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ACKNOWLEDGMENTS

The following members of the Program Committee helped in preparing and editing the 2011 NARST Annual International Conference Program Book.

Dana L. Zeidler, President and Program Committee Chair
J. Randy McGinnis, President-Elect
William C. Kyle, Jr., Executive Director
Toni A. Sondergeld, NARST Scheduling Coordinator
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Convention Hotel Floor Plan
Announcing a 2011 National Conference sponsored by National Study of Education in Undergraduate Science (NSEUS)*

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Research Based Undergraduate Science Teaching: Investigating Reform in Classrooms

June 19 – 21, 2011, Bryant Conference Center, University of Alabama Campus, Tuscaloosa, AL

The conference will focus on reforms in teaching undergraduate science and their short- and long-term impact on student outcomes. This highly interactive meeting combines presentations with time to interact and network with colleagues. We encourage you to plan to attend and participate. Register today at http://nseus.org.

If you currently are involved in research, or have future plans to conduct research in undergraduate science teaching, learning, and learning outcomes, consider submitting a proposal for the NSEUS 2011 Conference. We encourage you to send us your proposal abstract for consideration, for an individual research, action research paper, or larger group session and also to volunteer as a chair or discussant. Papers will be considered for publication as a chapter in the annual 2012 research volume Research in Science Education (RISE), Information Age Publishers.

Information regarding the conference or submitting a proposal for presentation is available on the NSEUS web site http://nseus.org. A limited number of travel expense stipends are available to partially cover conference expenses for faculty presenting research papers related to the theme of the conference.

Dennis Sunal, Dean Zollman, Cheryl Mason and Cynthia Sunal, conference committee co-chairs. For more information contact Dennis Sunal at dwsunal@bama.ua.edu

*The Conference is partially funded under the National Science Foundation Grant TPC 0554594. The project focuses on an examination of teaching in undergraduate science in the US and its impact on students. Opinions expressed in conference reports are those of the authors and do not necessarily reflect those of the Foundation.
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
The National Association for Research in Science Teaching (NARST) is a worldwide organization of professionals committed to the improvement of science teaching and learning through research. Since its inception in 1928, NARST has promoted research in science education and the communication of knowledge generated by the research. The ultimate goal of NARST is to help all learners achieve science literacy. NARST promotes this goal by: 1) encouraging and supporting the application of diverse research methods and theoretical perspectives from multiple disciplines to the investigation of teaching and learning in science; 2) communicating science education research findings to researchers, practitioners, and policy makers; and 3) cooperating with other educational and scientific societies to influence educational policies. To learn more about NARST you may visit the Association’s website at http://narst.org/ and read the Bylaws approved by the membership in October 2008 at http://www.narst.org/about/NARST_bylaws.pdf.

Member Benefits

- Ten issues of the Journal of Research in Science Teaching (JRST) are published each volume year. 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.
- 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 2011 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 2011 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 2011 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 2011 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.

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

NSTA - National Science Teachers Association
Open University Press
Routledge Journals
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Springer
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University of Alabama

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
2012 Annual Conference Details

The Program Chair invites NARST members and others to plan to participate in the 2012 NARST Annual International Conference. You may wish to start planning next year’s program proposals during this year’s conference.

VENUE: JW Marriott Indianapolis, 10 S. West Street • Indianapolis, Indiana, USA
This new hotel opened in February 2011 as the largest JW Marriott in the world. The downtown Indianapolis hotel overlooks a gorgeous art-filled plaza. It is adjacent to the convention center and close to the White River State Park, the Indianapolis Zoo, many museums and within walking distance of the Circle Centre Mall with over 100 shopping, dining and entertainment options.

THEME: Re-Imagining Research in 21st Century Science Education for a Diverse Global Community
We encourage NARST members to align their proposals, wherever it is conceptually feasible, with the 2012 NARST theme that focuses on looking forward imaginatively, courageously, and comprehensively while engaging in science education research for a diverse, global community.


SUBMISSION DEADLINE: The Program Chair or designate must receive your program proposals for the 2012 Annual International Conference by August 15, 2011. The deadline allows sufficient time for processing, reviewing and evaluating the many proposals. In June 2011, the call for program proposals will appear on the NARST website.

Conference Chair: J. Randy McGinnis, President-Elect

Future Meeting Dates for NARST, NSTA, and AERA

2012
NSTA Indianapolis, IN March 29 – April 1
AERA Vancouver April 13 – 17
NARST Indianapolis March 24 – 28

2013
NSTA San Antonio, TX April 11 - 14
AERA Atlanta, GA April 11 - 15
NARST TBD
2010-11 Strand Coordinators

STRAND 1 Science Learning, Understanding, and Conceptual Change
Julia Plummer, Anat Yarden

STRAND 2 Science Learning: Contexts, Characteristics, and Interactions
Jennifer Eklund, Lisa A. Donnelly

STRAND 3 Science Teaching – Primary School (Grades preK-6)
Meredith Park Rogers, Rebecca Monhardt

STRAND 4 Science Teaching – Secondary School (Grades 5-12)
Daniella Dani, Anna Lewis

STRAND 5 College Science Teaching (Grades 13-20)
Sanjay Rebello, Linda Keen-Rocha

STRAND 6 Science Learning in Informal Contexts
Sandra Martell, Anita Welch

STRAND 7 Pre-service Science Teacher Education
Kristin Gunckel, Jennifer Wilhelm

STRAND 8 In-service Science Teacher Education
Daniel Meyer, Nate Carnes

STRAND 9 Reflective Practice
Tom McConnell, Tang Wee Teo

STRAND 10 Curriculum, Evaluation, and Assessment
Joe Engemann, Ling Liang

STRAND 11 Cultural, Social, and Gender Issues
Maria Rivera, Geeta Verma

STRAND 12 Educational Technology
Keisha Varma, Reizelle Baretto

STRAND 13 History, Philosophy, and Sociology of Science
Sherry Southerland, Norm Lederman

STRAND 14 Environmental Education
Teddie Phillipson-Mower, Isha DeGoito

STRAND 15 Policy
Sarah Carrier, Andy Shouse
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NARST Presidents

1928 W. L. Eikenberry
1929 W. L. Eikenberry
1930 W. L. Eikenberry
1931 Elliot R. Downing
1932 Elliot R. Downing
1933 Francis D. Curtis
1934 Ralph K. Watkins
1935 Archer W. Hurd
1936 Gerald S. Craig
1937 Walter G. Whitman
1938 Hanor A. Webb
1939 John M. Mason
1940 Oris W. Caldwell
1941 Harry A. Carpenter
1942 G. P. Cahoon
1943 Florence G. Billig
1944 Florence G. Billig
1945 Florence G. Billig
1946 C. L. Thiel
1947 Earl R. Glenn
1948 Ira C. Davis

1949 Joe Young West
1950 N. Eldred Bingham
1951 Betty Lockwood
1952 Betty Lockwood
1953 J. Darrell Barnard
1954 George G. Mallinson
1955 Kenneth E. Anderson
1956 W. C. Van Deventer
1957 Waldo W. Blanchet
1958 Nathan S. Washton
1959 Thomas P. Fraser
1960 Vaden W. Miles
1961 Clarence H. Boeck
1962 Herbert A. Smith
1963 Ellsworth S. Obourn
1964 Cyrus W. Barnes
1965 Frederic B. Dutton
1966 Milton P. Pella
1967 H. Craig Sipe
1968 John M. Mason
1969 Joseph D. Novak

1970 Willard D. Jacobson
1971 Paul D. Hurd
1972 Frank X. Sutman
1973 J. David Lockard
1974 Wayne W. Welch
1975 Robert E. Yager
1976 Ronald D. Anderson
1977 O. Roger Anderson
1978 Roger G. Olstad
1979 James R. Okey
1980 John W. Renner
1981 Stanley L. Helgeson
1982 Stanley L. Helgeson
1983 Carl F. Berger
1984 Ann C. Howe
1985 Erle Thompson
1986 David P. Butts
1987 James P. Barufaldi
1988 Linda DeTure
1989 Patricia Blosser
1990 William G. Holliday

1991 Jane Butler Kahle
1992 Russell H. Yeany
1993 Emmett L. Wright
1994 Kenneth G. Tobin
1995 Dorothy L. Gabel
1996 Barry J. Fraser
1997 Thomas R. Koballa, Jr.
1998 Audrey B. Champagne
1999 Joseph S. Krajcik
2000 David F. Treagust
2001 Sandra K. Abell
2002 Norman G. Lederman
2003 Cheryl L. Mason
2004 Andy (Charles) Anderson
2005 John R. Staver
2006 James Shymansky
2007 Jonathan Osborne
2008 Penny J. Gilmer
2009 Charlene M. Czerniak
2010 Richard A. Duschl
2011 Dana L. Zeidler
NARST Executive Directors
(NARST created the position of Executive Secretary in 1975; the title was changed to Executive Director in 2003)

Paul Joslin 1975 – 1980
Bill Holliday 1980 – 1985
Glenn Markle 1985 – 1990
John Staver 1990 – 1995
Art White 1995 – 2000
David Haury 2000 – 2002
John Tillotson 2002 – 2007
William C. Kyle, Jr. 2007 – 2012

JRS Editors

James T. Robinson 1969
David P. Butts 1975 – 1979
James A. Shymansky 1980 – 1984
Ron Good 1990 – 1993
Charles A. Anderson and James J. Gallagher August 1999 – 2001
J. Randy McGinnis and Angelo Collins 2006 – 2010
Joseph Krajcik and Angela Calabrese Barton 2011 – 2015

NARST Emeritus Members
*Denote first time Emeritus members

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

<table>
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<td>Willard Jacobson</td>
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<td>Joseph D. Novak</td>
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<td>Robert L. Shrigley</td>
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<td>Jack Easley, Jr.</td>
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<td>Carl F. Berger</td>
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<td>2005</td>
<td>Paul Black</td>
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<td>John C. Clement</td>
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<td>David Tregast</td>
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<td>Dorothy Gabel</td>
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<td>2010</td>
<td>Fouad Abd-El-Khalick and Norman G. Lederman</td>
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<td>2011</td>
<td>Andrew Gilbert and Randy Yerrick</td>
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<td>2012</td>
<td>Sofia Kesidou and Jo Ellen Roseman</td>
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<td>2013</td>
<td>Jonathan Osborne, Sue Collins, Mary Ratcliffe, Robin Millar and Richard Duschl</td>
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<td>2014</td>
<td>Jonathan Osborne, Sibel Erduran and Shirley Simon</td>
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<td>2015</td>
<td>Troy D. Sadler and Dana L. Zeidler</td>
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<td>Jerome Pine, Pamela Aschbacher, Ellen Roth, Melanie Jones, Cameron McPhee, Catherine Martin, Scott Phelps, Tara Kyle and Brian Foley</td>
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<td>2017</td>
<td>Christine Chin</td>
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<td>2018</td>
<td>Kihyun Ryoo and Bryan Brown</td>
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<td>2019</td>
<td>Helen Patrick, Panayota Mantzicopoulos, and Ala Samarapungavan</td>
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<td>2020</td>
<td>Daphne Minner, Jeanne Century, and Abigail Jurist Levy</td>
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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.

<table>
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<th>Year</th>
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<td>Donald E. Riechard and Robert C. Olson</td>
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<td>Marcia C. Linn and Herbert C. Thier</td>
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<td>1978</td>
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<td>1979</td>
<td>Janice K. Johnson and Ann C. Howe</td>
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<td>1980</td>
<td>John R. Staver and Dorothy L. Gabel (tie) Linda R. DeTure</td>
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<td>1982</td>
<td>Robert G. Good and Harold J. Fletcher (tie) F. David Boulanger</td>
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<td>1983</td>
<td>Jack A. Easley, Jr.</td>
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<td>1984</td>
<td>Marcia C. Linn, Cathy Clement and Stephen Pulos</td>
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<td>1985</td>
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<td>Russell H. Yeany, Kueh Chin Yap, and Michael J. Padilla</td>
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<td>Kenneth G. Tobin and James J. Gallagher</td>
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<td>Robert D. Sherwood, Charles K. Kinzer, John D. Bransford, Jeffrey J. Franks and Anton E. Lawson</td>
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<td>Richard A. Duschl and Emmett L. Wright</td>
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<td>Allan G. Harrison, J. Grayson, and David F. Tregast</td>
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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.

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<td>Patricia L. Hauslein, Ronald G. Good, and Catherine Cummins</td>
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<td>Patricia Heller, Ronald Keith and Scott Anderson</td>
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<td>Carolyn Wallace Keys, Eun-Mi Yang, Brian Hand and Liesl Hohenshell</td>
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<td>Joanne K. Olson, Sharon J. Lynch, Joel Kuipers, Curtis Pyke and Michael Szesze</td>
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<td>Chi Yan Sui, David Treagust and Michael Szesze</td>
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<td>Leema Kuhn and Brian Reiser</td>
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<td>2008</td>
<td>Guy Ashkenazi and Lana Tockus-Rappoport</td>
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<td>Jérine Rahm</td>
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<td>2010</td>
<td>Mark W. Winslow, John R. Staver, and Lawrence C. Sharmann</td>
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<td>2011</td>
<td>Matthew Klosor</td>
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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.

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<td>René Stofflett</td>
<td>Dale R. Baker</td>
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<td>Julie Gess-Newsome</td>
<td>Norman G. Lederman</td>
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<td>1994</td>
<td>Carolyn W. Keys</td>
<td>Burton E. Voss</td>
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<td>1995</td>
<td>Jerome M. Shaw</td>
<td>Edward Haertel</td>
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<td>1996</td>
<td>Christine M. Cunningham</td>
<td>William L. Carlsen</td>
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<td>1997</td>
<td>Jane O. Larson</td>
<td>Ronald D. Anderson</td>
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<td>1998</td>
<td>Kathleen Hogan</td>
<td>Bonnie K. Nastasi</td>
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<td>1999</td>
<td>Fouad Abd-El-Khalick</td>
<td>Norman G. Lederman</td>
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<td>Danielle Joan Ford</td>
<td>Annemarie S. Palinscar</td>
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<td>Iris Tabak</td>
<td>Brian Reiser</td>
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<td>Mark Girod</td>
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<td>Hsin-Kai Wu</td>
<td>Joseph Kraječik</td>
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<td>David L. Fortus</td>
<td>Ronald Marx and Joseph Kraječik</td>
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<td>2005</td>
<td>Thomas Tetter</td>
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<td>Stacy Olitsky</td>
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<td>Julia Plummer</td>
<td>Joseph S. Kraječik</td>
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<td>2008</td>
<td>Victor Sampson</td>
<td>Douglas Clark</td>
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<td>Lei Liu</td>
<td>Cindy E. Hmelo-Silver</td>
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<td>Heather Toomey Zimmerman</td>
<td>Phillip Bell</td>
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<td>Jeffrey J. Rozelle</td>
<td>Suzanne M. Wilson</td>
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<td>2011</td>
<td>Catherine Eberbach</td>
<td>Kevin Crowley</td>
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</table>

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.

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

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.

<table>
<thead>
<tr>
<th>Year</th>
<th>Awardee</th>
<th>Major Professor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>Moreen K.</td>
<td>Travis Carol L. Stuessy</td>
</tr>
<tr>
<td>1996</td>
<td>Lawrence T. Escalada</td>
<td>Dean A. Zollman</td>
</tr>
<tr>
<td>1997</td>
<td>C. Theresa Forsythe</td>
<td>Jeffrey W. Bloom</td>
</tr>
<tr>
<td>1998</td>
<td>René D. Boyce</td>
<td>Glenn Clark</td>
</tr>
<tr>
<td>1999</td>
<td>Andrew B. T. Gilbert</td>
<td>Randy K. Yerrick</td>
</tr>
<tr>
<td>2000</td>
<td>Rola Fouad Khishfe</td>
<td>Fouad Abd-El-Khalick</td>
</tr>
<tr>
<td>2002</td>
<td>Laura Elizabeth Slocum</td>
<td>Marcy Hamby Towns</td>
</tr>
</tbody>
</table>
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. Gotham
1983 Robert D. Sherwood, Larry G. Enochs, and Dorothy L. Gabel
1984 Mary Westerbaek, 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
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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2010 - 2011

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President-elect: J. Randy McGinnis jmcginni@umd.edu
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(12) Julie Bianchini jbianchi@education.ucsb.edu
(12) Renee Schwartz r.schwartz@wmich.edu
(12) Jan H. Van Driel driel@iclon.leidenuniv.nl
(13) John Falk falkj@science.oregonstate.edu
(13) Xiufeng Liu xliu5@buffalo.edu
(13) Stephen Norris stephen.norris@ualberta.ca
(13) Sibel Erduran sibel.erduran@bristol.ac.uk
Support Team:
Executive Director: Bill Kyle bill_kyle@umsl.edu
Annual Meeting Coordinator: Robin Turner rturner@drohanmgmt.com
Office: Robin Turner rturner@drohanmgmt.com
Alex D’Imperio adimperio@drohanmgmt.com
JRS Co-Editor: Angela Calabrese Barton acb@msu.edu
JRS Co-Editor: Joseph Krajcik krajcik@umich.edu
E-NARST News Editor: Jan van Driel driel@iclon.leidenuniv.nl

Awards Committee
Co-Chairs:
(11) Phil Scott D. scott@education.leeds.ac.uk
(13) Xiufeng Liu xliu5@buffalo.edu

Members:
NARST Outstanding Paper Award Committee Selection Co-Chairs:
(11) Ann Cavallo cavallo@uta.edu
(13) Brian Gerber blgerber@valdosta.edu

Outstanding Doctoral Research Award Selection Committee Co-Chairs:
(12) Lynn Dierking dierkinl@science.oregonstate.edu
(13) Heidi Carlone hbcarlon@uncg.edu

JRS Award Selection Committee Co-Chairs
(12) Barbara Buckley bbuckle@wested.org
(13) Anil Banerjee banerjee_anil@colstate.edu

Early Career Research Award Selection Committee Co-Chairs:
(12) Anita Roychoudhury aroychou@purdue.edu
(13) Grady Venville grady.venville@uwa.edu.au

Distinguished Contributions in Research Award Committee Co-Chairs:
(12) Peter Hewson pwhewson@wisc.edu
(13) Jonathan Osborne osbornej@stanford.edu

NARST OUTSTANDING PAPER AWARD SELECTION COMMITTEE
Co-Chairs:
(11) Ann Cavallo cavallo@uta.edu
(13) Brian Gerber blgerber@valdosta.edu

Members:
(11) Elaine Howes ehowes@coedu.usf.edu
(11) Özgül Yılmaz-Tüzün ozgul@metu.edu.tr
(11) Wendy Frazier wfrazier@gmu.edu
(11) Karleen Goubeaud karleen.goubeaud@liu.edu
(11) Rhea Miles milesr@ecu.edu
(11) Sara Salloum sara.salloum@liu.edu
(12) Demet Kirbulut kirbulut@metu.edu.tr
(12) Ava Zeineddin zeinedddi@illinois.ed
(12) Soon-Hye Park soonhye-park@uiowa.edu
(12) Lisa Martin-Hansen lmartinhansen@gsu.edu
(12) Meg Blanchard meg_blanchard@ncsu.edu
(13) Kristy Loman Chiodo klomanchiado@verizon.net
(13) Issam Hafez Abi-El-Mona abi-el-mona@rowan.edu
(13) Gouranga Saha sahas@lincoln.edu
(13) Terry Arambula-Greenfield tarambulagreenfield@csumb.edu
(13) Leila Amiri lamiri@mail.usf.edu
(13) Wendy Michelle Frazier wfrazier@gmu.edu
Outstanding Doctoral Research Award Selection Committee

Co-Chairs:
(12) Lynn Dierking
dierkinl@science.oregonstate.edu
(13) Heidi Carlone
hbcarlon@uncg.edu

Members:
(11) Tim Slater
timslaterwyo@gmail.com
(11) Norm Thomson
n Thomsson@uga.edu
(11) Tracy Hogan
hogan@adelphi.edu
(11) John Lemberger
jlemberry@uwosh.edu
(12) Brian Williams
bawilli@gsu.edu
(12) Michelle Cook
mcooki@clemson.edu
(12) Victor Sampson
dsampson@fsu.edu
(12) Michael Ford
mjford+@pitt.edu
(12) Barbara Hug
bhug@illinois.edu
(12) Fred Finley
finle001@umn.edu
(13) Janice Anderson
anderjtl@email.unc.edu
(13) Hasan Deniz
hasan.deniz@unlv.edu
(13) Judith Lederman
ledermanj@iit.edu
(13) Wendy Michelle Frazier
wffrazier@gmu.edu

JRST Award Selection Committee

Co-Chairs:
(12) Barbara Buckley
bbuckle@wested.org
(13) Anil Banerjee
banerjee. anil@colstate.edu

