGill University  
 Brian Alters, Chapman University

## **Interrelating Attitudes toward Evolution, Climate Change, and Genetic Engineering in Students' Lives**

David E. Long, Valdosta State University, [delong@valdosta.edu](mailto:delong@valdosta.edu)

### How Universal is Students' Interest in Biology? Correlation between Interest in Biology, Gender, Culture and Religion

Ayelet Baram-Tsabari, Technion - Israel Institute of Technology,  
ayelet@technion.ac.il

Galit Hagay, Technion - Israel Institute of Technology

Jaume Ametller, University of Leeds

Gultekin Cakmakci, Hacettepe University

Betina Lopes, University of Aveiro

Aurora Moreira, University of Aveiro

Helena Pedrosa-de-Jesus, University of Aveiro

### Imaginary Subjects: School Science, Indigenous Students, and Knowledge–Power Relations

Eleanor D. Abrams, University of New Hampshire,  
eleanor.abrams@unh.edu

Joanna Kidman, University of Wellington, New Zealand

Hiria McRae, University of Wellington New Zealand

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### Strand 12: Educational Technology

Evaluation and Instrumentation of  
Technological Endeavors

2:15pm – 3:45pm, Room 101

#### **President:**

Noemi Waight, University at Buffalo

### An Animation-based Approach to Clarify the Meanings of Questions in a Technology-enhanced Science Learning Environment Preference Questionnaire

Yu-Ta Chien, National Taiwan Normal University, yutachien@ntnu.edu.tw

Chun-Yen Chang, National Taiwan Normal University

### Development of a Short Form Measure of Science and Technology Self-Efficacy using Rasch Analysis

Richard L. Lamb, George Mason University, lambdl9137@gmail.com

David B. Vallett, George Mason University

Leonard A. Annetta, George Mason University

Rebecca Cheng, George Mason University

### Analytical Framework to Assess Scientific Discourse in Connected Science Classrooms

Soon C. Lee, Ohio State University, lee.3552@osu.edu

Karen E. Irving, Ohio State University

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### Strand 13: History, Philosophy, and Sociology of Science Elementary Teachers' View of NOS 2:15pm – 3:45pm, Room 102

#### **President:**

Selina Bartels, Illinois Institute of Technology

### Exploring How Elementary Teachers Translate Their Nature of Views into Classroom Practice after a Graduate Level Nature of Science Course

Hasan Deniz, University of Nevada Las Vegas, hasan.deniz@unlv.edu

Elif Adibelli, University of Nevada Las Vegas

Mehmet F. Dulger, University of Nevada Las Vegas

### Factors Affecting Early Elementary (K-4) Teachers' Introduction of the Nature of Science

Sophia J. Sweeney, Northeastern State University, sweeney@nsuok.edu

William F. McComas, University of Arkansas

### Preservice Elementary Science Teachers' Connections among Aspects of NOS: Toward a Consistent, Overarching Framework

Sinan Ozgelen, Mersin University, sozgelen@gmail.com

Deborah L. Hanuscin, University of Missouri-Columbia

Ozgul Yilmaz-Tuzun, Middle East Technical University

### Exploring Elementary Science Methods Course Contexts for Improving Nature of Science Conceptions and Understandings of NOS Teaching Strategies

Valerie L. Akerson, Indiana University, vakerson@indiana.edu

Ingrid S. Weiland, University of Louisville

Kader Bilican, METU

Khemawaddee Pongsanon, Indiana University

Meredith A. Park Rogers, Indiana University

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### Strand 14: Environmental Education

Fostering Decision Making to Promote Sustainable  
Environmental Attitudes and Behaviours

2:15pm – 3:45pm, Room 103

**President:** Maurice DiGiuseppe, University of Ontario Institute of  
Technology

### Learning for Environmental Decision-Making

Sameer Honwad, sameervhonwad@gmail.com

### Human Nature: Chemical Engineering University Students' Attitudes about Human Relationships with the Natural World

Daphne Goldman, Beit Berl Academic College, dafnag@netvision.net.il

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

Julia Dranik, Ben Gurion University of the Negev, Israel

### Urban Elementary Students' Ideas about the Environment, Activism, and Jobs

Daniel L. Dickerson, Old Dominion University, ddickers@odu.edu

Stephanie Hathcock, Old Dominion University

### Being Responsible and Respectful: A Case Study of Collective Knowledge Building

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

Hoe Teck Tan, Singapore School of Science and Technology



**Strand 15: Policy**

Symposium - Developing Resources that Connect Learning Progression Research to Science Standards  
**2:15pm – 3:45pm, Room 104**

**Presider:**

Aaron D. Rogat, Teachers College, Columbia University

**Discussant:**

Amelia Wenk Gotwals, Michigan State University

**Presenters:**

Joseph S. Krajcik, Michigan State University

Marianne Wiser, Clark University

Jennifer Hicks, Indiana Department of Education

Stephen Pruitt, Achieve

**Concurrent Session #9**

**4:00pm – 5:30pm**

**Strands 1 and 2 Joint Sponsored Administrative Session Symposium – Connecting Research and Practice of Science Education: A Symposium in Honor of Phil Scott**

**4:00pm – 5:30pm, Room 313**

**Presiders:**

Jan H. Van Driel, janvandriel@aol.com

Xiufeng Liu, State University of New York at Buffalo

J. Randy McGinnis, University of Maryland

**Presenters:**

Eduardo F. Mortimer, Universidade Federal de Minas Gerais, Brazil

Asma Almahrouqi, University of Leeds

Edenia Ribeiro do Amaral, Universidade Federal Rural de Pernambuco

Jouni Viiri, University of Finland

Carl Angell, University of Oslo, Norway

Jonathan Emberton, Teacher of Physics in the North of England

Jim Ryder, University of Leeds, UK

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

Learning Using Mental and Conceptual Models

**4:00pm – 5:30pm, Room 310**

**Presider:**

Saouma B. Boujaoude, American University of Beirut

**Learning Ecology in a 3rd Grade Classroom Using Design-based Learning: An Embodied Modeling Approach**

Amanda C. Dickes, Vanderbilt University, amanda.c.dickes@vanderbilt.edu

Pratim Sengupta, Vanderbilt University

Gokul Krishnan, Vanderbilt University

**Learning University Physics Using Multiple Representations**

David F. Treagust, Curtin University Perth Australia,  
 d.f.treagust@curtin.edu.au

Yen-Ruey Kho, Curtin University Perth Australia

Marjan Zadnik, Curtin University Perth Australia

Salim Siddiqui, Curtin University Perth Australia

Mihye Won, Curtin University Perth Australia

**Supporting Students' Conceptual Change in Physics: Utilizing Teaching Strategies from the OGEM Cycle**

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

**Learning about Chemical Energy: Mapping the Progression Landscape**

Vicente A. Talanquer, University of Arizona, vicente@u.arizona.edu

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

School Contexts

**4:00pm – 5:30pm, Room 302**

**Presider:**

Martina Nieswandt, University of Massachusetts, Amherst

**Contestation and Labeling across the Spectrum of Inclusive Urban Science Education and Teacher Preparation**

Nicole K. Grimes, York Preparatory School, nkygrimes@gmail.com

Wesley Pitts, Lehman College, CUNY

**Developing Decision-making about a Familiar Socio-scientific Issue: A Four Nation Comparison**

Marcus Grace, University of Southampton, UK, mmg1@soton.ac.uk

Yeung C. Lee, Hong Kong Institute of Education

Anita Wallin, University of Gothenburg, Sweden

Roman Asshoff, Münster University, Germany

**Exploring the Potential of Gamification for Urban Science Education**

Christopher Emdin, Teachers College Columbia University, ce2165@columbia.edu

Joey J. Lee, Teachers College Columbia University

J. Hammer, Teachers College Columbia University

Jenny D. Ingber, Bank Street College of Education

**Effects of Class Size and School Location on Students' Perception of Learning Environment in Turkey**

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

Nevzat Yigit, Karadeniz Technical University

Yasin Cinemre, Karadeniz Technical University, Trabzon, Turkey

Bilal Balcin, Karadeniz Technical University, Trabzon, Turkey

**Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies**  
Teacher Knowledge  
4:00pm – 5:30pm, Room 301

**Presenter:**

Therese B. Shanahan, University of California - Irvine

**Improving Teacher Pedagogical Content Knowledge and Student Science Understanding with Inquiry-based Science Kits**

Sarah J. Brasiel, Edvance Research, Inc., sbrasiel@edvanceresearch.com

**Preservice Elementary Teachers' Pedagogical Content Knowledge of Inquiry-based Astronomy Investigations**

Julia D. Plummer, Pennsylvania State University, jdp17@psu.edu  
Arzu Tanis Ozcelik, Pennsylvania State University

**Investigating the Impact of Teachers' Physics Content Knowledge on Students' Interest in Elementary School Science**

Annika Ohle, University Duisburg- Essen, Annika.Ohle@uni-due.de  
Hans E. Fischer, University Duisburg-Essen

**Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies**  
Symposium - Learning from Children: A Conversation about Science Education in the Early Years  
4:00pm – 5:30pm, Room 303

**Discussant:** Cynthia C. Deaton, Clemson University

**Presenters:**

Cassie Quigley, Clemson University, cassieq@clemson.edu  
Christina Siry, University of Luxembourg  
Deborah C. Smith, Penn State University  
Bhaskar Upadhyay, University of Minnesota  
Maria Varelas, University of Illinois at Chicago  
Lynne Pieper, University of Illinois at Chicago  
Amy Arsenault, University of Illinois at Chicago

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

Fostering Problem Solving Skills

4:00pm – 5:30pm, Room 304

**Presenter:**

Ross H. Nehm, The Ohio State University

**Building a Valid and Reliable Assessment of Physics Identity**

Geoff Potvin, Clemson University, gpotvin@clemson.edu  
Kylie Paige, Clemson University  
Carrie E. Beattie, Clemson University

**Does Explicit Problem Solving Teaching Strategy Improve Pre-service Elementary Teachers' Problem Solving Ability in Chemistry?**

Lloyd M. Mataka, Western Michigan University, lloyd.m.mataka@gmail.com  
William W. Cobern, Western Michigan University  
George V. Akom, University of Hong Kong

**Facilitating Students' Transfer of Learning in Physics Problem Solving Using a Computer-Based Assessment**

Dehui Hu, Kansas State University, dehuu@phys.ksu.edu  
Joshua Von Korff, Kansas State University  
N. Sanjay Rebello, Kansas State University

**Undergraduate Life Science Students' Critical Evaluation of Research Articles**

Edwin B. Van Lacum, University of Groningen, e.b.van.lacum@rug.nl  
Miriam A. Ossevoort, University of Groningen  
Martin J. Goedhart, University of Groningen

**Strand 6: Science Learning in Informal Contexts**  
Gender and Science: Understanding Boys and Girls  
Engagement with Out-of-School Science  
4:00pm – 5:30pm, Room 305

**Presenter:**

Lynn D. Dierking, Oregon State University

**An Exploration of Girls' Socialization Patterns in a High School: University Science Partnership Program**

Megan E. Faurot, Illinois Institute of Technology, mfaurot@hawk.iit.edu  
Stephen A. Bartos, Illinois Institute of Technology  
Norman G. Lederman, Illinois Institute of Technology  
Teresa K. Woodruff, Northwestern University  
Cathryn Smeyers, Northwestern University  
Nadia Reynolds, Northwestern University