Members:
(11) Edna Tan
e_tan@uncg.edu
(11) Eva Toth
eva.toth@mail.wvu.edu
(11) Magnia George
magnia.george@emory.edu
(11) Jazlin Ebenezer
jbebenezer@wayne.edu
(11) Huann-shyang Lin
huannlin@faculty.nsysu.edu.tw
(12) Douglas Huffman
huffman@ku.edu
(12) Ayelet Barak-Tsabari
ayelet@technion.ac.il
(12) Carolyn Wallace
csw0013@auburn.edu
(12) Adam Maltese
amaltese@indiana.edu
(12) Michelle Fleming
flemingm@uwosh.edu
(12) Catherine Koehler
ckoehler@iit.edu
(12) David Grueber
grueberd@msu.edu
(12) Baohui Zhang
baohui.zhang@nie.edu.sg
(12) Kate McNeil
kmcneill@bc.edu
(13) Maria Varelas
m varelas@uic.edu
(13) Eric Brewe
ebrewe@fiu.edu
(13) Lloyd H. Barrow
barrow@missouri.edu
(13) Tahsin Khalid
tahsinkhalid@hotmail.com
(13) Terry Arambula-Greenfield
tarambulagreenfield@csumb.edu
(13) Doug Larkin
larkind@mail.montclair.edu
(13) Martina Nieswandt
mnieswan@iit.edu

Ex-Officio:
President: Dana Zeidler
zeidler@coedu.usf.edu
Executive Director: Bill Kyle
bill_kyle@umsl.edu
Awards Committee Chair: Phil Scott
scott@education.leeds.ac.uk

Early Career Research Award Selection Committee
Co-Chairs:
(12) Anita Roychoudhury
aroychou@purdue.edu
(13) Grady Venville
grady.venville@uwa.edu.au

Members:
(11) Hsin-Kai Wu
hkwu@ntnu.edu.tw
(11) William Holiday
holiday.holiday@gmail.com
(12) Shirley Simon
s.simon@ioe.ac.uk
(12) Bruce Waldrip
wadrip@usq.edu.au
(12) Michael Beeth
beeth@uwosh.edu
(13) Diana Rice
drice@fsu.edu
(13) Maria Varelas
mvarelas@uic.edu
(13) Terry Shanahan
tshanaha@uci.edu

Ex-Officio:
President: Dana Zeidler
zeidler@coedu.usf.edu
Executive Director: Bill Kyle
bill_kyle@umsl.edu
Awards Committee Chair: Phil Scott
scott@education.leeds.ac.uk

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pwhewson@wisc.edu
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osbornej@stanford.edu

Members:
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justin.dillon@kcl.ac.uk
(11) Kate Scantlebury
kscantle@UDel.Edu
(12) Nancy Brickhouse
nbrick@udel.edu
(12) Anthony Petrosino
ajpetrosino@mail.utexas.edu
(12) John Clement
clement@educ.umass.edu
(13) Dale Baker
dale.baker@asu.edu
(13) Reinders Duit
duit@ipn.uni-kiel.de

Ex-Officio:
President: Dana Zeidler
zeidler@coedu.usf.edu
Executive Director: Bill Kyle
bill_kyle@umsl.edu
Awards Committee Chair: Phil Scott
scott@education.leeds.ac.uk
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Members:
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(12) Doris B. Ash dash5@ucsc.edu
(12) Jim Ellis jdelis@ku.edu
(12) Sarah Barrett sbarrett@edu.yorku.ca
(13) Matthew Weinstein mattheww@u.washington.edu
(13) Geeta Verma geeta.verma@ucdenver.edu
(13) Bhaskar Upadhyay upadh006@umn.edu

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President: Dana Zeidler zeidler@coedu.usf.edu
Executive Director: Bill Kyle bill_kyle@umsl.edu

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(11) Betsy Davis betsyd@umich.edu
(13) John Falk falkj@science.oregonstate.edu

Members:
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(11) Sharon Lynch slynch@gwu.edu
(11) Kevin Holtz kjholtz@syr.edu
(12) Mike Barnett barnetge@bc.edu
(12) Nam hwa Kang kangn@science.oregonstate.edu
(12) Kathy Malone kmalone@shadysideacademy.org
(13) Chris Wilson ewilson@bses.org
(13) Meredith Houle mhoule@mail.sdsu.edu
(13) Timothy P. Scott tim@science.tamu.edu

Ex-Officio:
President: Dana Zeidler zeidler@coedu.usf.edu
Executive Director: Bill Kyle bill_kyle@umsl.edu
International Committee
Chair – International Coordinator:
(13) Sibel Erduran          sibel.erduran@bristol.ac.uk

Members:
(11) Irene Osisioma          iosisioma@csudh.edu
(11) Max Dass                dasspm@appstate.edu
(11) Knut Neumann           knut.neumann@uni-due.de
(11) Feral Ogan-Bekiroglu     fbekiroglu@marmara.edu.tr
(12) Hye-eun Zew            hyeun.chu@gmail.com
(12) Marie-Claire Shanahan   mcshanahan@ualberta.ca
(13) Issam Hafez Abi-El-Mona  abi-el-mona@rowan.edu
(13) Deniz Peker            dpeker@vt.edu
(13) Ismail Marulcu         marulcu@bc.edu

Ex-Officio:
President: Dana Zeidler   zeidler@coedu.usf.edu
Executive Director: Bill Kyle  bill_kyle@umsl.edu

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(12) Richard A. Duschl     rad19@psu.edu

Members:
(11) April Adams       adams001@nsuok.edu
(11) Adin Amirshokoohi  aamirshokoohi@mail.fairfield.edu
(12) Corinne Lardy      corinne_lardy@yahoo.com
(12) Julie Luft         julie.luft@asu.edu
(12) May Hung May Cheng maycheng@ied.edu.hk
(13) Jomo Mutegi        jmutegi@iupui.edu
(13) Kathryn Drago      kdrago@umich.edu
(13) Reizelle Barreto   rbarreto@towson.edu

Ex-Officio:
President: Dana Zeidler   zeidler@coedu.usf.edu
Executive Director: Bill Kyle  bill_kyle@umsl.edu
Program Committee

Co-Chairs:
Dana Zeidler zeidler@coedu.usf.edu
J. Randy McGinnis jmcginni@umd.edu
Toni Sondergeld tonis519@aol.com

Members (Strand Co-Coordinators):

Strand 1: Science Learning, Understanding, and Conceptual Change
(11) Julia Plummer plummerj@arcadia.edu
(12) Anat Yarden anat.yarden@weizmann.ac.il

Strand 2: Science Learning: Contexts, Characteristics and Interactions
(11) Jennifer Eklund jlekund@umich.edu
(12) Lisa A. Donnelly ldonnell@kent.edu

Strand 3: Science Teaching – Primary School (Grades preK-6)
(11) Meredith Park Rogers mparkrog@indiana.edu
(12) Rebecca Monhardt rebecca.monhardt@loras.edu

Strand 4: Science Teaching – Middle and High School (Grades 5-12)
(11) Danielle Dani dani@ohio.edu
(12) Anna Lewis arlewis@csle.usf.edu

Strand 5: College Science Teaching and Learning (Grades 13-20)
(11) Sanjay Rebello srebello@phys.ksu.edu
(12) Linda Keen-Rocha keenrocha.usfedu@yahoo.com

Strand 6: Science Learning in Informal Contexts
(11) Sandra Martell smartell@uwm.edu
(12) Anita Welch anita.welch@ndsu.edu

Strand 7: Pre-service Science Teacher Education
(11) Kriztin Gunckel kgunckel@email.arizona.edu
(12) Jennifer Wilhelm jennifer.wilhelm@uky.edu

Strand 8: In-service Science Teacher Education
(11) Daniel Meyer meyerd@iit.edu
(12) Nate Carnes nearnsc@sc.edu

Strand 9: Reflective Practice
(11) Tom McConnell tommac@msu.edu
(12) Tang Wee Teo tteo2@illinois.edu

Strand 10: Curriculum, Evaluation, and Assessment
(11) Joe Engemann engemann@brocku.ca
(12) Ling Liang liang@lasalle.edu

Strand 11: Cultural, Social, and Gender Issues
(11) Maria Rivera mriveram@barnard.edu
(12) Geeta Verma geeta.verma@ucdenver.edu

Strand 12: Educational Technology
(11) Keisha Varma keisha@umn.edu
(12) Reizelle Barreto rbarreto@towson.edu
Strand 13: History, Philosophy and Sociology of Science
(11) Sherry Southerland southerl@coe.fsu.edu
(12) Norm Lederman ledermann@iit.edu

Strand 14: Environmental Education
(11) Teddie Phillipson-Mower t.phillipsonmower@louisville.edu
(12) Isha DeCoito idecoito@edu.yorku.ca

Strand 15: Policy
(11) Sarah Carrier sarah_carrier@ncsu.edu
(12) Andy Shouse awshouse@u.washington.edu

Ex-officio:
Executive Director: Bill Kyle bill_kyle@umsl.edu

Publications Advisory Committee
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(12) Debra Tomanek dtomanek@u.arizona.edu
(13) James Minogue james_minogue@ncsu.edu
(13) Eric Wiebe eric_wiebe@ncsu.edu
(13) Tahsin Khalid tahsinkhalid@hotmail.com

Angela Calabrese barton acb@msu.edu
Joseph Krajeck krajcik@umich.edu

Ex-Officio:
President: Dana Zeidler zeidler@coedu.usf.edu
Executive Director: Bill Kyle bill_kyle@umsl.edu
NSTA Rep.: Julie Luft julie.luft@asu.edu

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Members:
(11) Dale Baker dale.baker@asu.edu
(11) Gavin Fulmer gavinfulmer@westat.com
(11) Colette Murphy c.a.murphy@qub.ac.uk
(12) Benjamin Herman bcherman@usf.edu
(12) Alandoeom Oliveira ao262638@albany.edu
(12) Abdulkadir (Kadir) Demir kadir@gsu.edu
(13) Allan Feldman allanfeldman@coedu.usf.edu
(13) Jim McDonald mcdon1jt@cmich.edu
(13) Toni Sondergeld tonis519@aol.com

Ex-Officio:
President: Dana Zeidler zeidler@coedu.usf.edu
Executive Director: Bill Kyle bill_kyle@umsl.edu
NSTA Rep.: Julie Luft julie.luft@asu.edu
# NARST Annual International Conference

## Schedule at a Glance - 2011

**Caribe Royale Orlando**  
**Orlando, FL USA**

<table>
<thead>
<tr>
<th>Event</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Saturday, April 2</strong></td>
<td></td>
</tr>
<tr>
<td>7:30 AM – 5:00 PM</td>
<td>NARST Executive Board Meeting #1</td>
</tr>
<tr>
<td>2:00 PM – 5:00 PM</td>
<td>Conference Registration</td>
</tr>
<tr>
<td><strong>Sunday, April 3</strong></td>
<td></td>
</tr>
<tr>
<td>7:30 AM – 12:00 PM</td>
<td>NARST Executive Board Meeting #2</td>
</tr>
<tr>
<td>7:00 AM – 5:00 PM</td>
<td>Registration</td>
</tr>
<tr>
<td>8:00 AM – 12:00 PM</td>
<td>Pre-Conference Workshop #1: Equity and Ethics Committee Free</td>
</tr>
<tr>
<td></td>
<td>Organizers: Geeta Verma and Regina E. Wragg</td>
</tr>
<tr>
<td></td>
<td>Participants: Gillian U. Bayne, Nate Carnes, Sumi Hagiwara, Maria S. Rivera Maulucci, Felicia Moore Mensah, Jomo Mutegi, Wesley Pitts and Jerome M. Shaw</td>
</tr>
<tr>
<td></td>
<td>Equity Internationally – Scholarship, Research, and Service for a Global Science Education Community</td>
</tr>
<tr>
<td>8:00 AM – 12:00 PM</td>
<td>Pre-Conference Workshop #2: Publications Committee Free</td>
</tr>
<tr>
<td></td>
<td>Angie Calabrese Barton, Joseph Krajcik, and Bob Geier</td>
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<tr>
<td></td>
<td>Developing High Quality Reviews for the Journal of Research in Science Teaching</td>
</tr>
<tr>
<td>8:00 AM – 12:00 PM</td>
<td>Pre-Conference Workshop #3: Research Committee Free</td>
</tr>
<tr>
<td></td>
<td>Gavin Fulmer, Janice Earle, Kusum Singh, and Celeste Pea</td>
</tr>
<tr>
<td></td>
<td>Developing a Competitive Educational Research Proposal for NSF’s Division of Research on Learning</td>
</tr>
<tr>
<td>8:00 AM – 12:00 PM</td>
<td>Pre-Conference Workshop #4: Research Committee $25 registration</td>
</tr>
<tr>
<td></td>
<td>Ravit Golan Duncan, Joseph Krajcik, David Fortus, Katherine McNeill, and Julia Plummer</td>
</tr>
<tr>
<td></td>
<td>Developing and Assessing Learning Progressions in Science</td>
</tr>
<tr>
<td>8:00 AM – 12:00 PM</td>
<td>Pre-Conference Workshop #5: Research Committee $50 registration</td>
</tr>
<tr>
<td></td>
<td>Kathleen Roth, Karen Givvin, Kathleen Schwille, Paul Numedahl, and Elaine Howes</td>
</tr>
<tr>
<td></td>
<td>Videocase-based Lesson Analysis of Science Teaching to Support Teacher Learning: Experiencing Lesson Analysis and Mapping a Program of Research</td>
</tr>
<tr>
<td>12:00 PM – 1:00 PM</td>
<td>Lunch <em>(on your own)</em></td>
</tr>
<tr>
<td>1:00 PM – 2:30 PM</td>
<td>Concurrent Session # 1</td>
</tr>
<tr>
<td>2:45 PM – 4:00 PM</td>
<td>Concurrent Session # 2</td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>4:00 PM – 4:30 PM</td>
<td>Break</td>
</tr>
<tr>
<td>4:30 PM – 6:00 PM</td>
<td>Plenary Session # 1</td>
</tr>
<tr>
<td></td>
<td>Kalanithy Vairavamoorthy</td>
</tr>
<tr>
<td></td>
<td>Head of the School of Global Sustainability</td>
</tr>
<tr>
<td></td>
<td>University of South Florida, Tampa, FL (USA)</td>
</tr>
<tr>
<td>6:00 PM – 7:00 PM</td>
<td>Mentor-Mentee Nexus</td>
</tr>
<tr>
<td>7:00 PM – 9:30 PM</td>
<td>Presidential / Welcome Reception</td>
</tr>
<tr>
<td></td>
<td><em>(Appetizers served and cash bar)</em></td>
</tr>
</tbody>
</table>

**Monday, April 4**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 AM – 8:15 AM</td>
<td>Committee Meetings</td>
<td></td>
</tr>
<tr>
<td>7:00 AM – 5:00 PM</td>
<td>Registration</td>
<td>Grand Sierra Registration North</td>
</tr>
<tr>
<td>8:30 AM – 10:00 AM</td>
<td>Concurrent Session # 3</td>
<td></td>
</tr>
<tr>
<td>10:15 AM – 11:45 AM</td>
<td>Concurrent Session # 4</td>
<td></td>
</tr>
<tr>
<td>12:00 – 1:00 PM</td>
<td>NARST Business Meeting</td>
<td>Grand Sierra E</td>
</tr>
<tr>
<td></td>
<td><em>(Box lunch provided for 1st 100 attendees who sign up)</em></td>
<td></td>
</tr>
<tr>
<td>1:15 PM – 2:45 PM</td>
<td>Concurrent Session # 5</td>
<td></td>
</tr>
<tr>
<td>2:45 PM – 3:15 PM</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>3:15 PM – 4:15 PM</td>
<td>Concurrent Session # 6A: Poster Session - even numbered posters</td>
<td>Grand Sierra D</td>
</tr>
<tr>
<td>4:15 PM – 5:15 PM</td>
<td>Concurrent Session # 6B: Poster Session - odd numbered posters</td>
<td>Grand Sierra D</td>
</tr>
<tr>
<td>5:30 PM – 6:30 PM</td>
<td>Graduate Student Forum</td>
<td>Grand Sierra F</td>
</tr>
<tr>
<td>6:30 PM – 7:30 PM</td>
<td>Graduate Student and Early Career Scholars</td>
<td>Poolside</td>
</tr>
<tr>
<td></td>
<td><em>(Informal social - on your own)</em></td>
<td></td>
</tr>
<tr>
<td>6:30 PM – 8:30 PM</td>
<td>JRST Editorial Board Meeting/Reception</td>
<td>Grand Sierra G &amp; H</td>
</tr>
<tr>
<td></td>
<td><em>(Meeting open/Reception by invitation)</em></td>
<td></td>
</tr>
</tbody>
</table>

**Tuesday, April 5**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 AM – 8:15 AM</td>
<td>Committee Meetings</td>
<td></td>
</tr>
<tr>
<td>7:00 AM – 5:00 PM</td>
<td>Registration</td>
<td>Grand Sierra Registration North</td>
</tr>
<tr>
<td>8:30 AM – 10:00 AM</td>
<td>Concurrent Session # 7</td>
<td></td>
</tr>
<tr>
<td>10:00 AM – 10:30 AM</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>10:30 AM – 12:00 PM</td>
<td>Plenary Session #2:</td>
<td>Grand Sierra E</td>
</tr>
<tr>
<td></td>
<td>Tim Kasser</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Professor and Chair of Psychology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Knox College, Galesburg, IL (USA)</td>
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</tr>
<tr>
<td>12:00 PM – 2:00 PM</td>
<td>Awards Luncheon</td>
<td>Grand Sierra Hall F, G, H &amp; I</td>
</tr>
<tr>
<td>2:15 PM – 3:45 PM</td>
<td>Concurrent Session # 8</td>
<td></td>
</tr>
<tr>
<td>4:00 PM – 5:30 PM</td>
<td>Concurrent Session # 9</td>
<td></td>
</tr>
<tr>
<td>Event</td>
<td>Room</td>
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<td>----------------------------------------------------------------------</td>
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</tr>
<tr>
<td>5:45 PM – 6:45 PM New Researcher and Junior Faculty Early Career Discussion</td>
<td>Grand Sierra F</td>
<td></td>
</tr>
<tr>
<td>6:00 PM – 8:00 PM Springer <em>(By invitation only)</em></td>
<td>Grand Sierra G</td>
<td></td>
</tr>
<tr>
<td>7:00 PM – 8:30 PM Routledge / Taylor &amp; Francis <em>(By invitation only)</em></td>
<td>Grand Sierra H</td>
<td></td>
</tr>
<tr>
<td>7:00 PM – 9:00 PM Equity Dinner</td>
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<tr>
<td>Bahama Breeze Lake Buena Vista</td>
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<tr>
<td><em>(Maximum attendance: 90)</em></td>
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<tr>
<td>Dinner, including tax and gratuity, is $35. Please note: You must</td>
<td></td>
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<tr>
<td>register for this event with your Advance Conference Registration.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8:00 PM – 10:30 PM Social</td>
<td>Poolside</td>
<td></td>
</tr>
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</table>

**Wednesday, April 6**

<table>
<thead>
<tr>
<th>Event</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 AM – 8:15 AM Strand Meetings</td>
<td></td>
</tr>
<tr>
<td>7:00 AM – 12:00 PM Registration</td>
<td>Grand Sierra Registration North</td>
</tr>
<tr>
<td>8:30 AM – 10:00 AM Concurrent Session # 10</td>
<td></td>
</tr>
<tr>
<td>10:15 AM – 11:45 AM Concurrent Session # 11</td>
<td></td>
</tr>
<tr>
<td>12:00 PM – 1:00 PM Lunch <em>(on your own)</em></td>
<td></td>
</tr>
<tr>
<td>1:00 PM – 2:30 PM Concurrent Session # 12</td>
<td></td>
</tr>
<tr>
<td>2:45 PM – 4:15 PM Concurrent Session # 13</td>
<td></td>
</tr>
<tr>
<td>5:00 PM – 10:00 PM NARST Executive Board Meeting #3</td>
<td>Antigua 1 and 2</td>
</tr>
</tbody>
</table>
7:30am - 5:00pm

NARST Executive Board Meeting Session #1
7:30am – 5:00pm, Antigua 1 & 2

Conference Registration
2:00pm – 5:00pm, Grand Sierra Registration North
Open University Press is a scholarly imprint of McGraw-Hill. We publish books for professors, students and professionals in social sciences, health, education, and study and research skills.

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2010 $66.00

This book provides a combination of engaging, practical lesson ideas and subject knowledge to help you teach the trickiest parts of primary science. This book explains the most difficult topics in a simple, non-technical style. It includes a range of accessible ideas, hints and tips with a focus on providing a skills-based, problem-solving approach to learning.

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2010 $46.00

This essential book offers friendly support and practical advice for dealing with the common misconceptions encountered in the primary science classroom. This handy book offers advice for teachers on how to recognise and correct such misconceptions.

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2010 $42.00

This truly innovative book supports primary schools in promoting the nature of pupil independence in choosing when and why to take their learning outside the classroom boundaries. This approach builds on the good practice begun in Foundation Stage.

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Sep-11 $42.00

This book challenges the approach to science and technology in schools by reconsidering where scientific skills and concepts are taught, such as sound, forces, materials and light. This book encourages the shift of learning from indoors to outdoors.

978-0-335-24132-3 144pp
Sep-11 $40.00

If you are teaching or learning to teach primary science, this is the toolkit to support you! Not only does it cover the essential knowledge and understanding that you need to know, it also offers over 200 great ideas for teaching primary science - so no more late nights thinking up creative new ways to teach key concepts!