**Innovating to Address Community Needs: Girls Learning 21st Century Skills of Innovation in Out-of-School Science**

Melissa Koch, SRI International, melissa.koch@sri.com  
Patrik Lundh, SRI International  
Christopher J. Harris, SRI International

**Informal Science Inquiry in U.S. Boy Scouts' Science and Technology Merit Badges**

Matthew E. Vick, University of Wisconsin-Whitewater, vickm@uwv.edu

**The Impacts of Informal Science on Girls' Interest, Engagement, and Participation in Science Communities, Hobbies and Careers**

Lynn D. Dierking, Oregon State University, dierkinl@science.oregonstate.edu  
Dale McCreedy, Franklin Institute Science Museum  
Jessica Luke, Institute for Learning Innovation



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

Pre-service Science Teachers' Understanding and Usage of Various Assessment Strategies

4:00pm – 5:30pm, Room 306

**Presider:**

Tamara H. Nelson, Washington State University Vancouver

**Preservice Formative Assessment Interviews: The Development of Responsive Questioning**

Julie Amador, Indiana University, jamador@indiana.edu

Ingrid S. Weiland, University of Louisville

Rick Hudson, University of Southern Indiana

**Exploring Portfolio Assessment in Saudi Pre-service Science Teachers' Education Program**

Hiya Almazroa, Princess Nora Bint Abdul Rahman University,

halmazroa@pnu.edu.sa

**Diagnosis in Teacher Education – Theoretical and Methodological Considerations**

Claudia von Aufschnaiter, University of Giessen, Claudia.von-

Aufschnaiter@didaktik.physik.uni-giessen.de

Gabi Duebbelde, Justus Liebig University of Giessen

Juergen Mayer, University of Kassel

Andrea Moeller, University of Trier

Joachim Stiensmeier-Pelster, Justus Liebig University Giessen

Anett Wolgast, Justus Liebig University Giessen

Janine Cappell, Justus Liebig University Giessen

**Eliciting, Identifying, Interpreting and Responding to Students' Ideas: Teacher Candidates Growth in Formative-Assessment Practices**

Amelia Wenk Gotwals, Michigan State University, gotwals@msu.edu

Daniel Birmingham, Michigan State University

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

Addressing Culture/High Need Classrooms in Teacher Preparation

4:00pm – 5:30pm, Room 309

**Presider:**

Gale A. Seiler, McGill University

**Investigation of Pre-service Science Teachers' Informal Reasoning, Epistemological Beliefs, and Metacognitive Awareness Regarding****Socioscientific Issues**

Nilay Ozturk, Middle East Technical University, onilay@metu.edu.tr

Ozgul Yilmaz-Tuzun, Middle East Technical University

**Pre-Service Science Teacher Understandings about the Role of Culture in the Classroom**

Stephen Krajcski, Penn State University, sek194@psu.edu

**Teaching the Content in Context: Preparing Science Teachers for Meaningful, Relevant Instruction in Underserved Classrooms**

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

**Preparing Teachers for Teaching in High-need Schools: A Comparison of Two Science Education Programs**

Kevin Goff, College of William & Mary, kdgoff@email.wm.edu

Juanita Jo Matkins, College of William & Mary

Jacqueline Theresa McDonnough, Virginia Commonwealth University

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

Using Technology to Facilitate Professional Development

4:00pm – 5:30pm, Room 105

**Presider:**

Marissa S. Rollnick, Wits University

**Professional Development Integrating Technology - Does Delivery Format Matter?**

Lori Rubino-Hare, Northern Arizona University, lori.hare@nau.edu

Jennifer Claesgens, Northern Arizona University

Kristi Fredrickson, Northern Arizona University

Nena Bloom, Northern Arizona University

Carol Henderson-Dahms, Southwest Evaluation Research, LLC

James Sample, Northern Arizona University

Mark Manone, Northern Arizona University

**Promoting a Learning Community: Using Wikis in a Professional Development Program for Chemistry Teachers**

Yael Shwartz, Weizmann Institute of Science, yael.shwartz@weizmann.ac.il

Dvora Katchevitch, Weizmann Institute of science

**The Use of Blogging as a Tool to Support Teachers' Identity Development as Leaders**

Deborah L. Hanuscin, University of Missouri, hanuscind@missouri.edu

Ya-Wen Cheng, University of Missouri

Carina M. Rebello, University of Missouri

Somnath Sinha, University of Missouri

Nilay Muslu, University of Missouri, Columbia

**Development of a Teacher Training Course on the Use of Computer Aided Material in Science**

Manuela Welzel-Breuer, University of Education Heidelberg, Germany, welzel@ph-heidelberg.de

Jari Lavonen, University of Helsinki, Finland

Helga Stadler, University of Vienna, Austria

Zhelyazka Raikova, University of Plovdiv "Paisii Hilendarski", Bulgaria

Roger Erb, University of Education Schwabebisch Gmuend, Germany

Karine Bécu-Robinault, University of Lyon, France

George S. Ioannidis, University of Patras, Greece

Sönke Graf, University of Education Heidelberg, Germany

Clemens Nagel, University of Vienna, Austria

## Strand 8: In-service Science Teacher Education Teachers Learning Content, Inquiry, and Universal Design

4:00pm – 5:30pm, Room 106

### **President:**

Irene U. Osisioma, California State University, Dominguez Hills

## Assessing an Innovative Program for K-12 Teachers that Integrates Scientific Inquiry with UDL

Peter Meyerson, University of Wisconsin Oshkosh, meyersen@uwosh.edu  
Stacey Skoning, University of Wisconsin Oshkosh  
John Lemberger, University of Wisconsin Oshkosh

## Case Studies in Teacher Content Learning in a Problem-Based Learning Professional Development Setting

Tom J. McConnell, Ball State University, tjmcconnell@bsu.edu  
Joyce M. Parker, Michigan State University  
Jan Eberhardt, Michigan State University

## Supporting Inquiry-Rich Teaching through Professional Development within a District-Higher Education Partnership

Jay A. Fogleman, University of Rhode Island, fogleman@mail.uri.edu  
Joshua Caulkins, University of Rhode Island  
Sarah Knowlton, Rhode Island College  
Laura Schifman, University of Rhode Island  
Daniel Murray, University of Rhode Island

## A Vygotskian Theoretical Framework for Understanding High School Science Teachers' Talk in Professional Development

Victoria M. Deneroff, Georgia College & State University, victoria.deneroff@gcsu.edu

## Strand 10: Curriculum, Evaluation, and Assessment

Approaches to Measures of Curriculum Effectiveness  
4:00pm – 5:30pm, Room 308

### **President:**

Christopher Wilson, BSCS

## Advancing Tools for Research on Science Instruction: Results from the National Field Test of a Classroom Observation Protocol

Jacqueline DeLisi, Education Development Center, Inc., jdelisi@edc.org  
Daphne Minner, Abt Associates, Inc.  
Linda Hirsch, Education Development Center, Inc.  
Ruth Krumhansl, Education Development Center, Inc.

## Instructional and School Factors and their Influence on Science Competencies

Nai-en Tang, University of Missouri-Columbia, naientang@gmail.com  
Chia-Lin Tsai, University of Missouri-Columbia  
Lloyd H. Barrow, University of Missouri

## Assessment Tools for Studying the Effect of Educative Curriculum Materials

Peggy Trygstad, Horizon Research, Inc., ptrygstad@horizon-research.com  
P. Sean Smith, Horizon Research, Inc.  
Elizabeth A. Davis, University of Michigan  
Annemarie S. Palincsar, University of Michigan

## Assessing the Quality of Teaching of Brown's Pre-College Courses

Esther L. Zirbel, Brown University, esther\_zirbel@brown.edu  
Robin Rose, Brown University  
James Chansky, Brown University  
Maria Byerly, Brown University

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

Exploring Elementary Science Education and Parent Participation for STEM Pipeline  
4:00pm – 5:30pm, Room 107

### **President:**

Felicia M. Mensah, Teachers College, Columbia University

## Effective Urban Elementary Teachers of Inquiry Science: Beliefs, Knowledge, and Resources Shaping Teacher Planning

Elaine M. Silva Mangiante, University of Rhode Island, emangiante@cox.net

## Exceptional Practices and Unconventional Norms: Parents' Initiatives for assisting their Children's STEM Learning

Rashmi Kumar, University of Pennsylvania, rashmikupenn@gmail.com

## Geeks or Freaks? How Primary School Children View Science-keen Peers

Jennifer DeWitt, King's College London, jennifer.dewitt@kcl.ac.uk  
Louise Archer, King's College London  
Jonathan F. Osborne, Stanford University

## Factors at the School Level Contributing to Reduced Achievement Gaps on Elementary Science Tests

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

**Strand 12: Educational Technology**

Symposium - Digital Resources to Support Science Instruction: Research, Development and Practice

4:00pm – 5:30pm, Room 101

**Presider:**

Alice Anderson, Education Development Center, Inc.

**Discussant:**

Eric N. Wiebe, North Carolina State University

**Presenters:**

Lauren Goldenberg, Education Development Center, Inc.

Catherine E. Milne, New York University

Ruth Schwartz, New York University

Mimi Recker, Utah State University

Al Byers, National Science Teachers Association

Chad Dorsey, The Concord Consortium

Marian Pasquale, Education Development Center, Inc.

Ted Sicker, WGBH Teachers' Domain

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

Assessing NOS

4:00pm – 5:30pm, Room 102

**Presider:**

Jonah B. Firestone, Arizona State University

**Pathways of a Humanistic Approach to Science Education: A Review of the Literature**

Jeremy Price, Boston College, jeremy.price@bc.edu

**Turkish Preservice Teachers' Epistemological beliefs in Physics, Chemistry, and Biology: A Mixed Study**

Mustafa S. Topcu, Mugla University, msamitopcu@gmail.com

**Development and Validation of a Rubric to Score the Views of Nature of Science (VNOS) Questionnaire**

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

Jeremy Belarmino, University of Illinois at Urbana-Champaign

Ryan Summers, University of Illinois at Urbana-Champaign

**Using Text Mining Technique to Categorize Science Writings According to Their Inclusion of Nature of Science: Implications for Practice and Research**

Feng Jiang, University of Arkansas, fjiang@uark.edu

William F. McComas, University of Arkansas

**Strand 14: Environmental Education**

Using Placed-based Frameworks to Engage Learners in Environmental Education

4:00pm – 5:30pm, Room 103

**Presider:**

Rita Hagevik, The University of North Carolina at Pembroke

**Merging Place-based Environmental Science and Traditional Ecological Knowledge in Secondary and Postsecondary Educational Settings**

Daniel R. Zalles, SRI International, daniel.zalles@sri.com

Brian D. Collins, University of Washington

Cynthia Updegrave, University of Washington

David R. Montgomery, University of Washington

Thomas G. Colonese, University of Washington

Amir J. Sheikh, University of Washington, Seattle

**Engaging Underrepresented Youth through the Enactment of an Urban Environmental and Geoscience Place-based Curriculum**

Amy DeFelice, CUNY, amyferguson3@hotmail.com

Jennifer D. Adams, Brooklyn College- CUNY

Pieranna Pieroni, Brooklyn College- CUNY

Brett Branco, Brooklyn College- CUNY

**Teaching Earth Smarts: A Pragmatic, Nonpartisan Educational Construct for Socioecological Literacy**

Bryan H. Nichols, University of South Florida, bryanhnichols@gmail.com

Dana L. Zeidler, University of South Florida

**This is More Like Home: Enriching Students' I-Thou Relationship with Nature through Community Mapping**

Susan Jagger, OISE/University of Toronto, sjagger@utoronto.ca

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## Evening/Social Events

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### Membership and Elections Committee

#### Sponsored Session

Early Career and Junior Faculty Early

Career Discussion

This session is particularly designed for the early career, junior faculty who need support during the first years of their academic career. The focus will be a panel discussion with experienced faculty who can guide junior faculty through important issues that pertain to the tenure process and other issues. Discussion topics include, but are not limited to: publications, research in the new position, collaboration with different colleges within the university setting, teaching loads, the tenure and promotion process, etc. We invite all junior faculty interested in this topic to join us.