978-0-335-23461-5 328pp
2009 $45.00

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978-0-335-23461-5 328pp 2009 $45.00
NARST Executive Board Meeting Session #2
7:30am – 12:00pm, Antigua 1 and 2

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

W1 Pre-Conference Workshop – Equity and Ethics Committee Sponsored
Equity Internationally – Scholarship, Research, and Service for a Global Science Education Community
8:00am – 12:00pm, Curacao 1
Geeta Verma, Georgia State University
Regina E. Wragg, University of South Carolina
Jerome M. Shaw, University of California, Santa Cruz
Gillian U. Bayne, Lehman College of the City University of New York
Nate Carnes, University of South Carolina
Sumi Hagiwara, Montclair State University
Maria S. Rivera Malucci, Barnard College
Felicia Moore-Mensah, Columbia University
Jomo W. Mutegi, Indiana University – Purdue University Indianapolis
Wesley Pitts, Lehman College of the City University of New York

W2 Pre-Conference Workshop – Publications Committee Sponsored
Developing High Quality Reviews for the Journal of Research in Science Teaching
8:00am – 12:00pm, Curacao 3
Angela M. Calabrese-Barton, Michigan State University
Joseph S. Krajcik, University of Michigan
Bob Geier, University of Michigan
Patti Bills, Michigan State University
Hayat Hokayem, Michigan State University

W3 Pre-Conference Workshop – Research Committee Sponsored
Developing a Competitive Educational Research Proposal for NSF’s Division of Research on Learning
8:00am – 12:00pm, Curacao 4
Gavin W. Fulmer, National Science Foundation
Janice Earle, National Science Foundation
Kusum Singh, National Science Foundation
Celeste Pea, National Science Foundation

W4 Pre-Conference Workshop – Research Committee Sponsored
Developing and Assessing Learning Progressions in Science
8:00am – 12:00pm, Curacao 5
Duncan Ravit Golan, Rutgers University
Joseph S. Krajcik, University of Michigan
David Fortus, Weizmann Institute of Science
Katherine L. McNell, Boston College
Julia D. Plummer, Arcadia University

W5 Pre-Conference Workshop – Research Committee Sponsored
Video Case-based Lesson Analysis of Science Teaching to Support Teacher Learning: Experiencing Lesson Analysis and Mapping a Program of Research
8:00am – 12:00pm, Curacao 7
Kathleen Roth, BSCS
Meridith Bruozas, BSCS
Elaine Howes, BSCS
Paul Numedahl, BSCS
Kathleen Schwille, National Geographic

Lunch – On Your Own
12:00pm – 1:00pm

Concurrent Session #1
1:00pm – 2:30pm

Presidential Sponsored Session
S1.1 Symposium – Inquiry to Practices: Data Modeling, Measurement and Representation in Children’s Statistical/Probabilistic Reasoning in Maths/Sciences
1:00pm – 2:30pm, Antigua 1

President:
Richard Duschl, Penn State University

Discussant:
Leona Schauble, Vanderbilt University

Presenters:
Cliff Konold, University of Massachusetts, Amherst
Richard Lehrer, Vanderbilt University
William A. Sandoval, UCLA
James Hammerman, TERC
Strand 1: Science Learning, Understanding and Conceptual Change
S1.2 Symposium – Examining Learning Progressions beyond Content: Strands of Scientific Proficiency
1:00pm – 2:30pm, Curacao 1
**Presider:** Julia D. Plummer, Arcadia University, plummerj@arcadia.edu
**Discussant:** Joseph S. Krajcik, University of Michigan
**Presenters:** Julia D. Plummer, Arcadia University,
Ravit Duncan, Rutgers University
Christina V. Schwarz, Michigan State University
Philip Bell, University of Washington
Nancy B. Songer, University of Michigan

S1.3 Related Paper Set - Pathways to Ecological Literacy: Developing a Biodiversity Learning Progression
1:00pm – 2:30pm, Bonaire 4

S1.3.1 Development of a Grade 6-12 Learning Progression for Biodiversity: an Overview of the Approach, Framework, and Key Findings
Laurel M. Hartley, University of Colorado Denver
Charles W. Anderson, Michigan State University
Alan Berkowitz, Cary Institute of Ecosystem Studies
John C. Moore, Colorado State University
Jonathon W. Schramm, Michigan State University
Scott E. Simon, University of California Santa Barbara

S1.3.2 The Understanding of Genetic Diversity in Student Accounts
Shawna K. McMahon, Colorado State University
John C. Moore, Colorado State University

S1.3.3 The Role of Heredity and Environment in Students’ Accounts of Adaptation by Selection and Phenotypic Plasticity
Jennifer Doherty, Michigan State University
Charles W. Anderson, Michigan State University

S1.3.4 Using Complexity in Food Webs to Teach Biodiversity
Cornelia Harris, Cary Institute of Ecosystem Studies
Alan Berkowitz, Cary Institute of Ecosystem Studies

S1.3.5 Student Understanding of Species Diversity in Ecosystems
Brook J. Wilke, Michigan State University
Charles W. Anderson, Michigan State University

Strand 2: Science Learning: Contexts, Characteristics and Interactions
S1.4 Approaches to Exploring Teachers’ Roles
1:00pm – 2:30pm, Curacao 2
**Presider:** Allison Antink, Illinois Institute of Technology

S1.4.1 An Informal Educator and a Classroom Teacher’s Perceived Roles during an Elementary Classroom Science Program
Ingrid S. Weiland, Indiana University, Bloomington, iweiland@indiana.edu
Kristin L. Cook, Indiana University, Bloomington

S1.4.2 Effect of Teacher Reasoning Ability on Student Learning
Jennifer L. Esswein, The Ohio State University, esswein.5@osu.edu
Jerome Mescher, Hilliard City Schools
Bruce R. Patton, The Ohio State University

S1.4.3 An Exploration of Teacher Involvement in County Science Fairs: Student Support and Curriculum Integration
Kathleen Fadigan, Pennsylvania State University, kxf24@psu.edu

S1.4.4 Teacher Hedging and the Tentative Nature of Science Inquiry Discussions
Huseyin Colak, Northeastern Illinois University, h-colak@neiu.edu
Alandeom W. Oliveira, State University of New York at Albany
Valarie L. Ackerson, Indiana University
Khemmawadee Pongsanon, Indiana University
Abdulkadir Genel, Indiana University

Strand 2: Science Learning: Contexts, Characteristics and Interactions
S1.5 Related Paper Set - Strategies for Fostering Discussion for Model Based Learning in Science
1:00pm – 2:30pm, Bonaire 8

S1.5.1 Multiple Levels of Discussion-based Teaching Strategies for Supporting Students
E. Grant Williams, University of Massachusetts - Amherst School District 18 - Fredericton, New Brunswick, Canada

S1.5.2 Comparative Case Studies of Discussion Strategies used in Dynamic Computer Simulation vs. Static Image-based Sessions
Norman Price, University of Massachusetts - Amherst
S1.5.3 Hands on Small-group vs. Whole-class use of Animations and Simulations: Comparative Case Studies in Projectile Motion
A. Lynn Stephens, University of Massachusetts – Amherst

S1.5.4 Discussion-based Strategies for use of Simulations and Animations in Middle and High School Science Classrooms
Abi Leibovitch, University of Massachusetts – Amherst
A. Lynn Stephens, University of Massachusetts – Amherst
Norman Price, University of Massachusetts - Amherst

Strand 3: Science Teaching–Primary School (Grades preK-6): Characteristics and Strategies
S1.6 Elementary Teacher Content Knowledge
1:00pm – 2:30pm, Curacao 3

S1.6.1 Using Research-based, Inquiry Physics Experiences (RIPE) to Improve Pedagogy Practices and Improve Content Knowledge of K-3 Teachers
Stephen J. Van Hook, Penn State University, sjv11@psu.edu
Tracy L. Huziak-Clark, Bowling Green State University

S1.6.2 Increasing Science Teaching Efficacy Beliefs among Elementary Teachers through Content Knowledge Improvement
Hasan Deniz, University of Nevada Las Vegas, hasan.deniz@unlv.edu
Marykay Orgill, University of Nevada Las Vegas
Kristoffer R. Carroll, Clark County School District

S1.6.3 Impact of Teachers’ Physics Content Knowledge on Quality of Teaching and Students’ Achievement during the Transition between Elementary and Secondary School
Annika Ohle, University Duisburg- Essen, Annika.Ohle@uni-due.de
Hans E. Fischer, University Duisburg- Essen

Strand 4: Science Teaching–Middle and High School (Grades 5-12): Characteristics and Strategies
S1.7 Strand Sponsored Session-Twenty First Century Skills: An International Perspective
1:00pm – 2:30pm, Curacao 4

Presenters:
Danielle Dani, Ohio University, dani@ohio.edu
Saouma B. Boujaoude, American University of Beirut
Sara Salloum, Long Island University
Anil Banerjee, Columbus State University
Rola Khishfe, American University of Beirut
Kenneth G. Tobin, City University of New York

Strand 5: College Science Teaching and Learning (Grades 13-20)
S1.8 Biology Instruction and Assessment
1:00pm – 2:30pm, Curacao 5

President:
Janelle M. Bailey, University of Nevada, Las Vegas

S1.8.1 Classification of Undergraduate Alternative Conceptions of the Tricarboxylic Acid Cycle
Sara L. Johnson, The University of Southern Mississippi,
Sara.Johnson@usm.edu
Jill D. Maroo, The University of Southern Mississippi

S1.8.2 Learning Natural Selection in College Biology Courses: The Relationship Between Teaching Methods and Learning Gains
Tessa M. Andrews, Ecology Department, Montana State University,
andrews.tessa@gmail.com
Mary J. Leonard, Education Department, Montana State University

S1.8.3 Naturalistic Inquiry of Introductory Biology Faculty Instructional Practices
Omah M. Williams, Texas A&M University, owillia2@tamu.edu
Tim P. Scott, Texas A&M University

S1.8.4 The Effects of Argumentation via On-line Discussion in University Students’ Informal Reasoning Regarding Genetic Engineering
Ying-Tien Wu, National Central University, Taiwan, ytwu@cl.ncu.edu.tw
Chin-Chung Tsai, University of Science and Technology, Taiwan

Strand 5: College Science Teaching and Learning (Grades 13-20)
S1.9 Related Paper Set - Measuring Pedagogical Reform in Undergraduate Entry-Level Science Courses
1:00pm – 2:30pm, Bonaire 7

President:
Dean Zollman, Kansas State University

Discussant:
Cheryl L. Mason, San Diego State University

S1.9.1 Measuring Perceptions of the Learning Environment in Undergraduate Entry-Level Science Courses
Cynthia S. Sunal, University of Alabama
Dennis W. Sunal, University of Alabama
Erika M. Steele, University of Alabama

S1.9.2 Assessing Students’ Reasoning across Disciplines in Entry-Level Science Courses
Mojgan Matloob Haghanikar, Kansas State University
Sytil Murphy, Kansas State University
S1.9.3 Measuring Outcomes of Undergraduate Science Reform on Inservice Teacher's Pedagogical Content Knowledge
Donna Turner, University of Alabama
Dennis W. Sunal, University of Alabama
Cynthia S. Sunal, University of Alabama

S1.9.4 The Impact of Reformed Undergraduate Science Courses on Elementary Teacher Self-Efficacy and Science Teaching Practices
Corinne H. Lardy, San Diego State University

Strand 6: Science Learning in Informal Contexts
S1.10 Life after High School: How Informal Science Impacts STEMS Careers
1:00pm – 2:30pm, Curacao 6
Presider:
Anita Welch, North Dakota State University

S1.10.1 Competitive Science Events and Academic Major Choice
Jennifer H. Forrester, The University of Wyoming, jforres5@uwyo.edu
M. Gail Jones, NC State University
Grant E. Gardner, East Carolina University

S1.10.2 Out-of-School Time Science Activities and their Association with Career Interest in STEM
John T. Almarode, University of Virginia, jta7z@virginia.edu
Katherine Dabney, University of Virginia
Jaimie L. Miller, Harvard-Smithsonian Center for Astrophysics
Zahra Hazari, Clemson University
Robert H. Tai, University of Virginia
Philip M. Sadler, Harvard-Smithsonian Center for Astrophysics

S1.10.3 Seeing Science as Part of Who You Are: Initial Impact of a STEM-focused Out-of-School Program
Patrik Lundh, SRI International
Melissa Koch, SRI International, melissa.koch@sri.com
Christopher J. Harris, SRI International

S1.10.4 I know what my Carbon Footprint is! Impact Analysis of a High-School
Ruchi T. Bhanot, SRI International, ruchi.bhanot@sri.com
Ann House, SRI International
Aisha Heredia, SRI International

Strand 7: Pre-service Science Teacher Education
S1.11 Developing Preservice Teachers’ Science Teacher Identity
1:00pm – 2:30pm, Curacao 7
Presider:
April Luehmann, University of Rochester

S1.11.1 Examining the Impact of Online Blogging on Pre-service Teacher’s Perceptions about their Development as Science Teachers
Ratna Narayan, Texas Tech University, rama.narayan@ttu.edu
Lori L. Petty, University of Texas, Brownsville
Deniz Peker, Virginia Tech
Sungwon Chung, Texas Tech University

S1.11.2 Pre-service Elementary Science Teacher Identity Development through Blogging in Communities of Practice
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
Kathleen Nichols, University of North Carolina at Chapel Hill
Jennifer Jones, University of North Carolina at Chapel Hill
Helen Crompton, University of North Carolina at Chapel Hill

S1.11.3 Combining Service Learning and Action Research for Preservice Science Teacher Education: Explorations of Learning
Carolyn S. Wallace, Auburn University, css0013@auburn.edu

Strand 8: In-service Science Teacher Education
S1.12 Barriers to Change
1:00pm – 2:30pm, Curacao 8
Presider:
Anita Martin, University of Illinois

S1.12.1 Science Teachers’ Perceptions of the Barriers to Classroom Implementation of Model-based Reasoning
Patrick Dowd, University of California, Davis, pfslowell@gmail.com
Lin Xiang, University of California, Davis
Connie Hvidsten, University of California, Davis
Cynthia Passmore, University of California, Davis

S1.12.2 Making It Work: Three Case Study Narratives from a Secondary Science Teacher Professional Development Program
James B. Cooper, Mississippi Academy for Science Teaching, Jackson State University, james.b.cooper@jsums.edu
Kristin Bass, Rockman et al.
Sarah Mushlin, Rockman et al.
S1.12.3 Results of a Two-year Study: Exploring the Relationship of Teachers’ Pedagogical Discontentment to Changes in Practices for 28 Rural Science and Mathematics Teachers
Margaret R. Blanchard, North Carolina State University, Meg_Blanchard@ncsu.edu
Jason W. Osborne, North Carolina State University
Jennifer L. Albert, North Carolina State University

S1.12.4 Teachers’ Perceived Challenges and Barriers to Implementing High-Level, Inquiry-Based Curriculums
Darin S. Munsell, Illinois Institute of Technology, munsdar@iit.edu
Norman G. Lederman, Illinois Institute of Technology

Strand 10: Curriculum, Evaluation, and Assessment
S1.13 Strand Sponsored Session - Exploring Large-Scale Assessment: A Four-Nations Perspective
1:00pm – 2:30pm, Bonaire 1
Presenters:
David F. Treagust, Curtin University, d.treagust@curtin.edu.au
John O. Anderson, University of Victoria
Chorng-Jee Guo, National Changhua University of Education
Xiufeng Liu, State University of New York at Buffalo

S1.14 Related Paper Set - Measuring Teacher Inquiry Knowledge
1:00pm – 2:30pm, Bonaire 6
Discussant:
Jon E. Pedersen, University of Nebraska-Lincoln

S1.14.1 Development and Validation of an Instrument to Measure Teacher Knowledge of Inquiry
Gwen Nugent, University of Nebraska-Lincoln
Greg Welch, University of Nebraska-Lincoln
Jim Bovaird, University of Nebraska-Lincoln

S1.14.2 Teaching Scenarios as a Probing Tool: Teachers
Nam-Hwa Kang, Oregon State University

S1.14.3 A PCK Rubric to Measure Teachers
Julie Gess-Newsome, Northern Arizona University
April Gardner, BSCS

S1.14.4 Assessing Pedagogical Content Knowledge of Inquiry Science Instruction
David Schuster, Western Michigan University
William Cobert, Western Michigan University
Brooks Applegate, Western Michigan University

Strand 11: Cultural, Social, and Gender Issues
S1.15 African American Children and Science: Identity, Representation, and Implications for Science Education
1:00pm – 2:30pm, Bonaire 2
Presider:
Mary Atwater, University of Georgia

S1.15.1 Young African American Children Constructing Narrative Identities in an Urban Science-Literacy Classroom
Justine M. Kane, Wayne State University, jmkane@wayne.edu

S1.15.2 Curriculum as a Weapon for Combating Systemic Racism: A Description of Science Unit for Elementary African American Science Learners
Jomo W. Mutegi, Indiana University - IUPUI, jmutegi@iupui.edu

S1.15.3 Identify-A-Scientist: How Third Grade African American Students See Scientists
Leon Walls, University of Vermont, lwalls@uvm.edu

S1.15.4 Young Black Children and Science: Chronotopes of Narratives around their Science Journals
Maria Varelas, University of Illinois at Chicago, mwarelas@uic.edu
Justine M. Kane, Wayne State University
Wylie Caitlin Donahue, University of Cambridge

Strand 12: Educational Technology
S1.16 Strand Sponsored Session - Digital Games and Conceptual Change in Core Concepts
1:00pm – 2:30pm, Bonaire 3
Discussant:
Diane Ketelhut, Temple University

Presenters:
Douglas B. Clark, Vanderbilt University, doug.clark@vanderbilt.edu
Mario Martinez-Garza, Vanderbilt University
Jody Clarke-Midura, Harvard University
Jilliane Code, Harvard University
Brian C. Nelson, Vanderbilt University
Cynthia M. D’Angelo, University of Wisconsin
Nathan Holbert, Northwestern University
Uri Wilensky, Northwestern University
Kent J. Slack, Arizona State University
Pratim Sengupta, Vanderbilt University
Concurrent Session #2
2:45pm – 4:00pm

Administrative Symposium
S2.1 Developing High Quality Reviews for the Journal of Research in Science Teaching
2:45pm - 4:00pm, Antigua 1

**Presider:**
Bob Geier, University of Michigan

**Presenters:**
Angela M. Calabrese-Barton, Michigan State University, acb@msu.edu
Joseph S. Krajcik, University of Michigan
Patti Bills, Michigan State University
Hayat Hokayem, Michigan State University

Strand 1: Science Learning, Understanding and Conceptual Change

S2.2 Argumentation and Knowledge Construction
2:45pm – 4:00pm, Curacao 1

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

S2.2.1 Science Learning and Argumentation: How are they Related?
Hanife Hakyolu, hakyoluhanif@yahoo.com
Bekiroglu Feral Ogan

S2.2.2 Impact on Year 4 Student Conceptual Understanding of Force and Motion after Writing Letters to Year 11 Students
Ying-Chih Chen, University of Iowa, ying-chih-chen@uiowa.edu
Brian M. Hand, University of Iowa
Leah Medowell, Seneca Valley School District, Pittsburgh, PA

S2.2.3 Kindergartners’ Understandings about Seeds, Plants and Scientific Knowledge Building
Deborah C. Smith, The Pennsylvania State University, dcs27@psu.edu
Alicia M. McDyre, The Pennsylvania State University

S2.2.4 Characterizing Uncertainty Associated with Middle School Students’ Scientific Arguments
Amy R. Pallant, The Concord Consortium, apallant@concord.org
Hee-Sun Lee, Tufts University

Strand 2: Science Learning: Contexts, Characteristics and Interactions

S2.3 Exploring Socio-Scientific Issues in the Science Classroom
2:45pm – 4:00pm, Curacao 2

**Presider:**
Wesley Pitts, Lehman College
2:45pm - 4:00pm

S2.3.1 What will Students Learn when Working with a Socio-Scientific Issues: Are Cell Phones Hazardous?
Britt Lindahl, britt.lindahl@hlr.se
Maria Rosberg

S2.3.2 Students and their Parents Speak Out on the Purposes of Learning Science in Middle School
Leigh K. Smith, Brigham Young University, leigh_smith@byu.edu
Pamela Cantrell, Brigham Young University
Erin Whiting, Brigham Young University
Erika Feinauer, Brigham Young University

S2.3.3 Evaluation of an Intervention to Improve Students’ Use of Content Knowledge when Dealing with Socio-Scientific Issues
Italo Testa, Federico II University, Naples, Italy, italo@na.infn.it
Ester Salvato, Convitto Nazionale, Naples, Italy

Strand 2: Science Learning: Contexts, Characteristics and Interactions
S2.4 Related Paper Set – Talking to Learn and Learning to Talk in Secondary Science
2:45pm – 4:00pm, Bonaire 8

S2.4.1 Developing the Teaching of Argumentation in School Science Departments
Shirley S. Simon, University of London
Andri Christodoulou, King's College London
Christina Howell-Richardson, King's College London
Katherine Richardson, University of London
Jonathan F. Osborne, Stanford University

S2.4.2 Argumentation by Design: A Study of Teachers’ Capacity to Enact Argumentation Activities Beyond the Classroom
Katherine Richardson, University of London
Ruth Amos, University of London