**5:45pm – 6:45pm, Room 101**

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

Reizelie Barreto-Espino, Towson University

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### Springer Publishing Reception

By Invitation

**6:00pm – 8:30pm, White River Ballroom A - B**

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### Equity and Ethics Committee Sponsored Dinner

**7:00pm – 9:00pm, Off-site – Buca di Beppo**

#### Italian Restaurant

Dinner, including tax and gratuity, is \$35.

NOTE: You must register for this event with your Advance Conference Registration (90 participants max).

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### Social

**8:00pm – 10:30pm, White River Ballroom E**

Wednesday, March 28, 2012





Conference Registration  
7:00am – 12:00pm, White River Registration

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Strand Meetings  
7:00am – 8:15am

Strand 1: Science Learning, Understanding and Conceptual Change  
Meeting—7:00am – 8:15am, Room 301

Strand 2: Science Learning: Contexts, Characteristics and Interactions  
Meeting—7:00am – 8:15am, Room 302

Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies  
Meeting—7:00am – 8:15am, Room 303

Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies  
Meeting—7:00am – 8:15am, Room 304

Strand 5: College Science Teaching and Learning (Grades 13-20)  
Meeting—7:00am – 8:15am, Room 305

Strand 6: Science Learning in Informal Contexts  
Meeting—7:00am – 8:15am, Room 306

Strand 7: Pre-service Science Teacher Education  
Meeting—7:00am – 8:15am, Room 308

Strand 8: In-service Science Teacher Education  
Meeting—7:00am – 8:15am, Room 313

Strand 9: Reflective Practice  
Meeting—7:00am – 8:15am, Room 206

Strand 10: Curriculum, Evaluation, and Assessment  
Meeting—7:00am – 8:15am, Room 311

Strand 11: Cultural, Social, and Gender Issues  
Meeting—7:00am – 8:15am, Room 312

Strand 12: Educational Technology  
Meeting—7:00am – 8:15am, Room 314

Strand 13: History, Philosophy, and Sociology of Science  
Meeting—7:00am – 8:15am, Grand Ballroom V-A

Strand 14: Environmental Education  
Meeting—7:00am – 8:15am, Grand Ballroom V-B

Strand 15: Policy  
Meeting—7:00am – 8:15am, Grand Ballroom VI-A

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## Concurrent Session #10 8:30am – 10:00am

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Equity and Ethics Committee Sponsored Session  
New Scholars Symposium Sponsored by the Equity and Ethics Committee: Teaching and Learning Science in Diverse Contexts -- Local and Global Perspectives  
8:30am – 10:00am, Room 313

**President:**

Bhaskar Upadhyay, University of Minnesota

**Discussant:**

Valerie L. Akerson, University of Indiana-Bloomington

**Presenters:**

Femi Otulaja, University of Witwatersrand-Johannesburg, South Africa

Vanashri Nargund-Joshi, Indiana University-Bloomington

Minjung Ryu, University of Maryland-College Park

Nai-en Tang, University of Missouri-Columbia

Idaykis Rodriguez, Florida International University-Miami

Renee Michelle Goertzen, Florida International University-Miami

Eric Brews, Florida International University-Miami

Laird H. Kramer, Florida International University-Miami

Ingrid M. Sanchez Tapia, University of Michigan

Consuelo J. Morales, University of Michigan

Teresa Satterfield, University of Michigan

Jean Rockford Aguilar-Valdez, University of North Carolina at Greensboro

Nieviata Bueno Watts, Purdue University

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Strand 2: Science Learning: Contexts, Characteristics and Interactions  
Science Inquiry  
8:30am – 10:00am, Room 302

**President:**

Jonathan F. Osborne, Stanford University

Inquiry and Elementary Science Learning:  
Evidence from a Randomized Trial of the  
Science Writing Heuristic

Mack Shelley, Iowa State University, mshelley@iastate.edu

Christopher Gonwa-Reeves, Iowa State University

Joan Baenziger, Iowa State University

Ashley Seefeld, Iowa State University

Brian M. Hand, University of Iowa

William Therrien, University of Iowa

## **Integrating the Outdoor Learning Environment into Formal Science: Testing the Model across Culture and Age**

Molly L. Yunker, Weizmann Institute of Science,  
molly.yunker@weizmann.ac.il  
Nir Orion, Weizmann Institute of Science

## **Assessment of Group Learning in Interdisciplinary Environments**

Bijaya Aryal, University of Minnesota-Rochester, baryal@umn.edu  
Robert L. Dunbar, University of Minnesota-Rochester  
Rajeev S. Muthyala, University of Minnesota-Rochester

## **Studying the Process of Decision-making in an Inquiry-based Module**

Eduardo F. Mortimer, Universidade Federal de Minas Gerais Brazil,  
mortimer@ufmg.br  
Fábio Augusto R. Silva, Universidade Federal de Ouro Preto Brazil

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

### **Secondary Science**

8:30am – 10:00am, Room 311

#### ***Presenter:***

Phyllis Katz, University of Maryland

## **Hearing the Meanings Expressed by High School Students of Science: A Qualitative Study**

Jeremy Price, Boston College, jeremy.price@bc.edu

## **The Influence of Lab Activities, Teacher Certification and Subject on Students'**

### **Engagement, Motivation and Learning**

Diana J. Zaleski, Northern Illinois University, DZaleski07@gmail.com  
Lee Shumow, Northern Illinois University  
Jennifer A. Schmidt, Northern Illinois University

## **Positionality in the Physics Classroom: Implications for Student Engagement**

Zahra Hazari, Clemson University, zahra@clemson.edu  
Cheryl A.P. Cass, North Carolina State University  
Carrie E. Beattie, Clemson University  
Robynne M. Lock, Clemson University

## **Comparative Study of the Learning Environments of Secondary Science Classrooms in Government and Private Schools**

Adit Gupta, Model Institute of Education and Research, Jammu,  
India, aditgupta@yahoo.com

## **Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies** Related Paper Set - Beyond Student Test Scores: A More Comprehensive Look at Quality of Teaching 8:30am – 10:00am, Room 301

### ***Discussant:***

Kathleen J. Roth, BSCS

## **Examining Quality of Teaching from Different Perspectives**

Maria Araceli Ruiz-Primo, University of Colorado Denver, maria.ruiz-primo@ucdenver.edu  
Min Li, University of Washington

## **Knowledge of Learning Goals as a Navigation Tool in Curriculum Implementation**

Ming-Chih Lan, University of Washington, mclan@uw.edu  
Michael Giamellaro, University of Colorado Denver  
Min Li, University of Washington  
Maria Araceli Ruiz-Primo, University of Colorado Denver

## **Supporting Students to Make Conceptual Connections**

Min Li, University of Washington, minli@u.washington.edu  
Ming-Chih Lan, University of Washington  
Maria Araceli Ruiz-Primo, University of Colorado Denver  
Michael Giamellaro, University of Colorado Denver  
Ting Wang, University of Washington  
Jennifer Feehan, University of Colorado Denver  
Mchale Aaron Orgeron, University of Colorado Denver

## **Quality Teaching as Reflected in Productive Failure**

Michael Giamellaro, University of Colorado Denver, michael.giamellaro@ucdenver.edu  
Maria Araceli Ruiz-Primo, University of Colorado Denver  
Min Li, University of Washington  
Kellie Wills, University of Washington  
Ming-Chih Lan, University of Washington

## **Knowing where Students are: Finding out What Students Know and Moving their Learning Forward**

Hillary Mason, Hillary.Mason@ucdenver.edu  
Maria Araceli Ruiz-Primo, University of Colorado Denver  
Min Li, University of Washington  
Michael Giamellaro, University of Colorado Denver

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

Inquiry Based Teaching and Learning

8:30am – 10:00am, Room 303

#### **Presider:**

Jodie Galosy, Knowles Science Teaching Foundation

### Influences on Teachers' Capacities to use Educative Curriculum Materials as Intended

Sihan Xiao, University of California, Los Angeles, shxiao@ucla.edu

William A. Sandoval, University of California, Los Angeles

### Cooperative Learning and Intergroup Competition in Biology Education

Sarah Sennebogen, University of Munich (LMU),

Sarah.Sennebogen@lrz.uni-muenchen.de

Birgit Jana Neuhaus, University of Munich (LMU)

### Project-Based Teaching: Supporting Students in Making Connections

Heather J. Johnson, Vanderbilt University, heather.j.johnson@vanderbilt.edu

### iCoach-Teacher Teams Professional Development: The Influence of Coach led Reflection, Practice Teaching, and Content Instruction on Middle School Teachers' Use of Inquiry Practices

Christine R. Lotter, University of South Carolina, lotter@mailbox.sc.edu

Jan Yow, University of South Carolina

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

Developing Conceptual Understanding in Science

8:30am – 10:00am, Room 304

#### **Presider:**

Leigh S. Arino De La Rubia, Tennessee State University

### Tracking College Students' Growth in Understanding of the Particulate Nature of Matter

James M. Nyachwaya, University of Minnesota, nyach002@umn.edu

Jamie L. Schneider, University of Wisconsin, River Falls

Nathan B. Wood, North Dakota State University

Abdirizak W. Mohammed, University of Minnesota

Anne L. Kern, University of Idaho

Gillian Roehrig, University of Minnesota

### Improving College Students' Interdisciplinary Science Understanding

Shannon Sung, The University of Georgia, shasung@uga.edu

Ji Shen, The University of Georgia

Kathrin Stanger-Hall, The University of Georgia

### University Students' Informal Reasoning Progression on NDM-1 Socio-scientific Issue: A Preliminary Study

Tzu-Chun Huang, National Taichung University, smy@mail.ntcu.edu.tw

Shu-Mey Yu, National Taichung University

Yu-Hsiang Su, National Taichung University

### Progress Made in the Development of a Conceptual Roadmap for Chemistry and Nanoscience Education

Alan K. Szeto, Purdue University Calumet, alan.szeto@purduecal.edu

### Strand 6: Science Learning in Informal Contexts

Fostering Complex Learning in Museums

8:30am – 10:00am, Room 305

#### **Presider:**

Jennifer DeWitt, King's College London

### Re-Imagining Science Museums: Communities of Environmental Lifelong Learners

Kathleen A. Fadigan, Pennsylvania State University, kxf24@psu.edu

### Guiding Play with Technology to Improve Science Affect and Learning

David E. Kanter, New York Hall of Science, dkanter@nysci.org

Sameer Honwad, New York Hall of Science

Cheryl Kwinn, Tufts University

Adiel Fernandez, New York Hall of Science

### Learning at the Museum: Specters of Learning in German Natural History Museums from the Museum Educator's Point of View