S2.4.3 Epistemic Features of Science Teachers’ Talk During Argumentation Instruction
Andri Christodoulou, King’s College London
Jonathan F. Osborne, Stanford University

S2.4.4 A Study of the Effect of Engaging in Argumentation on Students’ Ability to Reason, their Understanding of the Nature of Science their Engagement with School Science
Jonathan F. Osborne, Stanford University
Shirley S. Simon, University of London
Andri Christodoulou, King’s College London
Christina Howell-Richardson, King’s College London
Katherine Richardson, University of London

S2.5 Science and Literacy
2:45pm – 4:00pm, Curacao 3

S2.5.1 Primary Grade Children
Sheryl L. Honig, Northern Illinois University, shonig@niu.edu

S2.5.2 Engineering Design and Literacy in a Bilingual Elementary Classroom
Kevin Carr, Pacific University, Oregon, kcarr@pacificu.edu
Elizabeth Schlessman, Lincoln Elementary School, Woodburn, OR

S2.5.3 Writing and Learning in Science: Connections between Elementary Teachers’ Beliefs and Practice
Nicole J. Glen, Bridgewater State University, nglen@bridgew.edu

Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies
S2.6 Argumentation and the Nature of Science
2:45pm – 4:00pm, Curacao 4

Presider:
Irene U. Osisioma, California State University, Dominguez Hills

S2.6.1 Traversing the Divide between High School Students and Sophisticated Nature of Science: A Multi-pronged Approach
Tami Russell, The University of Tennessee Hardin Valley Academy/High School, russellt4@k12tn.net
Mehmet Aydeniz, The University of Tennessee

S2.6.2 Argumentation: Exploring Instructional Practices of Three Teachers, and their Students
Maria P. Evagorou, University of Nicosia, Cyprus, evagorou.mi@unic.ac.cy
Lucy Avraamidou, University of Nicosia, Cyprus

S2.6.3 The Effect of Using Thought Experiments on Grade 8 Students’ Physics Achievement and Views of Nature of Science
Saouma B. Boujaoude, American University of Beirut, boujaoud@aub.edu.lb
Garine Santourian, American University of Beirut

S2.6.4 The Relationship between Teachers’ Pedagogical Content Knowledge and Beliefs of Scientific Argumentation on Classroom Practice
Amanda M. Knight, Boston College, knightami@bc.edu
Katherine L. Mcneill, Boston College
Strand 5: College Science Teaching and Learning (Grades 13-20)
S2.7 Contexts and Factors Influencing Students’ Science Attitudes, Efficacy, and Interests
2:45pm – 4:00pm, Curacao 5

Presider:
Erika G. Offerdahl, North Dakota State University

S2.7.1 Depicting Chemistry Majors’ Self-Perceptions in Learning Chemistry
Murat Kahveci, Canakkale Onsekiz Mart University, Turkey, mkahveci@gmail.com

S2.7.2 Investigating College Students’ Self-Efficacy, Interest, and Conceptual Change About Stars
Janelle M. Bailey, University of Nevada, Las Vegas, janelle.bailey@unlv.edu
Doug Lombardi, University of Nevada, Las Vegas
Gale M. Sinatra, University of Nevada, Las Vegas

S2.7.3 Homework, Motivation, and Achievement in a College Genetics Course
Matthew S. Planchard, University of Southern Mississippi, matthew.planchard@eagles.usm.edu
Kristy L. Halverson, University of Southern Mississippi
Jill D. Maroo, University of Southern Mississippi
Timothy I. Mcean, University of Southern Mississippi

S2.7.4 Characterizing Self-Efficacy Opportunities in the Process of Modeling a Physical Phenomenon: A Study of Three Female Modeling Instruction Students
Vashti Sawtelle, Florida International University, vashti.sawtelle@gmail.com
Eric Brewe, Florida International University
Renee Michelle Goertzen, Florida International University, Department of Physics
Laird H. Kramer, Florida International University, Department of Physics

Strand 6: Science Learning in Informal Contexts
S2.9 Strand Sponsored Symposium-Learning Technologies in Informal Contexts
2:45pm – 4:00pm, Curacao 6

Presider:
Sandra T. Martell, University of Wisconsin-Milwaukee

Discussant:
Reed Stevens, Northwestern University

Presenters:
Mark Chen, University of Washington
Alex Games, Michigan State University
Douglas B. Clark, Vanderbilt University
Alex Games, Michigan State University
Robb Lindgren, University of Central Florida
Debora B. Wisneski, University of Wisconsin-Milwaukee
Heather T. Zimmerman, Penn State University
Susan M. Land, Penn State University
Arlene De Strulle, National Science Foundation

Strand 7: Pre-service Science Teacher Education
S2.10 Learning Science Teaching Practices
2:45pm – 4:00pm, Curacao 7

Presider:
Jennifer Cartier, University of Pittsburgh

S2.10.1 Learning to Assess: Preservice Science Teachers’ Learning about Classroom Assessment
Nam-Hwa Kang, Oregon State University, kangnh@science.oregonstate.edu
S2.10.2 Beginning Teachers’ Development of Classroom Practice and Their Narratives of Practices toward Reform-Oriented Instruction
Hosun Kang, Michigan State University, kanghosu@msu.edu
Charles W. Anderson, Michigan State University

S2.10.3 The Influence of Curriculum-Independent Factors on Preservice Elementary Teachers’ Adaptation of Science Curriculum Materials
Cory T. Forbes, University of Iowa, cory-forbes@uiowa.edu

S2.10.4 Elementary Preservice Teachers’ Knowledge and Application of Science Vocabulary
Sarah J. Carrier, North Carolina State University, sarah_carrier@ncsu.edu

S2.11 Case Studies of Teacher Growth
Presider:
Martina Nieswandt, Illinois Institute of Technology

S2.11.1 Hiking Mt. Kilimanjaro: Personal and Professional Impacts on Female Elementary Teachers’ Lives and Practice
Megan E. Mistler-Jackson, University of Colorado Denver, meganmj@comcast.net

S2.11.2 Examining Real-world IT-immersion Teacher Education Experiences through the Lens of Two Teacher Roles
Cathlyn D. Stylinski, University of Maryland, cstylinski@umces.edu
Caroline Parker, Educational Development Center
Carla Mcauliffe, TERC

S2.11.3 Enhancing Teacher Knowledge and Pedagogical Reasoning: A case study of cooperating science teacher mentors
Shelly Rodriguez, The University of Texas at Austin, shelly.rodriguez@austin.utexas.edu
Julie Gess-Newsome, Northern Arizona University
James Barufaldi, The University of Texas at Austin

S2.12.1 Improving Student Scientific Explanation Skills Through Research-based Professional Development
Nievita Bueno Watts, Arizona State University, nbueno@asu.edu
Dale R. Baker, Arizona State University
Gita Perkins, Arizona State University
Tapati Sen, Arizona State University
Dola Chaudhuri, Arizona State University
Michael G. Lang, Maricopa Community College

S2.12.2 Change in Implementation Practices of English and Science Teachers over Time
Tapati Sen, Arizona State University
Dale R. Baker, Arizona State University
Nievita Bueno Watts, Arizona State University
Gita Perkins, Arizona State University
Michael G. Lang, Maricopa Community College

S2.12.3 Scientific Explanations of Communication in English and Science Inquiry Project Students: Science vs English Comparison
Gita Perkins, Arizona State University
Dale R. Baker, Arizona State University
Nievita Bueno Watts, Arizona State University
Tapati Sen, Arizona State University
Michael G. Lang, Maricopa Community College

S2.12.4 The Relationship of Teacher Implementation of Professional Development to Student Scientific Explanations and Grades
Dale R. Baker, Arizona State University
Nievita Bueno Watts, Arizona State University
Tapati Sen, Arizona State University
Gita Perkins, Arizona State University
Dola Chaudhuri, Arizona State University
Michael G. Lang, Maricopa Community College

S2.13 Assessment in Chemistry
Presider:
Yilmaz Kara, Karadeniz Technical University

S2.13.1 Evaluation of the National Educational Standards in Chemistry Education
Maik Walpuski, University of Osnabrueck Chemistry Education, maik.walpuski@uos.de
S2.13.2 Identifying Chemistry Laboratory Safety Conceptions
Wendy E. Schatzberg, Western Washington University, wendy.schatzberg@gmail.com
Baohui Zhang, Nanyang Institute for Education, Singapore

S2.13.3 Analysis of Teachers’ Views on the Nature of Models in the Development of a New Model-based Course
Hui-Jung Chen, National Taiwan Normal University, Taiwan, karen3117tw@gmail.com
Mei-Hung Chiu, National Taiwan Normal University, Taiwan

S2.13.4 Does Question Type, Content and Gender Influence Student Understanding as Demonstrated in an Entrance Examination?
Ross D. Hudson, Australian Council for Educational Research, Curtin University of Technology, hudson@acer.edu.au
David F. Treagust, Curtin University of Technology

Strand 10: Curriculum, Evaluation, and Assessment
S2.14 Symposium – Computer Model-Based Assessment of Learning Progression: Promises and Issues
2:45pm – 4:00pm, Bonaire 6
Presider: Xiufeng Liu, University at Buffalo, SUNY
Discussant: Erica Smith, University at Buffalo, SUNY
Presenters: Noemi Waight, University at Buffalo, SUNY
Roberto Gregorius, Canisius College
Kristina Gillmeister, University at Buffalo, SUNY

Strand 11: Cultural, Social, and Gender Issues
S2.15 College Science Students: Attitudes, Beliefs, and Aspirations Related to Gender, Religion, Class and Ethnicity
2:45pm – 4:00pm, Bonaire 2
Presider: Janell N. Catlin, Teachers College, Columbia University

S2.15.1 Understanding Disadvantage: Comparing Motivation, Family Support, Preparation, and Income Characteristics of Minority and Non-Minority College Calculus Students
Charity N. Watson, Clemson University, charitw@clemson.edu
Philip M. Sadler, Harvard-Smithsonian Center for Astrophysics
Gerhard Sonnert, Harvard-Smithsonian Center for Astrophysics

S2.15.2 Stories of Persistence: How Class Shapes the Experiences of Female First-generation Students in Undergraduate Science
Rachel E. Wilson, The University of Georgia, rewilson@uga.edu
Julie M. Kittle, The University of Georgia

S2.15.3 Creationism, Worldviews, and Existential Anxiety: An Ethnographic Perspective
David E. Long, Valdosta State University, delong@valdosta.edu

S2.15.4 What Type of Science Person are You? Gender & Race/Ethnicity Comparisons
Zahra Hazari, Clemson University, zahra@clemson.edu
Philip M. Sadler, Harvard-Smithsonian Center for Astrophysics
Gerhard Sonnert, Harvard-Smithsonian Center for Astrophysics

Strand 12: Educational Technology
S2.16 Dynamics of Supporting Learning Through Technologies
2:45pm – 4:00pm, Bonaire 3
Presider: Taha Mzoughi, Kennesaw State University

S2.16.1 Learning and Social Dynamics in a Student Directed High School Virtual Reality Class
Teresa Morales, Iowa State University, tmorales@iastate.edu
Eunjin Bang, Iowa State University
Thomas Andre, Iowa State University

S2.16.2 Relationship between Students’ and Teacher’s Questions in an Online Forum
Seng-Chee Tan, National Institute of Education, Nanyang Technological University, Singapore, sengchee.tan@nie.edu.sg
Lay-Hoon Seah, University of Melbourne

S2.16.3 Nature of Community in a Science Teachers’ Virtual Community from a Community of Practice Perspective
Heather M. Worsham, University of Missouri, hmw7a5@mizzou.edu
Aaron J. Sickel, University of Missouri

S2.16.4 Using Web 2.0 Tools to Support Student Construction of Scientific Arguments
Jennifer L. Weible, Penn State University, jweible@gmail.com
Strand 13: History, Philosophy, and Sociology of Science
S2.17 Presidential Invited Session - Inquiry, Science Practices, and the Nature of Science
2:45pm – 4:00pm, Bonaire 4

**Presider:**
Richard Duschl, Penn State University

**Discussant:**
Gregory J. Kelly, Penn State University

**Presenters:**
Agustín Adúriz-Bravo, Universidad de Buenos Aires
Douglas Allchin, University of Minnesota
Barbara A. Crawford, Cornell University
Sibel Erduran, University of Bristol
Richard Grandy, Rice University
Renee Schwartz, Western Michigan University

Strand 14: Environmental Education
S2.18 Environmental Education in Practice
2:45pm – 4:00pm, Bonaire 5

**Presider:**
Kim Sadler, Middle Tennessee State University

S2.18.1 Exploring Environmental Education in Schools
Xavier E. Fazio, Brock University, xavier.fazio@brocku.ca
Douglas D. Karrow, Brock University

S2.18.2 Measuring the Effectiveness of the Ecology Disrupted Approach for Student Learning of Ecological Principles, Human Impact and the Nature of Science
Yael Wyner, City College of New York of the City University of New York, ywyner@ccny.cuny.edu

S2.18.3 Contradictions? What Contradictions?: Science Teachers do Environmental Education
Michael Tan, University of Toronto, mike.tan.lt@gmail.com
Erminia G. Pedretti, University of Toronto

S2.18.4 An Ethnographic Experience of a Place-based Learning Environment
Carlos Gustavo A. Ormond, Simon Fraser University, cormond@sfu.ca
David B. Zandvliet, Simon Fraser University
Susan Teed, Simon Fraser University

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PL1 Plenary Session #1
New Urban Leaders for Sustainable Cities of the Future
4:30pm – 6:00pm, Grand Sierra E

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

**Keynote Presenter:**
Kalanithy Vairavamoorthy, University of South Florida

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**Evening/Social Events**

Membership and Elections Committee Sponsored Session
Mentor-Mentee Nexus
Informal discussion: Early career NARST members are matched with more seasoned members to help launch or expand professional networks.
6:00pm – 7:00pm, Antigua 3
April Adams, Northeastern State University, adams001@nsuok.edu
Corinne Lardy, San Diego State University

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Presidential/Welcome Reception
Social Event: All NARST members are welcome – free appetizers and cash bar
7:00pm – 9:30pm, Grand Sierra Hall F, G, H, & I

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Break
4:00pm – 4:30pm
Do you read the official journal of NARST?

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Research Informing Practice

Edited by Julie A. Luft

This virtual issue of the _Journal of Research in Science Teaching (JRST)_ , with its focus on scientific inquiry, represents a commitment by two communities to bridge the research and practice gap: the community of science educators who craft the instruction that ensures student learning – the National Science Teachers Association (NSTA), and science education researchers who study classroom life in order to understand more about the process of teaching and learning - the National Association for Research in Science Teaching (NARST).

2010 Impact Factor: 1.91

Joseph Krajcik
University of Michigan
Ann Arbor, Michigan

Angela Calabrese-Barton
Michigan State University
East Lansing, Michigan

This leading journal, with an Eigen factor Score in the top 5 for its subject category, reports peer reviewed, scholarly articles on issues of science teaching and learning and science policy for researchers and practitioners. Types of articles include:

- Investigations employing experimental, naturalistic, historical, survey, philosophical, or case study research approaches;
- Position papers; policy perspectives;
- Critical reviews of the literature;
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2010 Impact Factor: 1.91
**Committee Meetings**

7:00am – 8:15am

Awards Committee Chairs & Co-Chairs Meeting
7:00am – 8:15am, Curacao 1

Equity and Ethics Committee Meeting
7:00am – 8:15am, Curacao 2

External Policy and Relations Committee Meeting
7:00am – 8:15am, Curacao 3

Research Committee Meeting
7:00am – 8:15am, Curacao 4

Membership and Election Committee Meeting
7:00am – 8:15am, Curacao 5

International Committee Meeting
7:00am – 8:15am, Curacao 6

Program Committee Meeting
7:00am – 8:15am, Curacao 7

Publications Advisory Committee Meeting
7:00am – 8:15am, Curacao 8

**Concurrent Session #3**

8:30am – 10:00am

Presidential Sponsored Session
S3.1 Symposium - The Cyberlearning Research Agenda: A View from NSF?
8:30am – 10:00am, Antigua 1

*Presider:*
Troy D. Sadler, University of Florida
Janet Kolodner, National Science Foundation, jkolodner@nsf.gov
Nancy B. Songer
Chris Quintana

External Policy Committee & Strand 15: Policy Sponsored Session
S3.2 Symposium - Exploration and Critique of the NRC’s New Conceptual Framework for Science Education Standards
8:30am – 10:00am, Antigua 2

*Presider:*
Andrew Shouse, University of Washington

*Discussants:*
Charles W. Anderson, Michigan State University
Nancy W. Brickhouse, University of Delaware
George E. Deboer, American Association for the Advancement of Science

*Presenters:*
Heidi Schweingruber, National Research Council
Sharon Lynch, George Washington University
Elizabeth A. Davis, University of Michigan
Sarah J. Carrier, North Carolina State University

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

S3.3 Learning Science in High School and College
8:30am – 10:00am, Curacao 1

*Presider:*
Janelle M. Bailey, University of Nevada, Las Vegas

S3.3.1 What Is More Effective - Learning With Worked-Out Examples Alone Or In Pairs?
Iris Mackensen-Friedrichs, IPN - Leibniz Institute for Science and Mathematics Education Kiel, Germany, mackensen@ipn.uni-kiel.de
Markus Luecken, IPN - Leibniz Institute for Science and Mathematics Education Kiel, Germany
Alexandra Schautz, University of Hildesheim Germany

S3.3.2 Navigating Deep Time: Landmarks from the Big Bang to the Present
Cesar Delgado, The University of Texas at Austin, cesar_delgado@austin.utexas.edu

S3.3.3 Increasing Inferential Comprehension of Science Texts Using Elaborative Interrogative Study Questions
William G. Holliday, University of Maryland, holliday@umd.edu
Cynthia A. Ghent, Towson University
Stephen D. Cain, Montgomery College
Janice M. Bonner, College of Notre Dame of Maryland
Strand 2: Science Learning: Contexts, Characteristics and Interactions
S3.4 Context and Learning Environment
8:30am – 10:00am, Curacao 2

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

S3.4.1 Analyzing Influences of a Real-life Context Compared to a Subject-related Context on Students’ Interest and Achievement
Eva Kölbach, eva.koelbach@uni-due.de
Elke Sumfleth

S3.4.2 Employing a Culturally-based Context as a Means to Science Agency: Snow Snakes and STEM
Brant G. Miller, University of Idaho, mill3770@umn.edu
Gillian H. Roehrig, University of Minnesota

S3.4.3 Relationship Between Pre-Service Elementary Science Teachers’ Argumentation Quality About Climate Change and Epistemic Belief Levels
Erdinc Isbilir, Middle East Technical University, isbilir@metu.edu.tr
Hamide Ertepinar, Middle East Technical University
Jale Cakiroglu, Middle East Technical University

S3.4.4 Multimedia Text-Synergy: A Pedagogy to Bridge Adolescents and School Science Literacies
Kok-Sing (Kenneth) Tang, University of Michigan, koksing@umich.edu
Stephen Tighe, Lake Orion High School
Elizabeth Moje, University of Michigan

Strand 2: Science Learning: Contexts, Characteristics and Interactions
S3.5 Symposium – Supporting Elementary and Middle School Students in Developing, Using, and Refining Scientific Models
8:30am – 10:00am, Antigua 3

**Presider:**
Christina V. Schwarz, Michigan State University

**Presenters:**
Brian J. Reiser, Northwestern University
Andres Acher, Northwestern University
Lisa Kenyon, Wright State University
Hamin Baek, Michigan State University
Michele Nelson, University of Michigan
Yael Bamberger, University of Michigan
Carlin Llorente, Middle East Technical University
William R. Penuel, SRI International
Carrie Tzou, University of Washington, Bothell
Philip Bell, University of Washington

Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies
S3.6 Teaching/Learning Science from Multiple Perspectives
8:30am – 10:00am, Curacao 3

**Presider:**
Deborah J. Tippins, University of Georgia

S3.6.1 Examining Culturally Responsive Teaching Practices over Three Enactments of a Personally Consequential Elementary Science Unit
Christopher J. Harris, SRI International, christopher.harris@sri.com
Patrik Lundh, SRI International
Hannah Lesk, SRI International
Liliana Ructtinger, SRI International
Carlin Llorente, SRI International
William R. Penuel, SRI International
Carrie Tzou, University of Washington, Bothell
Philip Bell, University of Washington

S3.6.2 Dramatic Science: Using Theatrical Techniques to Teach Primary (or Elementary) Science
Debbie J. McGregor, University of Wolverhampton, debmcgregor@btinternet.com

Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies
S3.7 Investigations of Science Teachers’ Knowledge and Beliefs
8:30am – 10:00am, Curacao 4

**Presider:**
Toni A. Sondergeld, University of Toledo

S3.7.1 Comparison of Pre-Service and In-Service Teachers’ Content Knowledge and Pedagogical Content Knowledge in Chemistry
Oliver Tepner, University of Duisburg-Essen Chemistry Education, oliver.tepner@uni-due.de
Sabrina Wittner, University of Duisburg-Essen Chemistry Education

S3.7.2 Physics Teachers’ Content Knowledge and Pedagogical Content Knowledge: Developing Test Scales and Measuring the Relation
Sophie Kirschner, University of Duisburg-Essen, Germany, sophie.kirschner@uni-due.de
Andreas Borowski, University of Duisburg-Essen, Germany
Hans E. Fischer, University of Duisburg-Essen, Germany
Strand 5: College Science Teaching and Learning (Grades 13-20)