Jennifer H. Härting, Jennifer.Haerting@uni-vechta.de

### Using Educational Research in the Development of Science Exhibitions

Antti Laherto, University of Helsinki, Finland, antti.laherto@helsinki.fi

### Strand 7: Pre-service Science Teacher Education Technology in Pre-Service Teacher Education

8:30am – 10:00am, Room 306

#### **Presider:**

Kristin L. Cook, Indiana University

### Investigating Pre-service Science Teachers' Content Knowledge And Perceived TPACK Regarding Genetics

Meltem Savas, Middle East Technical University, msavas@metu.edu.tr

Ozgul Yilmaz-Tuzun, Middle East Technical University

## **Preservice Teachers as eMentors: Using Web 2.0 Learning Tools To Foster Student Inquiry**

Gabriela Jonas-Ahrend, University of Dortmund,  
gabriela.jonas-ahrend@uni-dortmund.de  
M. Randall Spaid, Macon State College  
Stuart Fleischer, The American International School in Israel

## **Using Blogging as a Disruptive Design for Learning in Pre-Service Teacher Education Courses**

Janice L. Anderson, University of North Carolina at Chapel Hill,  
anderjl@email.unc.edu  
Julie E. Justice, University of North Carolina at Chapel Hill  
Steven D. Wall, University of North Carolina at Chapel Hill

## **Using PhotoVoice to Empower Pre-service Teachers to Connect Science to Their Daily Lives**

Kristin L. Cook, Indiana University, kshockey@indiana.edu  
Cassie Quigley, Clemson University

## **Strand 7: Pre-service Science Teacher Education Field Experiences as a Factor in Pre-service Teacher Development II**

8:30am – 10:00am, Room 312

### ***Presider:***

Vanessa Kind, Durham University

## **Curriculum Materials Analysis as a Boundary Spanning Task: Bridging Science Methods and Field Placement Discourses**

Kristin L. Gunckel, University of Arizona, kgunckel@email.arizona.edu

## **Examining the Role of School-Based Experiences in Preparing Pre-Service Teachers for Science Teaching**

Angela Fitzgerald, Monash University, Melbourne, Australia, angela.fitzgerald@monash.edu  
Katrin Schneider, Monash University, Melbourne, Australia

## **Science Educator Identity Formation: The Impact of Place-Based Teaching Opportunities**

Jennifer H. Forrester, The University of Wyoming, jforres5@uwyo.edu  
Jason M. Katzmann, The University of Wyoming

## **Strand 8: In-service Science Teacher Education Symposium - Different Ways to Investigate Teachers' Pedagogical Content Knowledge**

8:30am – 10:00am, Room 206

### ***Presider:***

Andreas Borowski, RWTH Aachen University

### ***Presenters:***

Sophie Kirschner, University Duisburg-Essen  
Janet Carlson, BSCS  
Ineke Henze, Radboud University, Nymegen  
Julie Gess-Newsome, Willamette University  
Hans E. Fischer, University Duisburg-Essen  
Jan H. Van Driel, Leiden University

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

Middle School Curriculum and Evaluation

8:30am – 10:00am, Room 308

### ***Presider:***

Gayle A. Buck, Indiana University

## **Assessing NOS Knowledge using Network Analysis: An Examination of Students' Growth in a Contextualized Environment**

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

## **The Effects of Coherent Curriculum on Middle School Students' Understanding of Key Chemistry Ideas**

Joseph S. Krajcik, Michigan State University, krajcik@umich.edu  
LeeAnn M. Sutherland, University of Michigan  
Sung-Youn Choi, University of Michigan  
Joi Merritt, Michigan State University  
Kathryn F. Drago, University of Michigan

## **Students' Errors Using Geographically Variable Data to Support Scientific Predictions**

Sarah J. Fick, University of Michigan, sfick@umich.edu

## **Results from a Pilot Study of a Curriculum Unit Designed to Help Middle School Students Understand Chemical Reactions in Living Systems**

Cari F. Herrmann Abell, AAAS/Project 2061, cabell@aaas.org  
Jean C. Flanagan, AAAS Project 2061  
Jo Ellen Roseman, AAAS Project 2061

## Strand 10: Curriculum, Evaluation, and Assessment

Science Assessment: Approaches and Issues

8:30am – 10:00am, Room 314

### **Presider:**

David F. Treagust, Curtin University

## How Stable are Students' Understanding of Light Propagation and Visibility of Objects in Different Contexts?

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

David F. Treagust, Curtin University

## Development and Validation of Instrument for Exploring High School Students' Conceptions of Science Assessment in Taiwan

Min-Hsien Lee, National Central University, Taiwan,

lee.minhsien@gmail.com

Tzung-Jin Lin, National Taiwan University of Science and Technology, Taiwan

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

## Children's Perceptions on Primary Science Assessment

Colette Murphy, Queen's University Belfast, c.a.murphy@qub.ac.uk

## Assessment of Student Reasoning in Control of Variables

Lei Bao, The Ohio State University, bao.15@osu.edu

Shaona Zhou, China Central Normal University

Jing Han, The Ohio State University

Amy Raplinger, The Ohio State University

Kathleen M. Koenig, University of Cincinnati

## Strand 10: Curriculum, Evaluation, and Assessment

Symposium - Argument Focused Instruction and Science Proficiency

8:30am – 10:00am, Grand Ballroom VI-A

### **Presider:**

Victor D. Sampson, Florida State University

### **Presenters:**

Patrick J. Enderle, Florida State University, pje07@fsu.edu

Barry Golden, University of Tennessee

Jonathon Grooms, Florida State University

Joi P. Walker, Florida State University

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

Poster Symposium - Identity and Science Education

Research: Topics, Issues, and Trends

8:30am – 10:00am, Grand Ballroom V-A

### **Presider:**

Maria Varelas, University of Illinois at Chicago

### **Presenters:**

Megan Bang, University of Washington

Angela Calabrese Barton, Michigan State University

Philip L. Bell, University of Washington

Leah A. Bricker, University of Washington

Heidi Carlone, University of North Carolina at Greensboro

Alice Carvalho, Université de Montréal

Allison J. Gonsalves, Université de Montréal

Juanita Bautista Guerra, Michigan State University

Jennifer Hope, University of Missouri-St. Louis

Angela Johnson, St. Mary's College of Maryland

Justine M. Kane, Wayne State University

Hosun Kang, University of Washington

Audrey Lachaine, Université de Montréal

Amanda Marin, Northwestern University

Maria S. Rivera Maulucci, Barnard College

Elizabeth Rita Menig, University of Illinois at Chicago

Felicia M. Mensah, Teachers College Columbia University

Carole P. Mitchener, University of Illinois at Chicago

Tara B. O'Neil, University of Hawaii at Manoa

Eileen C. Parsons, University of North Carolina at Chapel Hill

Joe Polman, University of Missouri-St. Louis

Jrene Rahm, Université de Montréal

Gale A. Seiler, McGill University

Daniela Stellino, University of Illinois at Chicago

Edna Tan, University of North Carolina at Greensboro

Katie Van Horne, University of Washington

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

Symposium - Perspectives from the Frontline:

Examining African-American Students Matriculation into Science

8:30am – 10:00am, Grand Ballroom V-B

### **Presenters:**

Bryan A. Brown, Stanford University, brbrown@stanford.edu

Christopher Emdin, Teachers College Columbia University

Andre M. Green, University of South Alabama

Christopher G. Wright, T.E.R.C



## Concurrent Session #11

### 10:15am – 11:45am

#### Publications Advisory Committee Sponsored Session

Symposium - The Anatomy of a Good Article: Publishing in the Journal of Research in Science Teaching

10:15am – 11:45am, Grand Ballroom V-A

#### **Presiders:**

Angela Calabrese Barton, JRST Editor; Michigan State University  
Joseph S. Krajcik, JRST Editor; Michigan State University  
Bob Geier, Assistant JRST Editor, University of Michigan

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

New Foundations for the Contribution of Prior Knowledge to Learning

10:15am – 11:45am, Room 314

#### **Presider:**

Michelle P. Cook, Clemson University

#### The Use of Construct Maps to Explore Student Understanding of the Chemical Reaction Big Idea

Nirit Glazer, University of Michigan, nirit@umich.edu

#### Exploring the Relationship between Integrated Understanding of Energy and Preparation for Future Learning

Jeffrey Nordine, Trinity University, jnordine@trinity.edu  
Abigail Drake, Trinity University

#### Attending to Individual Differences in the Instruction of Physics: The Role of Prior Knowledge

Shulamit Kapon, Tel Aviv University, ISRAEL, kaponsh@post.tau.ac.il

#### Eighth-grade Students' Mental Models of Magnetism: Modes of Agency and Mechanisms of Interaction

David Sederberg, Purdue University, dsederbe@purdue.edu

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

Elementary Science

10:15am – 11:45am, Room 302

#### **Presider:**

Bhaskar Upadhyay, University of Minnesota

#### On Learning Ecology in Elementary Grades by Designing Robotic Animals and Their Habitats

Gokul Krishnan, Vanderbilt University, gokul.krishnan@vanderbilt.edu  
Pratim Sengupta, Vanderbilt University  
Amanda C. Dickes, Vanderbilt University  
Amy Farris, Vanderbilt University

#### The Use of Drawings to Evaluate the Impact of an Out of School Environmental Education Experience

Michael W. Dentzau, Florida State University, mwd09c@my.fsu.edu  
Alejandro J. Gallard, Florida State University

#### The Effect of Instructional Framing on Learning and Transfer of Experimental Design Skills

Stephanie Siler, Carnegie Mellon University, siler@cmu.edu  
David Klahr  
Kevin Willows  
Cressida Magaro

#### An Investigation of How Cogenerative Dialogues Affect the Culture of Learning in a Pre-Service Elementary Science Learning Environment

Natan Samuels, Florida International University, nsamu002@fiu.edu  
Renee Michelle Goertzen, Florida International University  
Eric Brewe, Florida International University  
Laird Kramer, Florida International University

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

Middle Grades Science

10:15am – 11:45am, Room 311

#### **Presider:**

Noemi Waight, University at Buffalo

#### Can Science Inquiry Instruction Really Enhance 8th Graders' Inquiry Competency and Self-efficacy?

Ching-Wei Tung, Lu-Kang Junior High School, Taiwan, snailms@gmail.com  
Hsiao-Lin Tuan, National Changhua University of Education  
Chi-Chin Chin, National Taichung University of Education



### Personal and Contextual Factors as Predictors of Homework Management and Procrastination in Science Courses

Yasemin Tas, Ataturk University, tasyase@gmail.com  
Semra Sungur, Middle East Technical University  
Ceren Tekkaya, Middle East Technical University

### Measuring Students' Continuing Motivation

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

### Background Demographic Characteristics: Predictors of Parent Attitudes Toward and Expectations of Middle School Science?