S3.8 Mentoring and Development of Graduate Students
8:30am – 10:00am, Curacao 5

Presider:
Hye-Eun Chu, Kansas State University

S3.8.1 Understanding Student Evaluations of their Doctoral Advisors
Geoffrey Potvin, Clemson University, gpotvin@clemson.edu
Mark D. Harmon, Clemson University
Robert H. Tai, Curry School of Education University of Virginia

S3.8.2 What Students and Graduate Programs Can Do to Reduce Doctoral Completion Times
Geoffrey Potvin, Department of Engineering & Science Education, and Department of Mathematical Sciences Clemson University, gpotvin@clemson.edu
Adam V. Maltese, Indiana University
Joseph A. Harsh, Indiana University
Robert H. Tai, Curry School of Education University of Virginia

S3.8.3 Characterizing Strategies Used by Graduate Students in Field Ecology for Coping with Research Challenges
Mika Leon-Beck, The Hebrew University of Jerusalem, mikabeck@gmail.com
Jeff Dodick, Science Teaching Center, The Hebrew University of Jerusalem

S3.8.4 Faculty Mentor-Graduate Student Coauthoring: The Precursors, Processes, and Outcomes of ‘Scholarly Bricklaying’
Michelle A. Maher, University of South Carolina, mmaher@mailbox.sc.edu
Briana E. Timmerman, University of South Carolina
David F. Feldon, University of Virginia
Denise Strickland, University of Virginia

Strand 6: Science Learning in Informal Contexts

S3.9 Outcomes and Outreach: Bridging the Gap in Informal Science Education
8:30am – 10:00am, Curacao 6

Presider:
Susannah K. Sandrin, Arizona State University

S3.9.1 The Enduring Effect of Formal Science Learning on Adult Informal Science Learning
Jon D. Miller, University of Michigan, jondmiller@umich.edu

S3.9.2 Factors Contributing to Adult STEM Knowledge
John H. Falk, Oregon State University, falkj@science.oregonstate.edu

S3.9.3 Experiences with the Informal Science Education Program’s Transformation from Documenting Outputs to Measuring Outcomes
John P. Wells, Westat, johnwells@westat.com
Gary Silverstein, Westat

S3.9.4 Exploring Impacts of Professional Development for Informal Science Educators
James Kisiel, California State University, Long Beach, jkisiel@csulb.edu
Susan Magdziarz, Crystal Cove Alliance
Maria Grant, California State University, Fullerton
Donna Ross, San Diego State University
Amy Cox-Petersen, California State University, Fullerton

Strand 7: Pre-service Science Teacher Education

S3.10 Preparing Teachers to Teach Diverse Learners
8:30am – 10:00am, Curacao 7

Presider:
Felicia Moore-Mensah, Columbia University

S3.10.1 Preparing Preservice Elementary Teachers to Teach Science in Culturally Relevant Ways
Neporcha Cone, Northern Kentucky University, neporcha@yahoo.com

S3.10.2 Developing Pre-Service Elementary Teachers’ Capacity to Design Science Instruction for English Language Learners
Meredith E. Houle, San Diego State University, mhoule@mail.sdsu.edu
Michelle Nolasco, San Diego State University

S3.10.3 Preservice Teachers’ Uptake and Understanding of Funds of Knowledge in Elementary Science
David S. McLaughlin, Susquehanna University, mclaughlind@susqu.edu
Angela M. Calabrese-Barton, Michigan State University
Strand 7: Pre-service Science Teacher Education
S3.11 Topics in Physics & Space Science
8:30am – 10:00am, Bonaire 7

Presider:
Bruce R. Patton, The Ohio State University

S3.11.1 Investigating Elementary Education and Physical Therapy Majors’ Perceptions of an Inquiry-Based Physics Content Course
John M. Hilton, Delaware Technical & Community College, jhilton1@dtcc.edu

S3.11.2 Teaching and Learning through a Project-based Unit Implemented with Future STEM Educators: A Design Study
Jennifer A. Wilhelm, University of Kentucky, jennifer.wilhelm@uky.edu

S3.11.3 Integrating Pedagogy and Content in an Undergraduate Physics Course: What was Learned?
Danielle B. Harlow, University of California at Santa Barbara, dharlow@education.ucsb.edu
Lauren H. Swanson, University of California at Santa Barbara
Hilary A. Dwyer, University of California at Santa Barbara
Julie A. Bianchini, University of California at Santa Barbara

Strand 8: In-service Science Teacher Education
S3.12 Symposium - Supporting teachers in teaching science as inquiry: What is the evidence for effective professional development?
8:30am – 10:00am, Curacao 8

Presider:
Daniel K. Capps, Cornell University

Discussants:
Jan H. Van Driel, University of Leiden, The Netherlands
Judith S. Lederman, Illinois Institute of Technology

Presenters:
Barbara A. Crawford, Cornell University, bac45@cornell.edu
Daniel K. Capps, Cornell University
Julie A. Luft, Arizona State University
Norman G. Lederman, Illinois Institute of Technology
Aik Ling Tan, National Institute of Education in Singapore
Siew-Lee Shirley Lim, National Institute of Education in Singapore
Daniel P. Shepardson, Purdue University
Okhee Lee, University of Miami
John Loughran, Monash University in Australia

Strand 9: Reflective Practice
S3.13 Reflection on Teaching Context
8:30am – 10:00am, Bonaire 6

Presider:
Ratna Narayan, Texas Tech University

S3.13.1 Problematizing Reflection: Constructing a Cross-Cultural Researcher-Teacher Lens
Tang Wee Teo, University of Illinois, Urbana-Champaign, tteo2@illinois.edu

S3.13.2 The Examination of The Third Space: A Self-Study
Dashia Magee, The College of New Jersey, dmagee@tcnj.edu

S3.13.3 Visualizing, Investigating & Remembering: Modelling a Critical Place-Based Science Education
Sheliza Ibrahim-Khan, Nipissing University, shelizai@nipissingu.ca

S3.13.4 Technology and Teacher Self-Reflection: Professional Development in the 21st Century
Dino Sossi, Teachers College, Columbia University in the City of New York, dino_sossi@yahoo.com
Janell N. Catlin, Teachers College, Columbia University in the City of New York
Denise Wynn
Margaret Hood

Strand 10: Curriculum, Evaluation, and Assessment
S3.14 Assessment with Secondary and Postsecondary Students
8:30am – 10:00am, Bonaire 1

Presider:
Todd Milford, University of Victoria

S3.14.1 Closing the Feedback Loop: Assessment in an Introductory Physics Course for Non-Majors
Nilay Muslu, University of Missouri, nilaymuslu@mail.mizzou.edu
Deborah Hanuscin, University of Missouri

S3.14.2 Science Curriculum Reform in Senior Secondary Education in the Netherlands: A Comprehensive and Longitudinal Evaluation Study
Wilmad Kuiper, University of Utrecht / Netherlands Institute for Curriculum Development, wkuiper@slo.nl
Elvira Folmer, Netherlands Institute for Curriculum Development
Wout Ottevanger, Netherlands Institute for Curriculum Development / Vrije University Amsterdam
Lucia Bruning, Netherlands Institute for Curriculum Development

S3.14.3 Formative Interactions in Learning to Teach Science
Pernilla K. Nilsson, Halmstad University, Sweden, pernilla.nilsson@hh.se
S3.16.2 Innovative Information and Communication Technology Systems to Facilitate Student Learning: A Smart University Classroom in Taiwan
Chia-Li Debra Chen, National Taiwan Normal University, debra@ntnu.edu.tw
Yueh-Hsia Chang, National Taiwan Normal University
Chun-Yen Chang, National Taiwan Normal University

S3.16.3 Modeling of Student Perceptions of Learning in Connected Science Classrooms: How to Facilitate Learner-Centered Environments
Soon C. Lee, The Ohio State University, lee.3552@osu.edu
Karen E. Irving, The Ohio State University
Stephen J. Pape, University of Florida

S3.16.4 Examining Students’ Online Searching Strategies and Searching Patterns in Terms of Different Scientific Epistemological Beliefs
Chung-Yuan Hsu, National Taiwan University of Science and Technology, Taiwan, jackohio@gmail.com
Huei-Tse Hou, National Taiwan University of Science and Technology, Taiwan
Meng-Jung Tsai, National Taiwan University of Science and Technology, Taiwan
Chin-Chung Tsai, National Taiwan University of Science and Technology, Taiwan

Strand 13: History, Philosophy, and Sociology of Science
S3.17 Argument and Socio-scientific Issues
8:30am – 10:00am, Bonaire 4
Presider:
Renee Schwartz, Western Michigan University

S3.17.1 On the Functional Roles of Science in Socio-scientific Discussions
Jan Alexis Nielsen, University of Southern Denmark, jan@imada.sdu.dk

S3.17.2 Currents in STSE Education: Mapping a Complex Field, Forty Years On
Erminia G. Pedretti, University of Toronto, erminia.pedretti@utoronto.ca
Joanne Nazir, Ontario Institute for Studies in Education, University of Toronto

S3.17.3 Using Socioscientific Issues to Enhance Reflective Judgment in High School Students
Brendan E. Callahan, Ferris State University, brendancallahan@ferris.edu
Dana L. Zeidler, University of South Florida
Jeffrey Orasky, University of South Florida
Bryan H. Nichols, University of South Florida
Karey Burek, University of South Florida
S3.17.4 Argument and Explanation: A Necessary Distinction?
Alexis D. Patterson, Stanford University, alexisdp@stanford.edu
Jonathan F. Osborne, Stanford University

Strand 14: Environmental Education
S3.18 Expanding EE Understanding Through Technology and Assessment
8:30am – 10:00am, Bonaire 5

Presider:
Carol B. Brandt, Virginia Polytechnic Institute and State University

S3.18.1 Assessing the Effect of Systems Simulations on Systems Understanding in Undergraduate Environmental Science Courses
Heather J. Skaza, University of Nevada-Las Vegas, hjskaza@hotmail.com
Krystyna A. Stave, University of Nevada-Las Vegas
Kent J. Crippen, University of Nevada-Las Vegas

S3.18.2 Investigating the Impact on Student Learning and Outdoor Science Interest through Modular Serious Educational Games
Elizabeth Folta, SUNY-College of Environmental Science and Forestry, wildlife.educator@gmail.com
Leonard A. Annetta, George Mason University
Rebecca Cheng, George Mason University
Richard Lamb, Campbell University
Shawn Y. Holmes, NC State University

S3.18.3 An Examination of Nonformal Environmental Educators’ Technology Use to Promote Earth and Environmental Science Learning
Tamara E. Peffer, Lehigh University, tep205@lehigh.edu
Alec M. Bodzin, Lehigh University

S3.18.4 Longitudinal Analysis of Student Responses: Insights Gained Regarding Instrument Quality and Ecological Concept Development
Elsa Schaub, University of Arizona, eschaub@email.arizona.edu
Bruce Johnson, University of Arizona
Sanlyn Buxner, University of Arizona

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

Awards Committee Sponsored Session
S4.1 Symposium – Setting out in Science Education Research
10:15am – 11:45am, Antigua 1

Presider:
Xiufeng Liu, University at Buffalo, SUNY

Presenter:
Thomas R. Trettler, University of Louisville
Heather Toomey Zimmerman, Pennsylvania State University

External Policy Committee & Strand 15: Policy Sponsored Session
S4.2 Symposium – The Development of New Science Standards Aligned with NRC’s Framework
10:15am – 11:45am, Antigua 2

Presider:
Sharon Lynch, George Washington University

Discussants:
Stephen Pruitt, Achieve
Joseph S. Kraicik, University of Michigan
Janice Earle, National Science Foundation
Francis Eberle, National Science Teachers Association
Andrew Shouse, University of Washington
Elizabeth A. Davis, University of Michigan
Sarah J. Carrier, North Carolina State University
Jerome M. Shaw, University of California Santa Cruz

Strand 1: Science Learning, Understanding and Conceptual Change
S4.3 Scientific Reasoning in the Life Sciences
10:15am – 11:45am, Curacao 1

Presider: Deborah C. Smith, The Pennsylvania State University

S4.3.1 Models as Epistemic Anchors: How Model-based Inquiry Can Create Epistemic Demand
Julia Svoboda, Georgia Institute of Technology, jsvoboda3@gatech.edu
Cynthia Passmore, University of California, Davis

S4.3.2 Helping Students Learn More Expert Framing of Complex Causal Dynamics in Ecosystems Using EcoMUVE
Tina A. Grotzer, Harvard Graduate School of Education, Tina_Grotzer@pz.harvard.edu
Shane Tutwiler, Harvard Graduate School of Education
Amy Kamarainen, Harvard Graduate School of Education
Shari Metcalf, Harvard Graduate School of Education
Chris Dede, Harvard Graduate School of Education
S4.3.3 Supporting Students in Developing Explanatory Models of Natural Selection
Brian J. Reiser, Northwestern University, reiser@northwestern.edu

S4.3.4 Under the Microscope: A Study of Lab-based Instruction in Biology
Gillian Puttick, TERC, gilly_puttick@terc.edu
Brian Drayton, TERC
Meaghan Donovan, TERC

Strand 2: Science Learning: Contexts, Characteristics and Interactions
S4.4 English Language Learners in the Science Classroom
10:15am – 11:45am, Curacao 2
Presider:
Carol L. Stuessy, Texas A&M University

S4.4.1 The Use of Evaluative Questions to Shift ELL Student Engagement in a Secondary Science Classroom
Traci S. Baizer, University of Washington, tracibaizer@hotmail.com

S4.4.2 Changing Perceptions about Science for Underrepresented Students through an Authentic Inquiry-based Investigation
Xenia Meyer, University of California, Berkeley, xenia.meyer@berkeley.edu
Barbara A. Crawford, Cornell University

Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies
S4.5 Understanding Student Ideas
10:15am – 11:45am, Curacao 3
Presider:
Suna Ryu, UCLA

S4.5.1 Preschool Children’s Views about Science and Scientists: Findings from an Innovative Research Instrument
Mia Dubosarsky, University of Minnesota, dubo0053@umn.edu

S4.5.2 Understanding Elementary Students Knowledge of Health and Wellness
Ann W. Wright, Canisius College, wrighta@canisius.edu
Sue Tunnicliffe, University of London

S4.5.3 An Exploration of Upper Elementary Students’ Storyboarded Conceptions of Magnetism
James Minogue, North Carolina State University, james_minogue@ncsu.edu
John C. Bedward, North Carolina State University
Eric N. Wiebe, North Carolina State University
Lauren Madden, Science Education North Carolina State University
Mike Carter, North Carolina State University
Zebetta King, Swift Creek Elementary School

Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies
S4.6 New Programs and Resources for Middle and High School Science Teaching
10:15am – 11:45am, Curacao 4
Presider:
N. Sanjay Rebello, Kansas State University

S4.6.1 Analysis of Teaching Resources for Implementing an Interdisciplinary Approach in the K-12 Classroom
Morgan B. Yarker, University of Iowa, morgan-e-brown@uiowa.edu
Soonhye Park, University of Iowa

S4.6.2 Identifying and Replicating Successful Teacher Practices in Urban Science Education
Christopher Emdin, Teachers College, Columbia University, ce2165@columbia.edu

S4.6.3 Teachers’ Implementation of Digital Media and Inquiry Teaching Strategies Following Online Professional Development
Lauren B. Goldenberg, Education Development Center, lgoldenberg@edc.org
Scott Strother, Education Development Center
Alice Anderson, Education Development Center
Camille Ferguson, Education Development Center
Marian Pasquale, Education Development Center

S4.6.4 Accelerating Achievement in Math and Science in Gifted Urban Students (AAMSUS): A Project-based; Guided Inquiry Program and the Nature of Science
Andrea R. Milner, Adrian College, amilner@adrian.edu
Toni A. Sondergeld, The University of Toledo
Laurence J. Coleman, The University of Toledo
Strand 5: College Science Teaching and Learning (Grades 13-20)

S4.7 Developing Scientific Research Skills in Undergraduates
10:15am – 11:45am, Curacao 5

Presider:
Leila Amiri, University of South Florida

S4.7.1 The Impact of the Owens Ready Bridge on Student Preparation, Interest, and Confidence
Tracy L. Huziak-Clark, Bowling Green State University, thuziak@bgsu.edu
Staaden Moira Van, Bowling Green State University
Anne Bullerjahn, Owens Community College

S4.7.2 Undergraduate Science Research and the Nature of Science: Is Opening the Door to Understanding Enough?
Lara B. Pacifici, Kennesaw State University, lpacific@kennesaw.edu

S4.7.3 A Comparison of Two-year and Four-year College Students’ Undergraduate Research Experiences
Jeffrey S. Carver, West Virginia University, Jeffrey.Carver@mail.wvu.edu
Roger House, William Rainey Harper College
William J.F. Hunter, Illinois State University
Gregory Ferrence, Illinois State University

S4.7.4 Improving Undergraduate Life Science Students’ Rhetorical Consciousness of Research Articles
Lacum Edwin B. Van, University of Groningen, e.b.van.lacum@rug.nl
Martin J. Goedhart, University of Groningen
Miriam A. Ossevoort, University of Groningen

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

S4.8 Strategies for Improving Student Learning in Biology
10:15am – 11:45am, Bonaire 7

Presider:
Toth Eva Erdosne, West Virginia University

S4.8.1 Explaining the Visible with the Invisible: Students’ Conceptual Representations of the Genetic Origin of Variation
Speth Elena Bray, Saint Louis University, espeht@slu.edu
Matthew Dirnbeck, Saint Louis University
Paul Le, Saint Louis University
Jennifer L. Mornsen, North Dakota State University
Tammy M. Long, Michigan State University
Sara A. Wyse, Bethel University

S4.8.2 A Mental Mobile: Using Branch Rotation to Solve the Puzzle, Are these Trees the Same?
Jill D. Maroo, University of Southern Mississippi, Jill.Maroo@eagles.usm.edu
Kristy L. Halverson, University of Southern Mississippi

S4.8.3 Microevolution and Macroevolution: Ne’er the Twain Shall Meet?
Kefyn M. Catley, Western Carolina University, kcatley@wcu.edu
Laura R. Novick, Vanderbilt University

S4.8.4 Understanding Evolution and Evidentiary Support
Carrie J. Boyce, University of Southern Mississippi, Carrie.Boyce@eagles.usm.edu

Strand 6: Science Learning in Informal Contexts

S4.9 Museums as an Extension of the Classroom: Lessons Learned
10:15am – 11:45am, Curacao 6

S4.9.1 A Conceptual Framework for Designing Educational Museum Experiences
Marianne F. Mortensen, University of Copenhagen, Denmark, mm@ind.ku.dk

S4.9.2 Investigating different kinds of learning from interactive science exhibits
Leonie J. Rennie, Curtin University, l.rennie@curtin.edu.au
Rosemary S. Evans, Curtin University

S4.9.3 Understanding Teacher Intentions for Field Trips to a Museum of Natural History
Peggy L. Preusch, Smithsonian National Museum of Natural History, ppreusch422@gmail.com

S4.9.4 The Medium is the Message: Unraveling the Publics’ Responses to Body Worlds
Erminia G. Pedretti, OISE, University of Toronto, erminia.pedretti@utoronto.ca
Michelle Dubek, OISE, University of Toronto
Susan Jagger, OISE, University of Toronto

Strand 7: Pre-service Science Teacher Education

S4.10 Preparing Teachers for Diverse Schools
10:15am – 11:45am, Curacao 7

Presider:
Gail Richmond, Michigan State University

S4.10.1 Preparing Teachers for Diverse Schools
S4.10.1 Attributes that Shape Science and Math Preservice Teachers’ Commitment to Teach in Under-resourced Schools
Athena R. Ganchorre, University of Arizona, athenag@u.arizona.edu
Debra Tomanek, The University of Arizona

S4.10.2 Cultural Bumps: An International Cross-cultural Strategy used with Preservice Science Teachers during Field Placement
Shawn Y. Holmes, North Carolina State University, shawn.holmes@ncsu.edu
Jamila S. Simpson, North Carolina State University

S4.10.3 Readiness for Diverse Environments: Measuring Pre-service Science Teachers’ Confidence about Teaching in High-Need Schools
Juanita Jo Matkins, College of William & Mary, jmamat@wm.edu
Jacqueline T. Mclonnough, Virginia Commonwealth University
Kevin D. Goff, College of William & Mary
Kathryn E. Ottolini, College of William & Mary
Colleen P. Riesbeck, College of William & Mary

S4.10.4 Investigating Changes in Preservice Secondary Science Teachers’ Conceptions About the Pedagogical Implications of Student Diversity
Douglas B. Larkin, Montclair State University, douglarkin01@gmail.com

S4.11 Elementary Science Teachers
10:15am – 11:45am, Curacao 8
Presider:
Irene U. Osisioma, California State University, Dominguez Hills

S4.11.1 An Interpretive Case Study of how an Elementary Science Teacher uses Science Notebooks During Science Instruction
Lori L. Petty, University of Texas - Brownsville, lori.petty@utb.edu
Ratna Narayan, Texas Tech University