Leigh K. Smith, Brigham Young University, leigh\_smith@byu.edu  
Erika Feinauer, Brigham Young University  
Erin F. Whiting, Brigham Young University  
Pamela Cantrell, Brigham Young University

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

Symposium - Models in Science Education: Providing Foundation, Structure & Substance for Content Knowledge, Practice & Epistemology

10:15am – 11:45am, Grand Ballroom VI-A

#### **Presider:**

Julia Svoboda, University of California, Davis

#### **Discussant:**

Brian J. Reiser, Northwestern University

#### **Presenters:**

Julia Svoboda, University of California, Davis, jmsvoboda@ucdavis.edu  
Cynthia Passmore, University of California-Davis  
Michael Ford, University of Pittsburgh  
Melissa Braaten, University of Wisconsin  
Leema Berland, University of Texas, Austin

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

Enhancing the Understanding of NOS

10:15am – 11:45am, Room 303

#### **Presider:**

Tamara H. Nelson, Washington State University Vancouver

### The Effect of Educational Fieldtrips to Professional Research Labs on Students' NOS Understanding

Dina Tsybulskaya, The Hebrew University of Jerusalem,  
dina.tsybulsky@mail.huji.ac.il  
Jeff Dodick, The Hebrew University of Jerusalem  
Jeff Camhi, The Hebrew University of Jerusalem

### The Effect of Explicit-Embedded-Reflective Instruction on Understandings of Advanced Students about Nature of Science

Mustafa S. Koksul, Inonu University, bioeducator@gmail.com  
Jale Cakiroglu, Middle East Technical University  
Omer Geban, Middle East Technical University

### Exploring the Nature of Science through an Online Digital Game

Isha DeCoito, York University, idecoito@edu.yorku.ca  
Maurice DiGiuseppe, University of Ontario Institute of Technology

### A Comparative Case Study of Two High School Biology Teachers' Evolution and Nature of Science Teaching Practices

Lisa A. Donnelly, Kent State University, ldonnell@kent.edu

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

Exploring Different Types of Science Learning and Teaching

10:15am – 11:45am, Room 304

#### **Presider:**

Janelle M. Bailey, University of Nevada, Las Vegas

### Teaching Experiences for Researchers

Anne W. Collins, University of California, Santa Barbara,  
anne.wrigley@gmail.com

### Connections to the K-12 Community that Shape the Career of Future Science Educators: A Longitudinal Study of Former Participants in a GK-12 Program

Molly S. Bolger, University of Arizona, mbolger@email.arizona.edu  
Susan Kuner, Topaz Canyon Group, LLC  
Doug Robinson, Topaz Canyon Group, LLC  
Robert Crouch, Vanderbilt University  
John A. Willis, The Brooks Besor Consultants, Inc.  
Martha J. Willis, The Brooks Besor Consultants, Inc.  
Jennifer A. Ufnar, Vanderbilt University  
Virginia L. Shepherd, Vanderbilt University

### Review of Laboratory Learning in Undergraduate Chemistry Courses

Hannah Sevan, University of Massachusetts Boston,  
hannah.sevan@umb.edu  
Gavin W. Fulmer, National Science Foundation

## Strand 6: Science Learning in Informal Contexts

Innovations Cultivating STEM Disciplinary Knowledge

10:15am – 11:45am, Room 305

### **President:**

James F. Kiesel, California State University, Long Beach

### **Organizational Schemes as Aids for Understanding Astronomical Content**

Jean Creighton, UWM Planetarium

### **Adults' Perception of Learning as Inspired by Awe in Nature**

Tamara C. Coleman, Western Michigan University,

tcoleman@lowellschools.com

### **Museum Theater as a Learning Environment for Introducing Evolution**

Ayelet Baram-Tsabari, Technion

Ran Peleg, Technion - Israel Institute of Technology

### **STEM integration: Integrating Engineering to Enhance Science Learning**

Misun Park, University of Minnesota, parkx598@umn.edu

Younkyeong Nam, University of Minnesota

Tamara Moore, University of Minnesota

Gillian Roehrig, University of Minnesota

## Strand 7: Pre-service Science Teacher Education

Field Experiences as a Factor in Pre-service Teacher Development I

10:15am – 11:45am, Room 306

### **President:**

J. Steve Oliver, The University of Georgia

### **A Hidden Factor? Investigating the Impact Field Experience Hours on Science Teacher Attrition**

Charles B. Weeks, Arizona State University, cbweeks@asu.edu

Julie A. Luft, The University of Georgia

### **Re-imaging Inquiry-Based Field-Experiences for Preservice Science Teachers**

Julie Angle, Oklahoma State University, julie.angle@okstate.edu

Donald P. French, Oklahoma State University

### **A Comparison of Field and University Based Science Methods Courses' Impact on Preservice Teacher's Belief and Abilities to Design Instruction for Diverse Learners**

Anne P. Gatling, Merrimack College, gatlinga@merrimack.edu

## Strand 7: Pre-service Science Teacher Education

Identity formation and Self Efficacy in the Context of Reform

10:15am – 11:45am, Room 312

### **President:**

Andrew W. Shouse, University of Washington

### **Persistence of a Culture of Inquiry: Professional Development Schools and Preparation of Reform-based Science Teachers**

Jeffrey J. Rozelle, Syracuse University, jrozelle@syr.edu

Gail Richmond, Michigan State University

### **Looking through Different Lenses: How Preservice Science Teachers Use Practice-Oriented Reflections to Negotiate Reform-Minded Identities**

Robert Danielowich, Adelphi University (Garden City/New York, NY),

rdanielowich@adelphi.edu

### **Enhance Preservice Teacher Self-efficacy through a Reform-based Science Methods Course**

Sanghee Choi, North Georgia College & State University, sc1122@att.net

## Strand 8: In-service Science Teacher Education

Conceptions of Inquiry and the Nature of Science

10:15am – 11:45am, Room 206

### **President:**

Carla C. Johnson, University of Cincinnati

### **Elementary Education Teachers' interest in and Conceptual Knowledge of Science Process Skills**

Frackson Mimba, Southern Illinois University Carbondale, frackson@siu.edu

Erin Miles, Southern Illinois University Carbondale

Vivien M. Chabalengula, Southern Illinois University Carbondale

### **Changing Identities and Evolving Conceptions of Inquiry through Teacher-Driven Professional Development**

Ben Van Dusen, University of Colorado Boulder,

benvandusen@colorado.edu

Mike Ross, University of Colorado Boulder

Valerie Otero, University of Colorado Boulder

### **Making Room for Play in the World of Kit-Based Science**

Maria S. Rivera Maulucci, Barnard College, Columbia University,

mriveram@barnard.edu

### Examining the Progress Made on the Nature of Science Conceptions of Science and Elementary Teachers Exposed to an Astronomy Science Summer Camp

Ayhan Karaman, Canakkale Onsekiz Mart University,  
akaraman@comu.edu.tr  
Sezen Apaydin, Canakkale Onsekiz Mart University

### Strand 9: Reflective Practice

Curriculum Development, Teacher Beliefs, and Communities of Practice

10:15am – 11:45am, Room 301

### Factors that Influence the Translation of Teachers' Self-efficacy in Teaching Science as Inquiry into Practice

Nattida Promyod, University of Iowa, nattida-promyod@uiowa.edu  
Soonhye Park, University of Iowa

### Using Reflective Inquiry to Uncover Perceptions and Beliefs about Transforming Instructional Practice

Robbie L. Higdon, Clemson University, rhigdon@clemson.edu

### Pathways to Science Teaching and Curriculum Development: A Self-Study of Two Teachers' Experiences

Megan Leider, Loyola University Chicago/St. Rita HS,  
meganleider@gmail.com  
Elizabeth Coleman, Loyola University Chicago

### Developing Reflective Practitioners in Video Centered Communities of Practice (VCCOP)

Kimberly Lebak, Richard Stockton College of New Jersey,  
kimberly.lebak@stockton.edu  
Ron Tinsley, Richard Stockton College of New Jersey

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

Studies on Assessment Forms and Item Sequencing Effects

10:15am – 11:45am, Room 308

#### *Presider:*

Min Li, University of Washington

### Comparing Student Performances, Anxieties, and Preferences between Situated, Virtual Environment Assessments and Multiple-Choice Assessments

Angela Shelton, Temple University, angi@temple.edu  
Diane J. Ketelhut, University of Maryland

### The Impact of Blended Cyberlearning about Climate Change on Students and Teachers

Cindy L. Kern, University of Nevada, Las Vegas, kernc2@unlv.nevada.edu  
Kent J. Crippen, University of Florida  
Heather J. Skaza, University of Nevada-Las Vegas  
Peter G. Schrader, University of Nevada, Las Vegas  
Nya Berry, Clark County School District  
Jake Rollans, Clark County School District

### Item Sequencing Effects on the Measurement of Students' Biological Knowledge

Meghan A. Rector, The Ohio State University,  
rector.43@buckeyemail.osu.edu  
Dennis Pearl, The Ohio State University  
Ross H. Nehm, The Ohio State University

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

Symposium - Promoting Science among English Language Learners (P-SELL) Efficacy Study

10:15am – 11:45am, Grand Ballroom V-B

#### *Presider:*

Okhee Lee, University of Miami

#### *Discussant:*

Sherry A. Southerland, Florida State University

#### *Presenters:*

Jaime Maerten-Rivera, University of Miami  
Kimberly S. Lanier, University of Miami  
Brandon S. Diamond, University of Miami  
Rose Elizabeth Rohrer, University of Miami  
Georgina O. Lindskoog, University of Miami  
Soyeon Ahn, University of Miami

### Lunch—On Your Own

12:00pm – 1:00pm

## Concurrent Session #12

1:00pm – 2:30pm

### Presidential Sponsored Session Symposium - The PISA Assessment Framework for Science in 2015

1:00pm – 2:30pm, Room 313

#### *Presider:*

Sharon Lynch, George Washington University

#### *Presenter:*

Jonathan F. Osborne, Stanford, osbornej@stanford.edu

### **Presidential Sponsored Session**

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

**1:00pm – 2:30pm, Grand Ballroom V-A**

#### **President:**

Janet Carlson, BSCS

### **Students' Learning from Deliberative Communications in Socio-Scientific Issues**

Birgitta Berne, University of Gothenburg Sweden, birgitta.berne@ped.gu.se

### **Identification of Science Literacy Practices in Pre- Service and Practicing Teachers for Urban Youth**

Anna E. Hutchinson, University of Cincinnati, hutchiae@mail.uc.edu

### **From Evaluation to Instructional Support: Changes in Secondary Science Preservice**

#### **Teachers' Assessment Expertise**

Edward G. Lyon, University of California, Santa Cruz, egeaney@ucsc.edu

### **How do Elementary Teachers and Students with Known NOS Views Make Meaning of NOS**

#### **Messages in Trade Books?**

Seema Rivera, State University of New York (SUNY) Albany,  
emailseema@gmail.com

### **From "Teaching the Textbook" to Focusing on "Big Ideas" in an Introductory Undergraduate Biology Course**

Masha Tsaushu, Technion-Israel Institute of Technology,  
tmasha@gmail.com

Tali Tal, Technion-Israel Institute of Technology

Shimon Gepstein, Technion-Israel Institute of Technology

### **Elementary Teachers' Ideas about, Planning for, and Implementation of Learner-Guided and Teacher-Guided Inquiry**

Mandy Biggers, University of Iowa, mandy-biggers@uiowa.edu

Cory T. Forbes, University of Iowa

### **Investigating Teacher Beliefs about the Importance of Scientific Models through Professional Development**

Christopher Bogiages, University of South Carolina, cbogiages@gmail.com

Christine R. Lotter, University of South Carolina

### **Cultural Relevance in High School Biology - Exploring Students' Scientific Understandings and Dispositions**

Julie Brown, University of Florida, brownjc@ufl.edu

### **Teaching Science to English Learners: A Case Study of an Experienced Science Educator**

Joseph Chee, UC Santa Cruz, jchee1@ucsc.edu

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

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

### **Alternatively Certified Science Teachers' Perceptions of their Preparedness to Teach Urban Minority Students**

Patricia S. Dunac, Georgia State University, pdunac1@student.gsu.edu

### **Exploration of Professional Learning Pathways of Senior Years Science Teachers: the Journey toward Science Literacy**