S4.11.2 From Professional Development to the Classroom: A Case Study of a 3rd Grade Teacher’s Implementation of the Learning Cycle
Deepika Menon, University of Missouri, dm2qc@mail.mizzou.edu
Deborah Hanuscin, University of Missouri

S4.11.3 Rethinking Professional Development in Elementary Science: Teacher Leadership for Sustainable Change in Science Education
Milijana Suskavcevic, Rice University, milijana@rice.edu
Lisa Webber, Rice University

S4.12 Professional Development and Policy
10:15am – 11:45am, Bonaire 8
Presider:
Mary Oliver, The University of Western Australia

S4.12.1 How Much Professional Development is Needed to Effect Positive Gains in K-6 Student Achievement
James A. Shymansky, University of Missouri-St. Louis, jshymansky@umsl.edu
Tzu-Ling Wang, National Hsinchu University of Education
Leonard A. Annetta, George Mason University
Larry D. Yore, University of Victoria
Susan A. Everett, University of Michigan-Dearborn

Kgomotso Mabusa, University of Nottingham, UK, ttxkm11@nottingham.ac.uk
Leonard R. Newton, University of Nottingham, UK

S4.12.3 Fostering Teacher Development to a Tetrahedral Orientation in the Teaching of Chemistry
Rick Wiebe, St. James-Assiniboia School Division, rwiebe@sjsd.net
Brian E. Lewthwaite, University of Manitoba
Harvey Peltz, River East Transcona School Division

S4.13 Conceptual Learning
10:15am – 11:45am, Bonaire 1

S4.13.1 Middle-schoolers’ Learning about Photosynthesis and Cellular Respiration: A Mixed Methods Study
Kathryn F. Drago, University of Michigan, kdrago@umich.edu

S4.13.2 STEM Learning and Scientific Reasoning
Lei Bao, The Ohio State University Department of Physics and College of Teaching and Learning, bao.15@osu.edu
Jing Han, The Ohio State University
Kathy Koenig, Wright State University
Tianfang Cai, Beijing Jiaotong University
S4.13.3 Investigating Students’ Understanding of Energy Transformation, Energy Transfer, and Conservation of Energy Using Standards-Based Assessment Items
Cari F. Herrmann-Abell, AAAS / Project 2061, cabell@aaas.org
George E. Deboer, AAAS / Project 2061

S4.13.4 Managing Threats to Validity in Experimental Tests of Education Interventions Data and Evidence from a Large, Cluster-Randomized Trial (CRT) of a High School Science Intervention
Stephen R. Getty, Biological Sciences Curriculum Study, SGetty@BSCS.org
Christopher D. Wilson, Biological Sciences Curriculum Study
Joseph A. Taylor, Biological Sciences Curriculum Study
Susan M. Kowalski, Biological Sciences Curriculum Study

Strand 11: Cultural, Social, and Gender Issues
S4.14 Gender, Socially, and Culturally Responsive Science Pedagogies: Bridging the Gaps between Students and Science
10:15am – 11:45am, Bonaire 2
Presider:
Irasema B. Ortega, Arizona State University

Obed Norman, Morgan State University, obednorman@verizon.net
Sylvester Mckay, Morgan State University

S4.14.2 Descriptive Analysis of Gender-related Motivating Factors for Girls and Boys in High-needs Middle Schools
Eunmi Lee, DePaul University, yjsmom@gmail.com

S4.14.3 Bridging the Gender Gap: Equality vs. Equity
Jamie L. Miller, Harvard University, jlmiller@cfa.harvard.edu
Gerhard Sonnert, Harvard University
Zahra Hazari, Clemson University
Philip M. Sadler, Harvard University

S4.14.4 Development, Validation and Preliminary Use of the Culturally Congruent Instruction Survey
Regina C. Sievert, Salish Kootenai College, wenonah@centurytel.net
Joan Lafrance, Mekinak Consulting
Rod Brod, Professor Emeritus, the University of Montana

S4.15 Related Paper Set - Investigating Diverse Girls’ Identities and Identity Trajectories in Science
10:15am – 11:45am, Bonaire 6

S4.15.1 Becoming (Less) Scientific in the Figured Worlds of School Science Learning: A Longitudinal Study of Girls’ Identities
Heidi B. Carlone, University of North Carolina
Julia Kimmel, University of North Carolina
Cassi Lowder, University of North Carolina
Jean Rockford, University of North Carolina
Catherine Scott, University of North Carolina

S4.15.2 Urban Girls’ Identity Trajectories through the Participation between Figured Worlds
Hosun Kang, Michigan State University
Angela M. Calabrese-Barton, Michigan State University
Edna Tan, Michigan State University
Juanita Bautista Guerra, Michigan State University

S4.15.3 Girls and Science: Urban Middle School Girls’ Perspectives, Positioning and Activism in Science when Conversations about Identity and Discrimination are Explicitly Nurtured
April Luethmann, University of Rochester
Rachel Chaffe, University of Rochester

S4.15.4 Out of School Figured Worlds and Urban Girls’ Engagement with Science
Angela M. Calabrese-Barton, Michigan State University
Edna Tan, Michigan State University
Hosun Kang, Michigan State University
Juanita Bautista Guerra, Michigan State University

Strand 12: Educational Technology
S4.16 Examining the Effect of Traditional and Non-traditional Educational Technologies
10:15am – 11:45am, Bonaire 3
Presider:
Miri Barak, Technion- Israel Institute of Technology

S4.16.1 Transforming and Enhancing the Learning and Teaching of Senior Biology via Digital Technologies
Wilhelmina S. Van Rooy, Australian Catholic University, Australia, wilhelmina.vanrooy@mq.edu.au
John Hedberg, Macquarie University, Australia
Peter Freebody, The University of Sydney, Australia
Kim Nichols, University of Queensland, Australia
S4.16.2 The effect of Computer Simulation on Students’ Conceptual Understanding of Electric Circuits
Saed Sabah, saed_sabah@yahoo.com

S4.16.3 Student Learning in Science Simulations: Design Features That Promote Learning Gains
Michael Timms, WestEd, mtimms@wested.org
Kathleen Scalise, University of Oregon
Anita Moorjani, WestEd
Lakisha Clark, University of Oregon
Karen Holtermann, UC Berkeley
Shawn Irvin, University of Oregon

S4.16.4 Effectiveness of Computer Simulations in the Teaching/Learning of Physics
Aklilu Tilahun Tadesse, Arba Minch University, aklilu_tt@yahoo.com
Tesfaye Tilahun, Addis Ababa University
Tadesse Mesfin, Addis Ababa University

S4.17 Changes in Students’ Epistemologies
10:15am – 11:45am, Bonaire 4
Presider:
Sibel Erduran, University of Bristol

S4.17.1 What Changes Undergraduate Students’ Perception of the Tentative and Creative Nature of Science?
Nazan U. Bautista, Miami University, uludagn@muohio.edu
Elisabeth E. Schussler, University of Tennessee - Knoxville
Kimberly A. Haferkos, Miami University
Melanie A. Link-Perez, University of Oklahoma

S4.17.2 Views on the Nature of Science - Results from Large-scale Assessment of Students’ Competencies
Kerstin Kremer, Justus-Liebig-University Giessen,
Kerstin.H.Kremer@didaktik.bio.uni-giessen.de
Irene Neumann, Leibniz Institute for Science and Mathematics Education, Kiel
Hans E. Fischer, University of Duisburg-Essen
Jürgen Mayer, University of Kassel

S4.17.3 Practical Epistemologies of High School Students Participating in a Research Apprenticeship
Stephen R. Burgin, University of Florida, sburgin@ufl.edu
Troy D. Sadler, University of Florida
Rachael D. Griffin, University of Florida

S4.17.4 Comparative Case Studies of the Development of Third Graders’ Conceptions of Nature of Science: Student Understandings after a Year of Instruction
Valarie L. Akerson, Indiana University, vakerson@indiana.edu
Vanashri Nargund, Indiana University
Ingrid S. Weiland, Indiana University
Khemawaddee Pongsanon, Indiana University

Strand 14: Environmental Education
S4.18 Exploring Environmental Literacy and Future Green Career Interest
10:15am – 11:45am, Bonaire 5
Presider:
Deborah J. Tippins, University of Georgia

S4.18.1 Going Green: Exploring Career Decision Making of Canadian Youth
Oksana Bartosh, Directions Evidence and Policy Research, ksenia_brt@yahoo.com
Charles Ungerleider, Directions Evidence and Policy Research
Isabelle Eaton, Directions Evidence and Policy Research
Terri Thompson, Directions Evidence and Policy Research

S4.18.2 Students Environmental Attitudes: Links With Interest in Environmental-Related Topics, Out-of-School Activities and the Future Job
Hebel Florence Le, IUFM Université Lyon 1/ICAR ENS Lyon, florence.le-hebel@ens-lyon.fr
Pascale Montpied, ICAR ENS Lyon
Valerie Fontanieu, INRP Lyon

S4.18.3 What Do Eighth Grade Students Know About Energy Resources?
Alec M. Bodzin, Lehigh University, amb4@lehigh.edu

S4.18.4 Contours of Environmental Action in Science Education: A Critical Discourse Analysis of Middle Grade Science Textbooks
Ajay Sharma, University of Georgia, ajay@uga.edu
Cory Buxton, University of Georgia

S4.18.5 Promoting Global Sustainability: How do Students View the Ocean after an Ocean Literacy-focused Curriculum Program?
Meghan E. Marrero, U.S. Satellite Laboratory, mmarrero@us-satellite.net

NARST Business Meeting
Box lunch provided for 1st 100 attendees who sign up.
12:00pm – 1:00pm, Grand Sierra E
Concurrent Session #5
1:15pm – 2:45pm

Awards Committee Sponsored Session
S5.1 Symposium - Distinguished Contributions in Research
1:15pm – 2:45pm, Antigua 1

President:
Philip H. Scott, University of Leeds, UK.

Presenters:
Joseph S. Krajcik, University of Michigan
Reinders Duit, IPN, Leibniz Institute of Science Education, University of Kiel, Germany

Strand 1: Science Learning, Understanding and Conceptual Change
S5.2 Developing and Using Graphs in the Physical Sciences
1:15pm – 2:45pm, Curacao 1

President: David Fortus, Weizmann Institute Of Science

S5.2.1 Intuitive Rules – a Suggestion for an Additional Explanation of Misconceptions in Reading and Forming Kinematic Graphs
Haim Eshach, Ben Gurion University of the Negev; heshach@gmail.com

S5.2.2 Using Eye-tracking to Examine Learning in a Multimedia Simulation: The Importance of Visual Transitions
Catherine E. Milne, New York University, cerm4@nyu.edu
Jan Plass, New York University
Bruce Homer, Graduate Center, City University of New York
Trace Jordan
Paul O'Keefe, New York University
Ruth Schwartz, New York University
Yoo Kyung Chang, New York University

S5.2.3 Assessing Students’ Graphing Skills in a Context-Based Chemistry Module
Shirly Avargil, Technion, Israel Institute of Technology; shirly.avargil@gmail.com
Ort Herscovitz, Technion, Israel Institute of Technology; Ort Braude College
Yehudit Judy Dori, Technion, Israel Institute of Technology

S5.2.4 Characterizing Students’ Use of Graphs in Introductory Physics with a Graphical Analysis Epistemic Game
Elizabeth Gire, University of Memphis, egire@memphis.edu
Dong-Hai Nguyen, Kansas State University
N. Sanjay Rebello, Kansas State University

Strand 2: Science Learning: Contexts, Characteristics and Interactions
S5.3 Science Learning: Focusing on Student Communication and Dialogue
1:15pm – 2:45pm, Curacao 2

President:
Bruce Waldrip, Monash University

S5.3.1 How does the Complexity of Students’ Communication Influence the Learning Outcome?
Rebecca Knobloch, University of Duisburg-Essen, rebecca.knobloch@uni-due.de
Maik Walpuski, University of Osnabrueck

S5.3.2 Mixed Analysis of Student Relations Using Network Physics and Communities of Practice
Jesper Bruun, University of Copenhagen, Department of Science Education, jbruun@ind.ku.dk

S5.3.3 Towards an Interlanguage of Talking Science - Exploring Scientific Literacy through Analysis of Students Talk
Clas Olander, University of Gothenburg, Sweden, clas.lander@gu.se

S5.3.4 An Analysis of Whole-class Dialogue after Elementary Science Students Present their Claim and Evidence
Matthew J. Benus, The University of Iowa, matthew-benus@uiowa.edu
Yarker B. Morgan, The University of Iowa
Brian M. Hand, The University of Iowa
Lori A. Norton-Meier, University of Louisville

Strand 2: Science Learning: Contexts, Characteristics and Interactions
S5.4 Symposium - Socio-scientific Issues in Science Classrooms: Teaching, Learning and Research
1:15pm – 2:45pm, Bonaire 8

Presenters:
Troy D. Sadler, University of Florida, tsadler@coe.ufl.edu
Michelle L. Klosterman, Wake Forest University
Dana L. Zeidler, University of South Florida
Scott Applebaum, University of South Florida
Maria P. Evagorou, University of Nicosia, Cyprus
Shirley S. Simon, Institute of Education London
Ruth Amos, Institute of Education London
Jennifer L. Eastwood, University of Florida
Tali Tal, Technion - Israel Institute of Technology
Yael Kali, Technion - Israel Institute of Technology
Vaille Dawson, Curtin University
Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies

S5.5 Related Paper Set - Promoting and Examining Teacher Attention to Student Thinking in Science Classrooms
1:15pm – 2:45pm, Curacao 3

**Presider:**
Rosemary S. Russ, Northwestern University

S5.5.1 Resolving Underspecification: Using Teachers' Existing Strategies to Refine the Meaning of Attending to Student Thinking
Valerie Otero, University of Colorado at Boulder

S5.5.2 Teacher Attention Leading to Student Inquiry: Case Study of an Emergent 5th Grade Magnetism Unit
Colleen Gillespie, University of Maryland, College Park

S5.5.3 Promoting Generative Inquiry: The Importance of Attention and Responsiveness to Multiple Aspects of Classroom Activity
Lama Jaber, University of Maryland, College Park
Jennifer Richards, University of Maryland, College Park
Luke Conlin, University of Maryland, College Park
David Hammer, Tufts University

S5.5.4 Supporting Elementary Teachers Learning to See Students' Thinking in the Science Classroom
Melissa J. Luna, Northwestern University

S5.5.5 Testing a Conceptual Framework for Science Teacher Learning Programs: The Student Thinking Lens
Kathleen Roth, BSCS

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

S5.6 Images of Science in the Classroom
1:15pm – 2:45pm, Curacao 4

**Presider:**
Todd Milford, University of Victoria

S5.6.1 Images of Science in School Curriculum
Seema Rivera, SUNY Albany, SR681696@albany.edu

S5.6.2 Best Practice in Middle School Science
Alandeom W. Oliveira, State University of New York at Albany, aoliveira@albany.edu
Kristen C. Wilcox, State University of New York at Albany
Janet Angelis, State University of New York at Albany
Arthur N. Applebee, State University of New York at Albany
Vincent Amodeo, State University of New York at Albany
Michele A. Snyder, State University of New York at Albany

S5.6.3 Developing an Operational Model of Inquiry-Based Teaching: Teacher Roles and Pedagogies
Gillian Kidman, Queensland University of Technology, Australia, g.kidman@qut.edu.au

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

S5.7 Symposium - Climate Education: Research, Perspective, and Issues
1:15pm – 2:45pm, Antigua 2

**Presider:**
Anita Roychoudhury, Purdue University, aroychou@purdue.edu

**Discussant:**
William Cobern, Western Michigan University

**Presenters:**
Daniel P. Shepardson, Purdue University
Devdutta Niyogi, Purdue University
Andrew Hirsch, Purdue University
Bruce R. Patton, The Ohio State University
Soyoung Choi, Purdue University
Yukiko Maeda, Purdue University

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

S5.8 Retention & Graduate Student Development
1:15pm – 2:45pm, Curacao 5

**Presider:**
Andrea R. Milner, Adrian College

S5.8.1 An Exploratory Study of the Relationship Between STEM Graduate Students Teaching Orientations and Teaching Practices
Joanna A. Gilmore, University of South Carolina, jagilmor@mailbox.sc.edu
Michele Kelly

S5.8.2 Professional Development in College Science Teaching
Aimée K. Thomas, The University of Southern Mississippi, aimee.thomas@usm.edu
S5.8.3 Perceptions of Teaching Training and Department Climate Among US and International STEM Graduate Teaching Assistants
Sue Ellen Dechenne, University of Nebraska-Lincoln, sdechenne2@unlserve.unl.edu

S5.8.4 Engaging Diverse STEM Students in Transformative Learning
Larry D. Burton, Andrews University, burton@andrews.edu
David N. Mbungu, Andrews University
John F. Stout, Andrews University

Strand 5: College Science Teaching and Learning (Grades 13-20)
S5.9 Assessment and Analysis of Undergraduates’ Principled Reasoning About Biological Processes
1:15pm – 2:45pm, Bonaire 7

S5.9.1 Exploring Undergraduates’ Understanding of Photosynthesis Using Diagnostic Question Clusters
Joyce Parker, Michigan State University
Merle Heidemann, Michigan State University
Mark Urban-Lurain, Michigan State University
Brett Merrit, Michigan State University
John Merrill, Michigan State University
Amy Lark, Michigan State University
Charles W. Anderson, Michigan State University
Gail Richmond, Michigan State University

S5.9.2 Undergraduates’ Struggles to Trace Information in Genetics
Merle Heidemann, Michigan State University
Amy Lark, Michigan State University
Joyce Parker, Michigan State University

S5.9.3 Students’ Use of Spatial and Temporal Scale in their Explanations of Biological Phenomena
Jonathon Schramm, Michigan State University
Charles W. Anderson, Michigan State University

S5.9.4 Moving Across Scales: Using Lexical Analysis to Reveal Student Reasoning About Photosynthesis
Casey Lyons, Michigan State University
Shauna Jones, Michigan State University
Rosa Moscarella, Michigan State University
John Merrill, Michigan State University
Mark Urban-Lurain, Michigan State University

S5.9.5 Principled Reasoning and Conceptual Change: The Interplay Between Theory, Research and Practice
Mark Urban-Lurain, Michigan State University

Strand 6: Science Learning in Informal Contexts
S5.10 Science Outside the Classroom Walls
1:15pm – 2:45pm, Curacao 6
Presider:
Terence P. McClafferty, Curtin University

S5.10.1 The Zoo Acuity Model: Depicting Students’ Knowledge of Zoos
Patricia Patrick, Texas Tech University, trish.patrick@ttu.edu

S5.10.2 Why so Hard? Gaining Insights from School Teachers and Informal Science Education Staff Regarding Teacher use of ISE Resources
James Kisiel, California State University, Long Beach, jkisiel@csulb.edu

S5.10.3 Closing the Gap: Teachers’ Perceptions of Informal Science
Joy Kubarek-Sandor, Illinois Institute of Technology, John G. Shedd Aquarium, jkuba@sheddaquarium.org

S5.10.4 Connecting Fieldtrip Learning to a School-based Ecology Unit: Using Socio-cultural Theory to Design and Study Learning Across Settings
Heather Toomey Zimmerman, Pennsylvania State University, heather@psu.edu
Jennifer L. Weible, Pennsylvania State University

Strand 7: Pre-service Science Teacher Education
S5.11 Preservice Teacher Beliefs & Attitudes
1:15pm – 2:45pm, Curacao 7
Presider:
Carolyn S. Wallace, Auburn University

S5.11.1 The Intuitive Curriculum: Why Biology Teachers Tend to Shy Away from Philosophical and Social Issues
Arne Dittmer, University of Hamburg, arne.dittmer@erzwiss.uni-hamburg.de

S5.11.2 Longitudinal Research on the Impact of Pre-service Programs on Secondary Science Teachers’ Beliefs and Practices
John W. Tillotson, Syracuse University, jwtillo6@syr.edu
Monica J. Young, Syracuse University
Robert E. Yager, University of Iowa
John E. Penick, North Carolina State University
S5.11.3 Epistemological Views of Pre-Service Science Teachers: Role of A Pre-Service Science Teacher Education Course
Saiqa Azam, University of the Punjab, Lahore, Pakistan, sazam@ucalgary.ca

S5.11.4 Elementary Pre-service teachers’ Attitude Towards Biotechnology Processes
Frackson Mumba, Southern Illinois University Carbondale, IL, frackson@siu.edu
Vivien M. Chabalengula, Southern Illinois University Carbondale, IL
Jonathan Chitiyo, Southern Illinois University Carbondale, IL

Strand 8: In-service Science Teacher Education
S5.12 Teacher Practice
1:15pm – 2:45pm, Curacao 8
Presider: Tamara E. Peffer, Lehigh University

S5.12.1 Citizen Science Research and Teachers: Understanding the Process and Implementation into the Classroom
Michele J. Hollingsworth Koomen, Gustavus Adolphus College, mkoomen@gac.edu

S5.12.2 Science Teachers’ Orientations, Practices, Professional Development, and Intentions Regarding Project-Based Science focused on Sustainable Energy
Lisa A. Brooks, The University of Toledo, lisa.brooks2@utoledo.edu
Charlene M. Czerniak, The University of Toledo

S5.12.3 Teacher Knowledge of Practice Generated through Professional Experimentation with Model-based Reasoning
Rich Hedman, Sacramento State University Interim Director, Mathematics and Science Education Center, hedmanrd@csus.edu
Cynthia Passmore, University of California, Davis Associate Professor

S5.13 Reflection on Science Content Teaching
1:15pm – 2:45pm, Bonaire 6
Presider: Liesl M. Hohenshell, University of Wisconsin-Whitewater

S5.13.1 We Should Hardly Be Surprised That The Theory of Evolution Remains So Controversial...
Leslie Sandra Jones, Valdosta State University, lesliesj@valdosta.edu

S5.13.2 An Instructor’s Reflective Journey of Implementing a Thematic Approach to Teaching Nature of Science in a Pre-Service Education Biology Course
Sarah J. Krajewski, Western Michigan University, sarahkrajewski@yahoo.com
Renee Schwartz, Western Michigan University

S5.13.3 Analog Modeling of Earth Processes: A Case Study in Multidisciplinary, Guided Inquiry Science and Mathematics Education
Laura Serpa, University of Texas at El Paso, lserpa@utep.edu
Olga Kosheleva, University of Texas at El Paso, Milijana Suskavcevic, Rice University

S5.13.4 An Integrative Model for Exploring the Development of Science Teachers’ Personal Practical Knowledge
Chorng-Jee Guo, National Changhua University of Education, pfcjguo@cc.ncue.edu.tw
Ping-Tun Huang, National Changhua University of Education
Li-Jeng Wu, National Changhua University of Education

Strand 10: Curriculum, Evaluation, and Assessment
S5.14 Large-Scale Assessment and Curriculum Reform
1:15pm – 2:45pm, Bonaire 1
Presider: Mercy Ogunsola-Bandele, Adamawa State University

S5.14.1 The Impact of an Innovative Science Curriculum on Students’ Attitudes towards School Science
Indira C. Banner, University of Leeds, i.banner@education.leeds.ac.uk
Jim Ryder, University of Leeds
Jim Donnelly, University of Leeds

S5.14.2 Developing Instructionally Sensitive Assessment: Lessons Learned about the Manipulation of Close and Proximal Item Characteristics
Maria Araeeli Ruiz-Primo, University of Colorado Denver, maria.ruiz-primo@ucdenver.edu
Min Li, College of Education, University of Washington
Deanna Sands, University of Colorado Denver
Kellie Willis, College of Education, University of Washington
Michael Giangellaro, University of Colorado Denver
Margaret Anny Jones, University of Colorado Denver
Jennifer Feehan, University of Colorado Denver
Felix Schoppmeier, University of Duisburg-Essen, felix.schoppmeier@uni-due.de
Andreas Borowski, University of Duisburg-Essen
Hans E. Fischer, University of Duisburg-Essen

Strand 11: Cultural, Social, and Gender Issues
S5.15 Inservice Teacher and Preservice Teachers’ Attitudes towards Science and Children: Innovative Theoretical and Methodological Approaches
1:15pm – 2:45pm, Bonaire 2
Presider:
Regina Suriel, University of Georgia

S5.15.1 Science Teachers’ Views on Cultural Diversity: Contributions from Anthropology
Katemari Rosa, Columbia University, katemari@gmail.com
Felicia Moore-Mensah, Columbia University

S5.15.2 Nano-biotechnology Literacy for Sustainability in an International Context:
Preparing the Public by Educating Teachers
Toth Eva Erdosne, West Virginia University, eva.toth@mail.wvu.edu
Graham Meadow Sherrill, West Virginia University
Brittany Witherspoon, West Virginia University
Jennifer Trythall, West Virginia University

S5.15.3 Negotiating Emotions in Becoming a Social Justice Science Teacher
Maria S. Rivera Maulucci, Barnard College, Columbia University, mriveram@barnard.edu

S5.15.4 People and Places: The Use of Portraiture for Understanding Context in Science Classrooms
Cassie F. Quigley, Clemson University, cassieq@clemson.edu
Amy Trauth-Nare, Indiana University
Nicole Beeman-Cadwallader, Indiana University

Strand 12: Educational Technology
S5.16 Integrating Commercial Technologies into Teaching
1:15pm – 2:45pm, Bonaire 3
Presider:
Vanessa D.I. Pfeiffer, University of Duisburg-Essen

S5.16.1 Integrating Geospatial Technologies in an Inquiry Energy Unit with Urban Middle School Students
Violet Kulo, Lehigh University, violet.kulo@lehigh.edu
Alec M. Bodzin, Lehigh University

S5.16.2 Google Earth: How Are Teachers Using This Virtual Globe and How Can They Be Further Supported?
Rebecca R. Deutscher, University of California at Berkeley, rreutscher@berkeley.edu

S5.16.3 Electronic Interactions in Science Classrooms at no Cost: Google Voice as a Formative Assessment Tool
Brian C. Baldwin, Kean University, brian@bcbaldwin.com

Strand 13: History, Philosophy, and Sociology of Science
S5.17 Symposium - Objectivity in Science and the Study of Pseudoscience in Education
1:15pm – 2:45pm, Bonaire 4
Presider:
Ron Good, Louisiana State University

S5.17.1 Science Teachers’ Views on Cultural Diversity: Contributions from Anthropology
Katemari Rosa, Columbia University, katemari@gmail.com
Felicia Moore-Mensah, Columbia University

S5.17.2 Nano-biotechnology Literacy for Sustainability in an International Context:
Preparing the Public by Educating Teachers
Toth Eva Erdosne, West Virginia University, eva.toth@mail.wvu.edu
Graham Meadow Sherrill, West Virginia University
Brittany Witherspoon, West Virginia University
Jennifer Trythall, West Virginia University

S5.17.3 Negotiating Emotions in Becoming a Social Justice Science Teacher
Maria S. Rivera Maulucci, Barnard College, Columbia University, mriveram@barnard.edu

S5.17.4 People and Places: The Use of Portraiture for Understanding Context in Science Classrooms
Cassie F. Quigley, Clemson University, cassieq@clemson.edu
Amy Trauth-Nare, Indiana University
Nicole Beeman-Cadwallader, Indiana University

Strand 14: Environmental Education
S5.18 Science Teacher Education as a Context for Environmental Literacy Improvement
1:15pm – 2:45pm, Bonaire 5
Presider:
Maria Ferreira, Wayne State University

S5.18.1 Satisfaction of Pre-service Science Teachers’ Basic Psychological Needs While Solving an Environmental Problem
Guliz Kanaarslan, Agri Ibrahim Cecen University, Middle East Technical University, gsliz@metu.edu.tr
Hamide Ertepınar, Middle East Technical University
Semra Sungur, Middle East Technical University

S5.18.2 How Do Pre-Service Science Teachers Perceive Local and Non-Local Environmental Problems?
Busra Tuncay, Giresun University, tbusra@metu.edu.tr
Ozgul Yilmaz-Tuzun, Middle East Technical University

S5.18.3 Exploring Prospective Science Teachers’ Epistemological Beliefs regarding Learning in the Domain of Environment
Elif Adibelli, Middle East Technical University, aelif@metu.edu.tr
Ozgul Yilmaz-Tuzun, Middle East Technical University

S5.18.4 Environmental Knowledge, Attitudes, and Awareness of Pre-Service Teachers and Faculty
Bruce Johnson, University of Arizona, brucej@email.arizona.edu
Deborah Barca, University of Arizona
Dennis Rosemartin, University of Arizona
Break
2:45pm – 3:15pm

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

Poster Session A
3:15pm – 4:15pm, Grand Sierra D

Strand 1: Science Learning, Understanding and Conceptual Change
S6A.1 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.1.1 Improving Student Understanding of ‘Size and Scale’ through a Variation Theory Approach
Su Swarat, Northwestern University, s-swarat@northwestern.edu
Denise Drane, Northwestern University
Greg Light, Northwestern University

S6A.1.2 Investigating 6th Grade Students’ Causal Reasoning in Biodiversity
Hayat Hokayem, MSU, alhokaye@msu.edu
Gotwals Amelia Wenk, MSU

S6A.1.3 Chinese and Australian Grade 6 Children’s Conceptual Understanding of Science
Ying Tao, University of Western Australia, taoy03@student.uwa.edu.au
Mary Oliver, University of Western Australia
Grady Venville, University of Western Australia

S6A.1.4 The Development of Learners’ Attitudes Towards Different Natural Scientific Subjects - A Longitudinal Study
Alexandra Pleus, Humboldt-University Berlin, Germany, alexandra.pleus@biologie.hu-berlin.de
Zu Belzen Annette Upmeier, Humboldt-University Berlin

S6A.1.5 Triangulating America’s Science Literacy
Adam V. Maltese, Indiana University, amaltese@indiana.edu

S6A.1.6 Interpretive Discussion of Text in Physics
Shulamit Kapon, University of California Berkeley, and Tel Aviv University, shulamit.kapon@berkeley.edu

S6A.1.7 Sound Transmission: Fourteen old Students’ Conceptions and Learning from a Teaching-Learning Sequence
Eva West, Eva.West@ped.gu.se
Anita Wallin

S6A.1.8 Modelling-based Knowledge Building - The Case of a Blind Student
Rosaria Justi, Universidade Federal de Minas Gerais Education, rjusti@ufmg.br
Nilmara B. Mozzer, Universidade Federal de Minas Gerais Education

S6A.1.9 Confirmation for Increased Attention to Four Core Areas of Evolution Understanding: Observations from Classroom Instruction
Margaret M. Lucero, University of Texas at Austin, mmlucero@mail.utexas.edu
Anthony J. Petrosino, University of Texas at Austin
Nate K. Mcvaugh, University of Texas at Austin
Jeffrey Birchfield, University of Texas at Austin

Strand 2: Science Learning: Contexts, Characteristics and Interactions
S6A.2 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.2.1 Interactions between Classroom Discourse, Teacher Questioning, and
Julie B. Smart, Presbyterian College, jbsmart@presby.edu
Jeff C. Marshall, Clemson University

S6A.2.2 Effectiveness of Virtual Laboratories in Terms of Learning Environment, Attitudes, and Achievement among High School Genetics Students
Rachel R. Oser, Curtin University of Technology, Australia, rachel.oser@gmail.com
Barry J. Fraser, Curtin University of Technology, Australia

S6A.2.3 The Complex Nature of Physics and Engineering Students’ Academic and Social Networks in Higher Education
Jonas Forsman, Uppsala University, jonas.forsman@fysik.uu.se
Rachel F. Moll, Vancouver Island University
Staffan Andersson, Uppsala University
Cedric Linder, Uppsala University

S6A.2.4 Investigating the Influences of 5th Graders’ Learning Motivation on Dissolution Conceptual Change
Hung-Chih Yen, Sinping Elementary School, Taichung, Taiwan, R.O.C., hungchih.yen@gmail.com
Hsiao-Lin Tuan, National Changhua University of Education, Changhua, Taiwan, R.O.C.
S6A.2.5 Exploring the Structural Relationships between Taiwan University Students’ Conceptions of Learning Biology and Epistemological Beliefs toward Biology
Liang Jyh-Chong, National Taiwan University of Science and Technology, aljc@mail.ntust.edu.tw
Chin-Chung Tsai, National Taiwan University of Science and Technology
Guo-Li Chiou, National Chiao Tung University

S6A.2.6 An Aptitude-Treatment-Interaction Study: Effect of Interaction Between Inquiry-Teaching and Field-Dependency on Physics Achievement and Attitude
Hanife C. Sen, Yuzuncu Yil University, Middle East Technical University, hanifecan.sen@gmail.com
Ali Eryilmaz, Middle East Technical University
Sahin Mine Gokce, TED Ankara College, Middle East Technical University

S6A.2.7 Influences of a STEM Mentoring Program on Underachieving Middle School Students
Robbie L. Higdon, Clemson University, Clemson, SC, rhigdon@clemson.edu

S6A.2.8 Investigating the Creation of a Community of Physics Learners
Renee Michelle Goertzen, Florida International University, rgoertze@fiu.edu
Eric Brewe, Florida International University
Laird H. Kramer, Florida International University

S6A.2.9 Investigating Minority Student Participation in an Authentic Science Research Experience
Stephanie D. Preston, sdp163@psu.edu

S6A.2.10 Teacher Interactions with Technology: The Comparison of Two Teachers’ Discursive Practices Web-based Science Environment
Alicia M. Trotman, Michigan State University, trotmana@msu.edu
Michelle Williams, Michigan State University
Matthew Koehler, Michigan State University

S6A.2.11 Children in Science Fairs: Interviews with Parents on the Family Experience
G. Michael Bowen, Mount Saint Vincent University, gmbowen@yahoo.com
John L. Bencze, OISE/University of Toronto
Dianne Fraser, Mount Saint Vincent University

S6A.3 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.3.1 Research and Documentation of 4 year-old Understanding of Science
Judith A. Burton, Wooten Elementary, jahburton@yahoo.com

S6A.3.2 Student Ideas about the Science of Sound Before and After Engineering-Design-Based Instruction
Kristen B. Wendell, Tufts University, kristen.bethke@tufts.edu
Hee-Sun Lee, Tufts University

S6A.4 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.4.1 Teachers’ Understandings About Organs and Organ Systems in Frogs and Pigs
Patricia Patrick, Assistant Professor @ Texas Tech University, trish.patrick@ttu.edu

S6A.4.2 Argument-Based Inquiry Approach to Teaching 7th Grade Science in Korea
Aeran Choi, Kent State University, aeran-choi@hotmail.com
Jeonghee Nam, Pusan National University
Eulsun Seung, Indiana State University

S6A.4.3 Nature of Science (NOS) and Online Biological Simulations
Katrina Roseler, Florida State University, kr09e@fsu.edu

S6A.4.4 Interactions Between Teachers’ Existing PCK and Novel Content Knowledge
Emily D. Wischow, Purdue University, emily.wischow@gmail.com
Lynn A. Bryan, Purdue University
George M. Bodner, Purdue University
Strand 5: College Science Teaching and Learning (Grades 13-20)
S6A.5 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.5.1 The Pedagogical Content Knowledge of University Chemistry Professors Teaching Stoichiometry
Kira Padilla, UNAM, kira@unam.mx
Andoni Garritz, Faculty of Chemistry, UNAM

S6A.5.2 High School Preparation for Success in College Science Courses: South Korean Student and Teacher Perspectives
Miyoung Hong, Korea Institute for Curriculum & Evaluation, myhong@kice.re.kr
Nam-Hwa Kang, Oregon State University
Joo-Ah Kim, Yonsei University

S6A.5.3 Comparing Outcomes of Traditional Cookbook Versus Single-Question, Open-Ended Undergraduate Biology Lab
Matthew J. Kloser, Stanford University School of Education, mkloser@stanford.edu
Sara Brownell, Stanford University Biology Department

S6A.5.4 Undergraduate Non-science Majors’ Descriptions and Interpretations of a Scientific Data Visualization
Sandra Swenson, CUNY, sswenson@jjay.cuny.edu

S6A.5.5 The Relationship Between Epistemological Beliefs and Problem Solving in Physics
Wendi N. Wampler, Purdue University, wamplerw@purdue.edu
Lynn A. Bryan, Purdue University
Mark P. Haugan, Purdue University

S6A.5.6 Preparing Future Scientists and Engineers to Assess the Ethical Implications of Their Work in Nano-Biotechnology
Toth Eva Erdosne, West Virginia University, eva.toth@mail.wvu.edu
Kasi J. Jackson, West Virginia University
Brittany Witherspoon, West Virginia University

Strand 6: Science Learning in Informal Contexts
S6A.6 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.6.1 Pedagogic Understandings of Science Summer Camp Leaders
A. Leo Macdonald, St. Francis Xavier University, kmacdon@stfx.ca
Ann Sherman, University of New Brunswick

S6A.6.2 A Case Study of the Interaction on Science Activities Between Parents and Children in Taiwan
Yi-Ting Cheng, National Changhua University of Education, tonia0213@gmail.com
Huey-Por Chang, National Changhua University of Education

S6A.6.3 Attitudes towards Science and Technology among General Education Development Students
Casey Fisher, Southern Illinois University Carbondale, mwseeechabangula@excite.com
Vivien M. Chabalengula, Southern Illinois University Carbondale
Frackson Mumba, Southern Illinois University Carbondale

S6A.6.4 An Evaluation of the Impact of an Electronic Field Trip on Students’ Perceptions of Scientists
Mary E. Varghese, Purdue University, mvarghes@purdue.edu
Kristin A. Hetzel, Purdue University
Omolola A. Adedokun, Purdue University
Loran C. Parker, Purdue University
Wilella D. Burgess, Purdue University
Jamie L. Loizzo, Purdue University
Joseph P. Robinson, Purdue University

S6A.6.5 A Youth-Directed Science Café: Impacts on Teen Participants
Susan Foutz, Institute for Learning Innovation, foutz@ilinet.org
Michelle Hall, Science Education Solutions, Inc
Jessica Luke, Institute for Learning Innovation
Michael Mayhew, Synoptic LLC and Science Education Solutions, Inc.

Strand 7: Pre-service Science Teacher Education
S6A.7 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.7.1 Teacher Candidates’ Exploration of Teaching Science for Social Justice with Elementary Students: Toward a Critical Science Pedagogy
Julie L. Haun-Frank, Old Dominion University, jhaun@odu.edu
Catherine E. Matthews, The University of North Carolina at Greensboro
Melony Allen, The University of North Carolina at Greensboro
S6A.7.2 Explicit versus Implicit Teaching: Pre-service Elementary Teachers’ Peer Teaching Lessons on Inquiry Process Skills
Byoung Sug Kim, Roosevelt University, bkim@roosevelt.edu
Eun Kyung Ko, National-Louis University

S6A.7.3 A Further Exploration of Factors Related to Acceptance of Evolutionary Theory among Turkish Preservice Biology Teachers
Hasan Deniz, University of Nevada Las Vegas, hasan.deniz@unlv.edu
Irфан Yılmaz, Dokuz Eylül University, Izmir Turkey
Faruk Cetin, Dokuz Eylül University, Izmir Turkey

S6A.7.4 Using Problems of Practice to Approximate Teaching in a Pre-service Methods Course
David J. Grueber, Wayne State University, grueber@wayne.edu
Nonye M. Alozie, Wayne State University
Mary O. Dereski, Wayne State University

S6A.7.5 Examining Progress in Recruitment, Preparation and Induction of Pre-service Teachers in the NSF Noyce Program
Ann M.L. Cavallo, The University of Texas at Arlington, cavallo@uta.edu
Gregory Hale, The University of Texas at Arlington
James Epperson, The University of Texas at Arlington
Ramón Lopez, The University of Texas at Arlington

S6A.7.6 A Co-er and Papi-ers Unit on Electricity for Preservice and In-service Elementary Teachers
Saiqa Azam, University of Calgary, sazam@ucalgary.ca

S6A.7.7 Investigating Teachers’ Understandings of the Nature of Science (NOS) and Developing a NOS Assessment Questionnaire
Eunmi Yang, Stonehill College, eyang@stonehill.edu
Michelle Jaques, Stonehill College
Virginia Epps, University of Wisconsin-Whitewater

S6A.7.8 Developing PCK Beyond the Methods Course: Exploring the Use of Science Specific Mentors with Elementary Student Teachers
Meredith A. Park Rogers, Indiana University - Bloomington, mparkrog@indiana.edu

S6A.7.9 Promoting an Argument Structure in Elementary School Classrooms
Reizelie Barreto-Espino, Towson University, rbarreto@towson.edu
Carla Zembal-Saul, The Pennsylvania State University

S6A.7.10 Contrast of the Science Teaching Practices of Two Pre-service Early Childhood Educators
Deirdre Englehart, UCF Daytona Campus, dengleha@mail.ucf.edu

S6A.8 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.8.1 Professional Identity Development of Beginning Elementary Teachers of Science: A Comparative Case Study
Phyllis Katz, University of Maryland, pkatz15@gmail.com
J. Randy McGinnis, University of Maryland
Kelly Riedinger, University of Maryland
Scott J. Dantley, Coppin State University
Gili Marbach-Ad, University of Maryland
Rebecca Pease, University of Maryland
Amy Dai, University of Maryland
Lori Jusiewicz, University of Maryland

S6A.8.2 Using Lesson Study to Understand How Elementary Science Teachers Translate Social Constructivist Learning Theory into Practice
Apisata Juntaraprasert, Kasetsart University, Bangkok, Thailand, japisata@hotmail.com
Vantipa Roadrangka, Kasetsart University, Bangkok, Thailand
Deborah J. Tippins, The University of Georgia, Athens, GA

S6A.8.3 Comparison of Science, Social Studies and Ethics Teachers’ Understanding
Jungsook Yoo, Ewha Womans University, jsyoo@ewhain.net
Sung-Youn Choi, Ewha Womans University
Hyunju Lee, Ewha Womans University

S6A.8.4 Teachers’ Experiences on Inquiry Teaching Learning: From the Perceptions of 10 Experienced Junior-high Science Teachers
Chung-Hsien Tseng, National Changhua University of Education, csj268@ms.klhj.cyc.edu.tw
Hsiao-Lin Tuan, National Changhua University of Education
Chi-Chin Chin, National Taichung University