Nancy Grant, University of Manitoba, grantnm@mts.net

### **Leveraging Students' Lived Experiences and Science Ideas**

Sara Hagenah, University of Washington, shagenah@uw.edu

### **Teacher Candidates' Storied Identities and Their Learning to Become a Science Teacher**

Amal Ibourk, Michigan State University, ibourkam@msu.edu

### **Pre-service High School Science Teachers' Selection and Implementation of Formative Assessment Tasks (FATs)**

Kemal Izci, University of Missouri-Columbia, kikrc@mail.missouri.edu

### **What Meanings do Rural Students Place on STEM Careers when Exploring and Creating Career Videos?**

Meredith Kier, North Carolina State University, meredith\_kier@ncsu.edu

Margaret R. Blanchard, North Carolina State University

### **Pedagogical Content Knowledge and Content Knowledge of Pre-Service and In-Service Secondary Physics Teachers**

Sophie Kirschner, University Duisburg-Essen, sophie.kirschner@uni-due.de

Andreas Borowski, RWTH Aachen University

Hans E. Fischer, University of Duisburg-Essen

### **Modeling Instruction: Success in Dissemination through Teacher Empowerment**

May Lee, University of Colorado at Boulder, may.lee@colorado.edu

Melissa Dancy, University of Colorado Boulder

Charles Henderson, Western Michigan University

Eric Brew, Florida International University

### **Open Inquiry in the Urban Science Classroom**

Megan Leider, Loyola University Chicago, megalneider@gmail.com



### **Insights about Students' Knowledge of Natural Selection Concepts from Three High School Biology Teachers' Classes**

Margaret M. Lucero, University of Texas at Austin,  
mmlucero@mail.utexas.edu

### **The Fundamentals of Literacy in Science: Teachers' Implementation of Literacy Practices in the Science Classroom**

Sara C. Heredia, University of Colorado at Boulder,  
Sara.Heredia@colorado.edu

### **Understanding the Co-Development of Modeling Practice and Ecological Knowledge**

Eve I. Manz, Vanderbilt University, eve.i.manz@vanderbilt.edu

### **Studying a Reconceptualized Instructional Model for Secondary Physics Education**

Michael Mastroianni, University at Albany, SUNY, mm187487@albany.edu

### **Figured Worlds as a Lens of Understanding Girls' Identity in a Kindergarten Science Classroom**

Alicia McDyre, Pennsylvania State University, axd252@psu.edu

### **Barriers to Developing Science Faculty Knowledge for Teaching: Identifying Gaps through Critical Review of the Literature**

Deepika Menon, University of Missouri, deepikamenon@mail.mizzou.edu

### **What do Second Graders Notice? Examining Student Notebooks from a Problem-Based Learning Unit**

Eileen Merritt, University of Virginia, egm8e@virginia.edu  
Catherine Brighton, University of Virginia  
Christine Trinter, University of Virginia  
Tonya Moon, University of Virginia  
Kristen Whitlock, University of Virginia  
Kris Wiley, University of Virginia  
Peter Malcolm, University of Virginia

### **Evolution of a K-5 Teacher Learning Community: Grappling With Ambitious Science Teaching Practices**

Mark Merritt, Pennsylvania State University, mdm35@psu.edu  
Carla Zembal-Saul, Pennsylvania State University

### **Supports for Engaging Students' Argumentation: The Role of Students' Everyday View and Teachers' Questioning Scaffold**

Ji yeong Mun, Ewha Womans University, Republic of Korea,  
ksljyl@ewhain.net  
Sung-Won Kim, Woman's University, Republic of Korea

### **Above the Fold: Headlining the Engagement of Teen Science News Journalists**

Jennifer Hope, University of Missouri-St. Louis, jmghope@gmail.com

### **Engaging in Pedagogical Reasoning through the Work of Mentoring: A Case Study**

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

### **Desegregating Evolution within the Curriculum: Exploring Changes in Students' Epistemology and Evolutionary Reasoning**

Nancy Rose, Ohio University, nrose@laca.org

### **Youth Participatory Action Research in Science through a Critical Race Theory Lens**

Takumi Sato, Michigan State University, tsato@msu.edu

### **Argumentation as Collaborative Discourse: Productive Argumentation Moves in Elementary Classrooms**

Kari Shutt, University of Washington, shuttk@uw.edu

### **Changes in Teachers' Culturally Congruent Instruction Over Three Years in a Professional Development Project**

Regina Sievert, Salish Kootenai College, regina\_sievert@skc.edu  
Joan Lafrance, Mekinak Consulting  
Rod Brod, University of Montana-Missoula

### **Revealing Undergraduates Conceptions of the Nature of Science in Ill-Structured Media Domains**

Michele Snyder, University at Albany, michele.snyder@clinton.edu

### **It's (Not) Elementary: Experiences of Pre-Service Teachers in Science Classrooms**

Jessica Stephenson, Virginia Tech, Jesteph3@vt.edu  
George Glasson, Virginia Tech

### **Using Technology to Transform the Social Structure of the High School Physics Classroom**

Ben Van Dusen, University of Colorado, Boulder,  
Benjamin.VanDusen@Colorado.EDU

### **Influence of PCK for Teaching Evolution on Student Outcomes In A Non-Majors' College Course**

Emily Walter, University of Missouri, emw2n4@mail.missouri.edu  
Patricia Friedrichsen, University of Missouri

### **Examining Student Collaboration when Using Web 2.0 Tools to Construct a Group Knowledge Artifact**

Jennifer Weible, Pennsylvania State University, jweeble@gmail.com  
How School Environments Impact Elementary Science Instruction  
Julianne A. Wenner, University of Georgia, jakent@uga.edu

### **Supporting Secondary Biology Teachers in Their Use of Technology to Teach Genetics**

Regina Wragg, University of South Carolina, wragg@biol.sc.edu

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

Conceptual Understanding and Conceptual Change  
**1:00pm – 2:30pm, Room 311**

#### ***Presider:***

Shulamit Kapon, Tel Aviv University

### **The Impact of using a Scaffolded Written Framework on Students' Conceptual Understanding**

Jeong-yoon Jang, University of Iowa, jeongyoon-jang@uiowa.edu  
Brian M. Hand, University of Iowa

### **Epistemic Network Analysis: An Alternative Analysis Technique for Complex STEM Thinking**

Cynthia M. D'Angelo, University of Wisconsin – Madison, cmdangelo@wisc.edu  
Douglas B. Clark, ASU / Vanderbilt  
David Williamson Shaffer, University of Wisconsin – Madison

### **The Role of Metacognition in Students' Development of Explanatory Ideas of Magnetism**

Meng-Fei Cheng, University of Illinois at Urbana-Champaign, mcheng2@illinois.edu  
David E. Brown, University of Illinois at Urbana-Champaign

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

Strategies in Secondary Science  
**1:00pm – 2:30pm, Room 302**

#### ***Presider:***

Phillip Herman, University of Pittsburgh

### **Supporting Reading in High School Science: Evidence that Explicit Strategy Instruction Increases Science Achievement**

Phillip Herman, University of Pittsburgh, pherman@pitt.edu  
Kristen Perkins, Northwestern University  
Peter S. Wardrip, University of Pittsburgh

### **The Dissonance between Taiwanese High School Students' and Teachers' Conceptions of Learning Science and Conceptions of Science Assessment**

Tzung-Jin Lin, National Taiwan University of Science and Technology, tzungjinlin@gmail.com  
Min-Hsien Lee, National Central University

### **Exploring the Link between the Framing of Activity and the Conceptual Trajectory of an Idea**

Brett A. Criswell, Georgia State University, bcriswell@gsu.edu

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

Symposium - Re-imagining Context: Student-Generated Representations as Tools for Reasoning in Science  
**1:00pm – 2:30pm, Grand Ballroom VI-A**

#### ***Discussant:***

Megan Bang, University of Washington

#### ***Presenters:***

Brian Gravel, Tufts University, brian.gravel@tufts.edu  
Kristen B. Wendell, University of Massachusetts Boston  
Christopher G. Wright, TERC  
Joshua A. Danish, Indiana University  
Asmalina Saleh, Indiana University

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

Using Technology for Science Learning  
**1:00pm – 2:30pm, Room 303**

#### ***Presider:***

Josephine Shireen Desouza, Ball State University

### **Edison Didn't Work Alone: A Case for Collaboration among Rural Middle School Science Students Using Digital Backpacks**

Jennifer J. Mohler-Geary, University of Cincinnati, mogy2001@yahoo.com  
Maya Israel, University of Cincinnati

### **Inquiry-Based Science and Technology Program for Female Middle School Students**

Hanna Kim, hkim13@depaul.edu



## What Makes for Effective Multimedia Simulations in Science Education? Outcomes from an Effectiveness Study

Catherine E. Milne, New York University, cem4@nyu.edu

Jan Plass, New York University

Bruce Homer, Graduate Center, City University of New York

Trace Jordan, New York University

Ruth Schwartz, New York University

Elizabeth Hayward, New York University

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

Visual Representation and Science Learning

1:00pm – 2:30pm, Room 304

### *President:*

Allison Ritchie, University of Toronto

## Subject Matter Content Knowledge and Representation Strategies of Physics Teachers: Biot-Savart Law and Ampère's Law

Sharareh Majidi, University of Helsinki, Sharareh.majidi@helsinki.fi

Terhi Mäntylä, University of Helsinki

## Comparing Physical and Virtual Manipulatives for Retention and Preparation for Future Learning of Science Concepts

Amy Rouinfar, Kansas State University, rouinfar@phys.ksu.edu

Adrian C. Madsen, Kansas State University

N. Sanjay Rebello, Kansas State University

Sadhana Puntambekar, University of Wisconsin

## Categorizing Students' Kinds of Mental Representations during Problem Solving of Different Representational Task Formats

Bashirah Ibrahim, Kansas State University, bibrahim@phys.ksu.edu

N. Sanjay Rebello, Kansas State University

## Using Student Learning Preferences to Specifically Augment Student Performance in an Introductory Biology Laboratory Course

Martin G. Kelly, D'Youville College, Buffalo, NY, martink@dyc.edu

## Strand 6: Science Learning in Informal Contexts

Community Involvement in Science: Youth and Adults

Participating in Scientific Practices

1:00pm – 2:30pm, Room 305

### *President:*

Rita Hagevik, The University of North Carolina at Pembroke

## Community Science Experts: Putting Place at the Center

Daniel Birmingham, Michigan State University, birming2@msu.edu

Angela Calabrese Barton, Michigan State University

## Getting Participants to Participate: Stimulating Interest and Uninvolvement among Participants in a Citizen Science Initiative

Jennifer Borland, Rockman Et Al, jennifer@rockman.com

Aaron Price, AAVSO

## Community Youth as Socioscientific Activists: Visions for School Science Reform

John L. Bencze, OISE, University of Toronto, larry.bencze@utoronto.ca

G. Michael Bowen, Mount Saint Vincent University

Shaun Chen, University of Toronto

Allison Ritchie, University of Toronto

Erin R. Sperling, OISE, University of Toronto

## Scientific Competencies and Learning in Online Discourse of a Citizen Science Project

Aaron Price, AAVSO, aaronp@aavso.org

Hee-Sun Lee, University of California, Berkeley

Jennifer Borland, Rockman Et Al

## Strand 7: Pre-service Science Teacher Education

Secondary Science Teacher Preparation

1:00pm – 2:30pm, Room 306

### *President:*

Christiana Nkechi Omoifo, University of Benin

## The Mechanisms of Secondary Science Teacher Candidates' Learning to Teach

Hosun Kang, University of Washington, hosunk@uw.edu

Charles W. Anderson, Michigan State University

## Preservice Secondary Science Teachers' Approaches to Teaching Inquiry Skills

Byoung Sug Kim, Roosevelt University, bkim@roosevelt.edu

Yeon-A Son, Dankook University

Eun Kyung Ko, National-Louis University

Seok Jun Hong, Dankook University

## Preservice Secondary Science Teachers' Views on the Value and Role of Student Ideas

Douglas B. Larkin, Montclair State University, larkind@mail.montclair.edu

## An Investigation of Secondary Science Teacher Candidates Discourse in the Context of Inquiry Investigations

Danielle E. Dani, Ohio University, dani@ohio.edu

Helen M. Meyer, University of Cincinnati

## Strand 7: Pre-service Science Teacher Education

Topics in Environmental Education

1:00pm – 2:30pm, Room 312

### *Presider:*

Julie Thomas, Oklahoma State University

### **Cosmologies of Preservice Teachers: A Six-Year Study, With Comparisons to Cosmologies of Children**

Alice (Jill) A. Black, Missouri State University, [ablack@missouristate.edu](mailto:ablack@missouristate.edu)

### **The Western Worldview vs. Environmental Education: Pre-service Teachers' Beliefs**

Darren D. Hoeg, University of Toronto, [hoeg\\_darren@hotmail.com](mailto:hoeg_darren@hotmail.com)

Sarah Barrett, York University

## Strand 9: Reflective Practice

Enhancing Students' Understanding and Empowerment

1:00pm – 2:30pm, Room 301

### *Presider:*

Kim Charmatz, Daemen College

### **Using an Understanding of Children for Science Lesson Design**

Jenny D. Ingber, Bank Street College of Education, [jingber@bankstreet.edu](mailto:jingber@bankstreet.edu)

Margaret A. McNamara, Bank Street College of Education

### **A Self-Study on Reframing Non-Science Majors' Fundamental Understandings about Scientific Inquiry and Scientists**

Gayle A. Buck, Indiana University Bloomington, [gabuck@indiana.edu](mailto:gabuck@indiana.edu)

Xinying Yin, Indiana University Bloomington

Pazit Koren, Hebrew University

Varda Bar, Hebrew University

### **Building Bridges across the Borders: Elementary Student Conceptions of Science**

Erin A. Hashimoto-Martell, Boston College/Boston Public Schools,

[hashimer@bc.edu](mailto:hashimer@bc.edu)

### **Environmental Action Projects: Exploring Community Partnerships and College Student Empowerment through Participatory Action Research**

Kim Charmatz, Daemen College, [kcharmat@daemen.edu](mailto:kcharmat@daemen.edu)

## Strand 10: Curriculum, Evaluation, and Assessment

Inquiry Instruction and Curriculum

1:00pm – 2:30pm, Room 308

### *Presider:*

Mehmet Aydeniz, The University of Tennessee

### **A Comparative Analysis of K-12 Assessment Instruments of Students' Understandings about Scientific Inquiry**

Darin S. Munsell, Illinois Institute of Technology, [munsdar@hawk.iit.edu](mailto:munsdar@hawk.iit.edu)

Norman G. Lederman, Illinois Institute of Technology

### **Comparative Interactions of High School Biology Students Engaging Textbook Accounts and Narratives of Historical Experiments**

Matthew Kloser, Stanford University, [mkloser@stanford.edu](mailto:mkloser@stanford.edu)

### **The Inclusion of the Main Features of Inquiry in Saudi 10th Grade Physics Textbooks**

Abdulaziz H. Alolah, King Saud University, Saudi Arabia,

[aalolah2@yahoo.com](mailto:aalolah2@yahoo.com)

Fahad S. Alshaya, King Saud University, Saudi Arabia

Saeed M. Alshamrani, King Saud University, Saudi Arabia

### **How do we do Inquiry? Let us Count the Ways**

Daniel Z. Meyer, Illinois Institute of Technology, [meyerd@iit.edu](mailto:meyerd@iit.edu)

Joy Kubarek-Sandor, Illinois Institute of Technology

James Kedvesh, Illinois Institute of Technology

Cheryl Heitzman, Illinois Institute of Technology

Yaozhen Pan, Illinois Institute of Technology

Sima Faik, Illinois Institute of Technology

## Strand 10: Curriculum, Evaluation, and Assessment

Teachers' Knowledge and Practices

1:00pm – 2:30pm, Room 314

### *Presider:*

Colette Murphy, Queens University Belfast

### **Escalating the Validity of the Survey-Type Measure of Teachers' Pedagogical Content Knowledge using Think-Aloud Interviews**

Soonhye Park, University of Iowa, [soonhye-park@uiowa.edu](mailto:soonhye-park@uiowa.edu)

Sae Yeol Yoon, University of Iowa

Jee Kyung Suh, University of Iowa

### **Examining Secondary Science Teachers' Formative Assessment Practices Based on Video Analysis**

Min Li, University of Washington, Seattle, [minli@uw.edu](mailto:minli@uw.edu)

Jim Minstrell, Facet Innovations Inc

Ruth A. Anderson, Facet Innovations Inc

Ting Wang, University of Washington, Seattle

Jennifer Quynn, University of Washington, Seattle

### **Translation and Validation of the Epistemological Beliefs Scale with Preservice Teachers**

Yusuf Sulun, Mugla University, [ysusuf@mu.edu.tr](mailto:ysusuf@mu.edu.tr)

Aylin Cam, Mugla University

Mustafa S. Topcu, Mugla University

Gokhan Guven, Mugla University

Sertac Arabacioglu, Mugla University

### **Factors Affecting Primary Science Teachers' Enactment of Formative Assessment: Reality and Professional Decision Making**

Poh Hiang Tan, National Institute of Education, [pohhiang.tan@nie.edu.sg](mailto:pohhiang.tan@nie.edu.sg)

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

Symposium - Science Education for Diversity: An International Perspective

**1:00pm – 2:30pm, Grand Ballroom V-B**

**Discussant:** Sibel Erduran, University of Bristol

#### **Presenters:**

Saouma B. Boujaoude, American University of Beirut, Lebanon, [boujaoud@aub.edu.lb](mailto:boujaoud@aub.edu.lb)

Rola Khishfe, American University of Beirut, Lebanon

Sugra Chunawala, Homi Bhabha Centre for Science Education, India

SweeChin Ng, Tunku Abdul Rahman College, Malaysia

Ralf van Griethuijsen, Eindhoven University of Technology, The Netherlands

Perry den Brok, Eindhoven University of Technology, The Netherlands

Ayşe Savran Gencer, Pamukkale University

Huseyin Bag, Pamukkale University

Alun Morgan, Exeter University, UK

Nasser Mansour, Exeter University, UK

Sahar Alameh, American University of Beirut

Michiel van Eijck, Eindhoven University of Technology, The Netherlands

SiewChee Choy, Tunku Abdul Rahman College, Malaysia

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### **Strand 14: Environmental Education**

Poster Symposium - Climate Change Education for the Twenty-First Century

**1:00pm – 2:30pm, Grand Ballroom VI-B**

#### **Presenter:**

Devarati Bhattacharya, University of Minnesota

### **Collaborative Development of a climate change curriculum for classrooms in the Intermountain west-The ICE-Net Project**

Anne Kern, University of Idaho, [akern@uidaho.edu](mailto:akern@uidaho.edu)

### **Global Climate Change Education: Advancing Student Knowledge through Teacher Education-The ASK Florida Project**

Anna Lewis, University of South Florida, [arlewis@csl.usf.edu](mailto:arlewis@csl.usf.edu)

### **CYCLES: Teachers Discovering Climate Change from a Native Perspective**

Gillian Roehrig, University of Minnesota, [roehr013@umn.edu](mailto:roehr013@umn.edu)

### **Global Climate Change for Teachers: An Online Professional Development Leading to Civic Engagement**

#### **Presenter:**

Julie Thomas, Oklahoma State University, [Julie.thomas@okstate.edu](mailto:Julie.thomas@okstate.edu)

### **Date Enhanced Investigations for Climate Change Education-The DICCE Project**

Daniel Zalles, SRI International, [daniel.zalles@sri.com](mailto:daniel.zalles@sri.com)

NCAR Research Experience for Teachers (RETT)

### **2010-2012 NASA Challenger Center Global Climate Change Award**

Annette Brickley, Challenger Center for Space Science Education, [abrickley@clcofine.org](mailto:abrickley@clcofine.org)

### **Global Climate Change Education: Research Experiences, Teaching and Learning**

Mary Margaret Small, Clarkson University, [mmsmall@clarkson.edu](mailto:mmsmall@clarkson.edu)

### **Improvements to AMS Pre-college Programs: Results of a Self-study on Datastreme Earth's Climate System**

James Brey, American Meteorological Society, [brey@ametsoc.org](mailto:brey@ametsoc.org)

### **An Experimental Approach to Climate Change Professional Development**

Patricia D. Morrell, University of Portland, [morel@up.edu](mailto:morel@up.edu)

Kari O'Connell, Oregon State University

### **Bringing Global Climate Change Education to Alabama Classrooms: The Auburn University GCCE Project**

Marlin Simon, Auburn University, [msimon@physics.auburn.edu](mailto:msimon@physics.auburn.edu)

### **Climate Change Literacy: Analysis of Learning Gains in Formal Education Setting Using a Normed Evaluation Instrument**

Carol Mandryk, George Mason University, [mandryk@gmail.com](mailto:mandryk@gmail.com)

## Concurrent Session #13

### 2:45pm – 4:15pm

#### Research Committee Sponsored Session

Symposium - Framing Standards: Researching the Development & Implementation of the Next Generation Science Standards

2:45pm – 4:15pm, Grand Ballroom V-A

##### **Presider:**

Richard Duschl, Penn State University

##### **Discussants:**

Kathryn Scantlebury, University of Delaware

Janice Earle, National Science Foundation

##### **Presenters:**

Stephen Pruitt, Achieve, Inc.

Brett Moulding, Utah State, Tidemark Inst.

James Pellegrino, University of Illinois - Chicago

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

Symposium - Towards a Learning Progression of Energy Procedures, and Pedagogical Issues to Reposition Literacy in Scientific Literacy

2:45pm – 4:15pm, Room 311

##### **Presider:**

Reinders H. Duit, Leibniz Institute for Science Education (IPN) Kiel

##### **Discussant:**

Charles W. Anderson, Michigan State University, andya@msu.edu

##### **Presenters:**

David L. Fortus, Weizmann Institute of Science

Joseph S. Krajcik, Michigan State University

Xiufeng Liu, State University of New York At Buffalo (SUNY)

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

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

Diverse Learners

2:45pm – 4:15pm, Room 302

##### **Presider:**

Janell Nicole Catlin, Teachers College, Columbia University

#### The Construction of Inquiry Questions in Project-based Small-group Scientific Inquiry

Jane J. Lee, Seoul National University, jane8207@gmail.com

Heui-Baik Kim, Seoul National University

#### Factors Affecting whether Students in England Choose to Study Physics once the Subject is Optional

Tamjid Mujtaba, Institute of Education, University of London, t.mujtaba@ioe.ac.uk

Michael J. Reiss, Institute of Education, University of London

#### Science in the Inclusive Classroom: Addressing Students' Needs through a Multi-Dimensional Instructional Environment

Ornit Spektor-Levy, ornitsl@gmail.com, Bar Ilan University

Yafa Gonda-Keren, Bar Ilan University

Merav Yifrach, Bar Ilan University

#### Promoting a Culture of Learning based on Internal Values in an Introductory Undergraduate Biology Course

Ornit Sagy, Technion-Israel Institute of Technology, ornit\_sagy@yahoo.com

Yael Kali, University of Haifa

Masha Tsashu, Technion-Israel Institute of Technology

Tali Tal, Technion-Israel Institute of Technology

Dan Zilberstein, Technion-Israel Institute of Technology

Shimon Gepstein, Technion-Israel Institute of Technology

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

Measuring and Exploring Teachers' PCK

2:45pm – 4:15pm, Room 303

##### **Presider:**

Isha DeCoito, York University

#### Teacher Knowledge versus Teacher Practice: Reflecting on Classroom Instruction and Interaction through PCK-directed Observation

Erik Barendsen, Radboud University Nijmegen, ILS-RU,

e.barendsen@ils.ru.nl

Ineke Henze, Radboud University, Nijmegen

#### Further Examination of Interplay between Pedagogical Content Knowledge Components

Sevgi Aydin, Yuzuncu Yil University, sevgi.aydin45@hotmail.com

Yezdan Boz, Middle East Technical University

#### Comparison of Experienced Chemistry Teachers' Pedagogical Content Knowledge in Electrochemistry and Radioactivity

Yezdan Boz, Middle East Technical University, yezdan@metu.edu.tr

Sevgi Aydin, Yuzuncu Yil University

#### Examine The Discourse Pattern And Teacher's Pedagogies In Promotion Reasoning In Science Writing Heuristic Classroom

Niphon Chanlen, University of Iowa, niphon-chanlen@uiowa.edu

Brian M. Hand, University of Iowa



### **Measuring PCK for Teaching Chemical Equilibrium: A Comparison between Experienced Teachers and Pre-service Teachers**

Marissa S. Rollnick, Wits University, marissa.rollnick@wits.ac.za  
Elizabeth M. Mavhunga, Wits University

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

Teacher Beliefs and Effects on Practice

2:45pm – 4:15pm, Room 305

#### **Presider:**

Catherine E. Milne, New York University

### **Relationship between Teachers' Beliefs and Practice of Review Lesson and Student Learning**

Su Gao, University of Nevada, Las Vegas, gaos2@unlv.nevada.edu  
Jian Wang, University of Nevada, Las Vegas

### **Teachers Views of the Role of Literacy in Science**

Jonathan F. Osborne, Stanford University, osbornej@stanford.edu  
Michael Metz, Stanford University  
Alexis Patterson, Stanford University  
Diego Xavier Roman, Stanford University

### **Pre-service Science Teachers' Orientations toward Teaching: Evidence for Constancy and Ability across Subject Matter Knowledge Areas**

Vanessa Kind, Durham University, UK, vanessa.kind@durham.ac.uk

### **Science Teachers' Beliefs about the Influence of their Summer Research Experiences on their Pedagogical Strategies**

Rommel Miranda, Towson University, Rmiranda@towson.edu  
Julie Damico, Towson University

### **Secondary Science Teacher Beliefs about Talk during Whole-Class Discussions**

Diane Silva Pimentel, Boston College, silvadi@bc.edu  
Katherine L. McNeill, Boston College

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

Science and Graphic Representations

2:45pm – 4:15pm, Room 304

### **Investigating the Value of Multi Modal Representation Instruction on Learning Physics Concepts**

Murat Gunel, Ahi Evran University, mgunel@ahievran.edu.tr  
Cuneyt Ulu, Marmara University

### **Understanding the Conventions Undergraduate Students Follow or Break When Constructing Scales for Graphs**

Margaret M. Lucero, The University of Texas at Austin, mmlucero@mail.utexas.edu  
Cesar Delgado, The University of Texas at Austin

### **Students' Use of Covalent Bond Model to Represent Ionic Bonds: Insights from Particulate Drawing Task**

Abdi M. Warfa, University of Minnesota, moham489@umn.edu  
James M. Nyachwaya, University of Minnesota  
Gillian Roehrig, University of Minnesota  
Jamie L. Schneider, University of Wisconsin River Falls

### **Using Diagrams in Conjunction with Clicker-questions in Large Lecture Biology Courses to Enhance Student Learning**

Johanna M. Fitzgerald, UMass-Amherst, johfitz@yahoo.com  
J.Z. Barlow, UMass-Amherst  
Randall Phillis, UMass-Amherst

### **Strand 7: Pre-service Science Teacher Education Preservice Teachers' Understandings and Perceptions of the Nature of Science**

2:45pm – 4:15pm, Room 306

#### **Presider:**

G. Michael Bowen, Mount Saint Vincent University

### **A Case Study of a Pre-Service Science Teacher's Practice of NOS Teaching and Argumentation**

Yasemin Ozdem, Gaziosmanpasa University, yozdem@metu.edu.tr  
Kader Bilican, Ataturk University

### **Investigating use of Self-efficacy Sources in Improving Preservice Science Teachers' Self-efficacy Beliefs Regarding Teaching Nature of Science**

Kader Bilican, Ataturk University  
Jale Cakiroglu, Middle East Technical University

### **Assessing Student Learning from a PBL Approach: Comparing Pre-Service Science Teachers to Undergraduate Science Students**

Sharon Schleigh, East Carolina University, schleighs@ecu.edu  
Alex Manda, East Carolina University  
Hilda Bryan, East Carolina University

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**Strand 7: Pre-service Science Teacher Education**  
 Developing Pre-Service Teachers' Content Knowledge  
 2:45pm – 4:15pm, Room 312

***Presider:***

Douglas B. Larkin, Montclair State University

**Examining the Role of Content Knowledge in Learning to Teach Science: Implications for Teacher Preparation**

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

**Exploring the Teacher-Researcher Model for Impacts on Pre-service Teachers' Preparation for Science and Math Teaching**

Bryan M. Rebar, California Polytechnic State University, brebar@calpoly.edu

John M. Keller, California Polytechnic State University

Collie Conoley, University of California, Santa Barbara

**Science Student Teachers' Struggles with and Learning about Classroom Action Research During Their Field Experiences**

Chatree Faikhamta, Kesetsart University, chatreechem@yahoo.com

Anthony Clarke, University of British Columbia

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**Strand 8: In-service Science Teacher Education**  
 Promoting Project-Based Science Teaching  
 2:45pm – 4:15pm, Room 206

***Presider:***

Christine R. Lotter, University of South Carolina

**The Impact of an Immersion Course on In-Service K-8 Teachers Implementation of Reformed Teaching Practices in the Classroom**

Margaret D. Nolan, Boston University, noland@mersd.org

Peter Garik, Boston University

Charles Winnich, Boston University

Nicholas Gross, Boston University

**Developing Science Teacher Leaders to Facilitate the Implementation of Project-Based Science in Schools: Preliminary Findings**

Gale A. Mentzer, Grant Fundamentals LLC, gale@grantfundamentals.com

Janet Struble, The University of Toledo

**Educative Curriculum Materials that Allow for Learned Adaptations: Ensuring Quality of Implementation**

Barbara Hug, University of Illinois at Urbana-Champaign, bhug@illinois.edu

Tania Jarosewich, Censeo Group LLC

Donna Korol, University of Illinois at Urbana-Champaign

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

Assessment and Evaluation

2:45pm – 4:15pm, Room 308

***Presider:***

Alan K. Szeto, Purdue University Calumet

**Effect of Order of Concept Introduction on Secondary Honors Students' Understanding of Chemistry**

John C. Scali, University of Delaware, Newark, john.scali@bsd.k12.de.us

**Research-Based Shift from Algorithmic Teaching to 'HOCS Learning' Science - for a Diverse Global Community**

Uri Zoller, Haifa University, uriz@research.haifa.ac.il

Naji Kortam, Haifa University

Tami Levy Nahum, Haifa University

Ibtesam Azaiza, Haifa University

David Ben-Chaim, Haifa University

**Where are the People? Understanding Representations of Society-Nature Relationships in State Science Standards in United States**

Ajay Sharma, University of Georgia, ajay@uga.edu

Cory A. Buxton, University of Georgia

**Designing Effective Science Achievement Measures for Intervention Studies with English Language Learners**

Jerome M. Shaw, University of California, Santa Cruz, jmlshaw@ucsc.edu

Edward G. Lyon, University of California, Santa Cruz

Joseph Chee, University of California, Santa Cruz

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**NARST Executive Board Meeting #3**  
 5:00pm – 10:00pm, Grand Ballroom 7



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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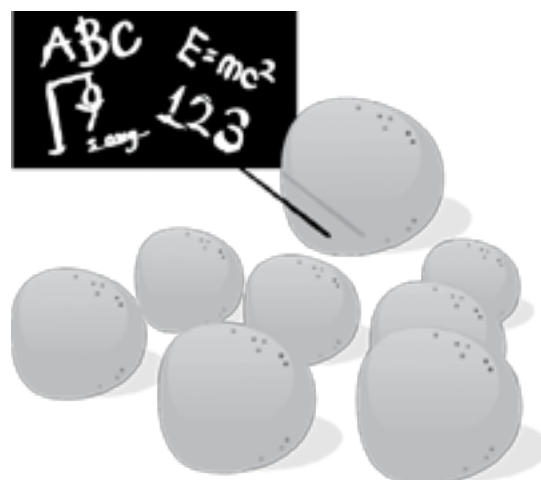
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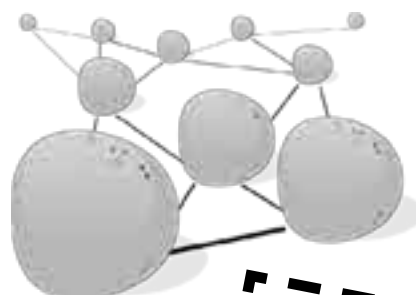


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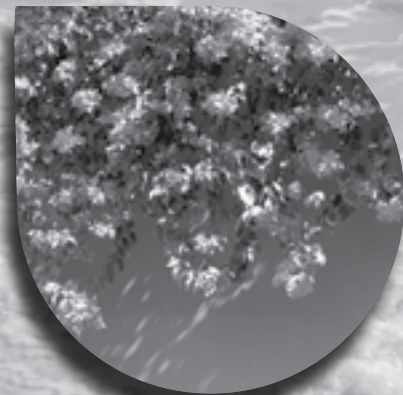
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