S6A.8.5 Navigating with Content Driven Literacy in the Secondary School Classroom: A Case Study of Three Teachers Approaches from Their Second Year Teaching
Jessica F. Riccio, Teachers College, Columbia University, riccio@tc.edu

S6A.8.6 Professional Development Program Boosts Science Teaching Practices among Head-Start Teachers on an American-Indian Reservation
Mia Dubosarsky, University of Minnesota, dubo0053@umn.edu
Gillian H. Roehrig, University of Minnesota
Ann Mogush-Mason, University of Minnesota
Barb Murphy, University of Minnesota
Stephan Carlson, University of Minnesota
S6A.8.7 Impact of School Experiences on Beliefs about the Nature of Science: Two Case Studies on Persisting Secondary Science Teachers
Sissy S. Wong, University of Houston, sissywong@uh.edu
Irasema B. Ortega, Arizona State University
Julie A. Luft, Arizona State University
Jonah B. Firestone, Arizona State University
Krista L. Adams, Arizona State University

Strand 9: Reflective Practice
S6A.9 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.9.1 A Story About How A Novice Science Teacher Became An Expert Science Teacher In Taiwan
Hsin-Jung Dai, Pingtung County Chung-Hsiao Elementary School, sir641286@yahoo.com.tw
Jing-Ru Wang, National Pingtung University of Education

S6A.9.2 Engaging Urban Pre-service Teachers in Meaningful Reflective Practices Through Video Analysis and Peer Feedback
Irene U. Osisioma, California State University, Dominguez Hills, iosisioma@csudh.edu
Mercy Ogunsola-Bandele, Adamawa State University, Adamawa Nigeria

S6A.9.3 The Influence of Collaborative Action Research on Chemistry Teacher Beliefs
Katrin Vaino, University of Tartu, katrin.vaino@ut.ee
Jack Holbrook, University of Tartu

Strand 10: Curriculum, Evaluation, and Assessment
S6A.10 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.10.1 Using Many Facet Rasch Measurement to Evaluate Judges, Examinees, and Items: An Example Using the ESTAM
Jeffery S. Townsend, Eastern Kentucky University, scott.townsend@eku.edu
William J. Boone, Miami University

S6A.10.2 Discussion as a Meaning-making Practice: Variations in the Enactment of Discussions in Science Classrooms
Monica (Mon-Lin) Ko, Northwestern University, monlinko2008@u.northwestern.edu
Brian J. Reiser, Northwestern University
S6A.10.3 Research-Based Multidisciplinary Science Instructional Materials for Grade 8: A Tool to Promote Equity?
Susan M. Kowalski, BSCS, skowalski@bscs.org
Janet Carlson, BSCS
Scotter Pamela Van, BSCS
Betty Stennett, BSCS

S6A.10.4 Using the Force Concept Inventory to Measure High School Students’ Learning Progression of Forces
Gavin W. Fulmer, National Science Foundation, gfulmer@nsf.gov
Ling L. Liang, La Salle University
Xiaofeng Liu, University at Buffalo

S6A.10.5 Understanding the Impact of Formative Assessment Strategies on First Year University Students’ Conceptual Understanding of Chemical Concepts
Mehmet Aydeniz, The University of Tennessee, maydeniz@utk.edu
Aybuke Pabuccu, Abant Izzet Baysal University, Bolu, Turkey

S6A.10.6 The Development of Practical Course Work for Prospective Science Teachers’ Pedagogical Content Knowledge
Koichi Furuya, Professor, Hokkaido University of Education, Japan, furuya@asa.hokkyodai.ac.jp

S6A.10.7 Global Sustainability and Public Understanding of Science: Using Socioscientific Issues to Assess Environmental Literacy
Tali Tal, Technion, rtal@technion.ac.il
Anat Aabramovitch, Technion

S6A.10.8 Surveying Ocean Literacy: Instrument Development and Validation
Joo Chung, Lawrence Hall of Science University of California, Berkeley
Kristin Nagy Catz, University of California, Berkeley, knec@berkeley.edu
Rena Dorph, Lawrence Hall of Science University of California, Berkeley

S6A.10.9 Integrating Science Simulations into Curricula and Assessment Systems
Matt D. Silberglitt, WestEd, msilber@wested.org
Barbara C. Buckley, WestEd

S6A.10.10 How Do Elementary School Science Textbooks Present The Nature Of Science?
Marianne Phillips, University of Houston, marianne.phillips@tamusa.tamus.edu
Julie Vowell, University of Houston
Young Lee, University of Houston
Strand 11: Cultural, Social, and Gender Issues
S6A.11 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.11.1 Connecting School Science Learning with At-home Activities: Documenting Learning through a Science Backpack Program
Carrie Tzou, University of Washington Bothell, tzouct@u.washington.edu
Elyse Litvack, Maple Elementary School, Seattle School District

S6A.11.2 The Intersection of Ethnicity and Gender in STEM Undergraduate Experiences: A Case Study
Roxanne Hughes, Florida State University, hughes@magnet.fsu.edu

S6A.11.3 Comparison of 15-Years Old and Upper-Secondary Schools Students’ Occupational Expectations and Extrinsic Motivation to Learn Science
Imbi Henno, imbi.henno@tlu.ee
Maarja Lond
Priit Reiska

S6A.11.4 Story-telling and Writing: A Platform for Cultural Exchange between Science and Everyday Ways of Knowing
Xenia Meyer, University of California, Berkeley, xenia.meyer@berkeley.edu
Barbara A. Crawford, Cornell University

S6A.11.5 Navigating Inquiry and Academic Language in Classrooms with ELLs: A Longitudinal Study of two Beginning Secondary Science Teachers
Irasema B. Ortega, Arizona State University, iortegac@asu.edu
Sissy S. Wong, University of Houston
Sarah Newcomer, Arizona State University
Jonah B. Firestone, Arizona State University
Krista L. Adams, Arizona State University
Julie A. Luft, Arizona State University

S6A.11.6 Grade Nine Students’ Interests towards Learning Science at School and its Relationship with their Future Career Choices
Moonika Teppo, University of Tartu, Estonia, moonika.teppo@ut.ee
Miia Rannikmäe, University of Tartu, Estonia

Strand 12: Educational Technology
S6A.12 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.12.1 Crystal Island-Uncharted Discovery: An Intelligent Game-based Leaning Environment
James Minogue, North Carolina State University, james_minogue@ncsu.edu
Bradford Mott, North Carolina State University
Hiller Spires, North Carolina State University
John Neitfeld, North Carolina State University
Marc Russo, North Carolina State University
Jonathan Rowe, North Carolina State University

S6A.12.2 Interactive Whiteboard use in Two High-tech Science Classrooms: Technology Adoption and Integration
Rena Stroud, TERC, rena_stroud@terc.edu
Jon Drayton, TERC
Joni Falk, TERC

S6A.12.3 Making and Moving Ideas: Students Using XO Laptops to Create, Discover, and Share Ideas
Anne E. Emerson, University of California, Santa Barbara, aemerson@education.ucsb.edu
Danielle B. Harlow, University of California, Santa Barbara
Alyssa Krier

S6A.12.4 Study the Effectiveness of Interactive Whiteboard in Facilitating Junior High School Students’ Biology Learning
Kai-Ti Yang, National Taiwan Normal University, biokaty@gmail.com
Tzu-Hua Wang, National HsinChu University of Education
Mei-Hung Chiu, National Taiwan Normal University

Strand 13: History, Philosophy, and Sociology of Science
S6A.13 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.13.1 Young Children’s Images of a Scientist: Revisiting the Draw-A-Scientist Test
Tiffany R. Lee, University of Washington, tlee13@u.washington.edu

S6A.13.2 The Superconductivity Centennial: A Very ‘Cool’ Subject for Teaching the Nature of Science
Mehmet F. Tasar, Gazi Universitesi, mftasar@gmail.com
Strand 14: Environmental Education
S6A.14 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.14.1 Environmental Education in Pre-Service Teacher Preparation
Scott A. Ashmann, University of Wisconsin-Green Bay, ashmanns@uwgb.edu

S6A.14.2 Middle School Students’ Decisions about Global Endangered Species Management Dilemmas
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

S6A.14.3 Exploring the World: Comparing Student Learning in Environmental and Science Inquiry Programs
Oksana Bartosh, Directions Evidence and Policy Research Group, ksenia_brt@yahoo.com
Jolie Mayer-Smith, University of British Columbia
Margaret Tudor, Pacific Education Institute
Linda Peterat, University of British Columbia

S6A.14.4 Combining Environmental Education and Integrated STEM Instruction: A Model and Case Study
Daniel L. Dickerson, Old Dominion University, ddickers@odu.edu
Patti Horne, Averett University
Stephanie Hathcock, Old Dominion University
Eileen Hofmann, Old Dominion University
Laura Nelson, Portsmouth Public Schools

S6A.14.5 Indicators for Environmental Literacy: Local vs. Global Knowledge
Tali Tal, Technion, rtal@technion.ac.il
Einat Peled, Technion

S6A.14.6 Ecological Sustainability and Place-based Learning: A Model of Education for Transformative Experiences
Julie Singleton, Texas A&M, jsingle47@yahoo.com

Poster Session B
4:15pm – 5:15pm, Grand Sierra D

Strand 15: Policy
S6A.15 Poster Session A
3:15pm – 4:15pm, Grand Sierra D

S6A.15.1 Ohio Biology Teacher Licensure Requirements: Implications for Evolution Instruction
Lisa A. Donnelly, Kent State University, ldonnell@kent.edu
Vanessa Klein, Kent State University

S6B.1.1 Electric Current Mental Models of Japanese and U.S. students
David Henry, Buffalo State College, henryd@buffalostate.edu
Michael Jabot, SUNY Fredonia
Koichi Furuya, Hokkaido University of Education

S6B.1.2 Facilitating Synthesis Problem Solving with Conceptual Scaffolding in Introductory Physics
Lin Ding, The Ohio State University, ding.65@osu.edu

S6B.1.3 Association Between Belief and Conception of Evolution
Heeyoung Cha, Korea National University of Education, hycha@knue.ac.kr
Yangsuk Heo, Pohang Idong High School
Minsu Ha, The Ohio State University
Seulae Ku, Korea National University of Education
Hyernin Park, Korea National University of Education
Soon-nam Lee, Korea National University of Education

S6B.1.4 Examining Student Writings of Argument-Based Inquiry Approach
Saeyeol Yoon, University of Iowa, saeyeol-yoon@uiowa.edu
Jeffrey Perkins, University of Iowa
Nattida Promyod, University of Iowa
Claudia P. A. Mendez, University of Iowa
Brian M. Hand, University of Iowa

S6B.1.5 High School Students’ Interpretations of Cellular Transport Graphics
Michelle Cook, Clemson University, mcook@clemson.edu
S6B.1.6 Interpreting Probabilistic Causal Outcomes in Science: A Microgenetic Study of Sixth Graders’ Patterns of Reasoning
Tina A. Grotzer, Harvard Graduate School of Education, Tina_Grotzer@pz.harvard.edu
Shane Tutwiler, Harvard Graduate School of Education
Leslie Duhaylongsod, Harvard Graduate School of Education
Molly Levitt, Harvard Graduate School of Education
Erika Spangler, Harvard Graduate School of Education

S6B.1.7 Exploration of Using Narrative to Scaffold Levels of Representation in a Multimedia Simulation forIntroductory High School Chemistry
Catherine E. Milne, New York University, cem4@nyu.edu
Jan Plass, New York University
Bruce Homer, City University of New York
Trace Jordan, New York University
Ruth Schwartz, New York University
Mubina Khan, New York University
Dixie Ching, New York University
Yoo Kyung Chang, New York University

S6B.1.8 Cross-cultural Comparison of SI-native and Imperial-native Students’ Understanding of Size and Scale
Cesar Delgado, The University of Texas at Austin, cesar_delgado@austin.utexas.edu

S6B.2 Poster Session B
4:15pm – 5:15pm, Grand Sierra D

S6B.2.1 Investigating Students’ Strengths and Weaknesses in the Area Scientific Inquiry
Manja Erb, erb@chemie.fu-berlin.de
Claus F. Bolte, Prof.

S6B.2.2 Epistemology and Personality Traits as Predictors of Scientific Reasoning Ability
Gavin W. Fulmer, gavinfulmer@hotmail.com

S6B.2.3 Towards Improving the Measurement of Quality of Argument Using Toulmin’s Framework: A Methodological Contribution
Maria P. Evagorou, University of Nicosia, Cyprus, evagorou.m@unic.ac.cy
Jonathan F. Osborne, Stanford University

S6B.2.4 Blending Physical and Virtual Manipulatives in Physics
Georgios G. Olympiou, University of Cyprus, olympiog@ucy.ac.cy
Zacharias C. Zacharia, University of Cyprus

S6B.2.5 Teacher’s Views on Science, Teaching Science, and Their relationship to Argumentation Norms in a Classroom
Suna Ryu, UCLA, sunaryu@ucla.edu

S6B.2.6 Young Children Do Not Hold the Classic Earth’s Shadow Misconception to Explain Lunar Phases
Jennifer A. Wilhelm, University of Kentucky, jennifer.wilhelm@uky.edu

S6B.2.7 Nature of Science Communication in Teacher Personal Pronouns
Alandecom W. Oliveira, State University of New York at Albany, aoliveira@albany.edu

S6B.2.8 Investigating Discursive Practices Utilized Students and their Teacher in a Freshman-Level High School Science Course
Lauren H. Swanson, UC Santa Barbara, lhoneycutt@education.ucsb.edu
Julie Blanchini, University of California, Santa Barbara

S6B.2.9 Examining How Elementary Students Generate Inferences When Reading Informational Science Texts and Interpreting Scientific Data
Jamie N. Mikeska, Michigan State University, mikeskaj@msu.edu

Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies
S6B.3 Poster Session B
4:15pm – 5:15pm, Grand Sierra D

S6B.3.1 Making the Invisible Visible: Exploring Science Literacy through Creation of Non-fiction Science Picture Books
Yovita N. Gwekwerere, Laurentian University, ygwekwerere@laurentian.ca
Jan Buley, Laurentian University

S6B.3.2 Exploring Primary Teachers’ Epistemological Understandings and Dilemmas of School Science Lab Practices
Sun-Kyung Lee, Seoul National University, sunlee@snu.ac.kr
Myeong-Kyeong Shin, Gyeongin National University of Education
Gyuho Lee, Seoul National University

S6B.4 Poster Session B
4:15pm – 5:15pm, Grand Sierra D

Maria P. Evagorou, University of Nicosia, Cyprus, evagorou.m@unic.ac.cy
Jonathan F. Osborne, Stanford University

S6B.4.2 Blending Physical and Virtual Manipulatives in Physics
Georgios G. Olympiou, University of Cyprus, olympiog@ucy.ac.cy
Zacharias C. Zacharia, University of Cyprus

S6B.4.3 Investigating Students’ Strengths and Weaknesses in the Area Scientific Inquiry
Manja Erb, erb@chemie.fu-berlin.de
Claus F. Bolte, Prof.

S6B.4.4 Epistemology and Personality Traits as Predictors of Scientific Reasoning Ability
Gavin W. Fulmer, gavinfulmer@hotmail.com

S6B.4.5 Towards Improving the Measurement of Quality of Argument Using Toulmin’s Framework: A Methodological Contribution
Maria P. Evagorou, University of Nicosia, Cyprus, evagorou.m@unic.ac.cy
Jonathan F. Osborne, Stanford University

S6B.4.6 Blending Physical and Virtual Manipulatives in Physics
Georgios G. Olympiou, University of Cyprus, olympiog@ucy.ac.cy
Zacharias C. Zacharia, University of Cyprus
S6B.4.1 The Relationship between Nature of Science Understandings and Science Self-efficacy Beliefs of Sixth Grade Students
Beth Allyn Parker, Georgia State University, eap1961@comcast.net
Geeta Verma, University of Colorado Denver
Lisa Martin-Hansen, Georgia State University
Ray Hart, Georgia State University

S6B.4.2 Fostering Transfer of Learning in 9th Grade Chemistry Lessons using the Scientific Method as an Example
Susanne Bley, Humboldt-Universität zu Berlin, Germany, ruediger.tiemann@chemie.hu-berlin.de
Rüdiger D. Tiemann, Humboldt-Universität zu Berlin, Germany

S6B.4.3 A Critical Analysis of Force and Motion Unit at a Newly Reformed Science and Technology Curriculum
Mehmet C. Ayar, Texas A&M University, mehmetayar@tamu.edu
Bugrahan Yalvac, Texas A&M University

S6B.4.4 Developing the TPACK of Secondary Science Teachers using the Interactive Whiteboard and Peer Coaching
Syh-Jong Jang, Chung-Yuan Christian University, jang@cycu.edu.tw

S6B.4.5 Boring, Cool, Enjoyable, DulL: Students’ Interest during Analytical Chemistry Laboratory Activities
Martina Nieswandt, Illinois Institute of Technology, mnieswan@iit.edu
Linnea Garrett, Illinois Institute of Technology

S6B.4.6 A Phenomenological Study of Non-science majors’ Perceptions of Evolution
Emily M. Walter, University of Missouri, emw2n4@mail.mizzou.edu
Patricia M. Friedrichsen, University of Missouri

S6B.4.7 Students’ Perceptions about Their Learning Experience through a Process-oriented Chemistry Laboratory Curriculum
Eulsun Seung, Indiana State University, esseung@gmail.com
Beverly Pestel, Indiana State University

S6B.5 Poster Session B
4:15pm – 5:15pm, Grand Sierra D

S6B.5.1 How Do Students’ Approaches to Learning Science Relate to Their Ability to Ask Good Questions?
Erika G. Offerdahl, North Dakota State University, erika.offerdahl@ndsu.edu
Lisa M. Montplaisir, North Dakota State University

S6B.5.2 Teaching Quantum Physics: Impact on Learning Using a Representational Approach
Bruce G. Waldrip, Monash University, bruce.waldrip@monash.edu
Promovendus Abdurrahman, Indonesia University of Education

S6B.5.3 A Longitudinal Perspective of Gender Differences in STEM Undergraduate Research Experiences
Joseph A. Harsh, Indiana University, Science Education, jharsh@indiana.edu
Adam V. Maltese, Indiana University, Science Education
Robert H. Tai, University of Virginia, The Curry School of Education

S6B.5.4 A Phenomenological Study of Non-science majors’ Perceptions of Evolution
Emily M. Walter, University of Missouri, emw2n4@mail.mizzou.edu
Patricia M. Friedrichsen, University of Missouri

S6B.5.5 A Phenomenological Study of Non-science majors’ Perceptions of Evolution
Emily M. Walter, University of Missouri, emw2n4@mail.mizzou.edu
Patricia M. Friedrichsen, University of Missouri

S6B.5.6 Students’ Perceptions about Their Learning Experience through a Process-oriented Chemistry Laboratory Curriculum
Eulsun Seung, Indiana State University, esseung@gmail.com
Beverly Pestel, Indiana State University

S6B.6 Poster Session B
4:15pm – 5:15pm, Grand Sierra D

S6B.6.1 Content Related Social Interactions during Professional Development at an Informal Science Institution
Gary M. Holliday, Illinois Institute of Technology, ghollida@iit.edu
Judith S. Lederman, Illinois Institute of Technology
Norman G. Lederman, Illinois Institute of Technology

S6B.6.2 An Examination of Visitor Responses and their Meaning Making of the Von Hagens’ Body Worlds Exhibition
Susan Jagger, OISE/University of Toronto, s.jagger@utoronto.ca
Michelle Dubek, OISE/University of Toronto
Erminia G. Pedretti, OISE/University of Toronto

S6B.6.3 Difficult Biological Concepts in Media Coverage
Carl-Johan Rundgren, Linköping University, Sweden, carl-johan.a.rundgren@liu.se
Rundgren Shu-Nu Chang, Linköping University, Sweden
Chun-Yen Chang, National Taiwan Normal University, Taiwan
Yuen-Hsien Tseng, National Taiwan Normal University, Taiwan
S6B.6.4 Interactive Museum Workshop in Cell Biology Positively Impacts Nurses’ Knowledge of Molecular Medicine
Kathleen M. Vandiver, Massachusetts Institute of Technology, kathymv@mit.edu
Catherine Ricciardi, Massachusetts Institute of Technology
Amanda N. Gruhl, Massachusetts Institute of Technology
Robin Meisner, MIT Museum
Jonathan M. Bijur, MIT Museum
Charles Shubert, Massachusetts Institute of Technology
Ivicta Ceraj, Massachusetts Institute of Technology
Lourdes Aleman, Massachusetts Institute of Technology

S6B.6.5 Expanding the Depth of Informal Learning with Mixed Reality at Science Centers
Robb Lindgren, University of Central Florida, lindgren@mail.ucf.edu
Eileen Smith, University of Central Florida
J. Michael Moshell, University of Central Florida

Strand 7: Pre-service Science Teacher Education
S6B.7 Poster Session B
4:15pm – 5:15pm, Grand Sierra D

S6B.7.1 Evolution in Elementary Methods: A Practical Instrument Shows Attitudinal Change is Possible (but Tricky)
Bryan H. Nichols, University of South Florida, bryanhnichols@gmail.com

S6B.7.2 Analysis of Preservice Science Teachers’ Understanding of NOS and Warrants on Socioscientific Issues
Kader Bilican, Ataturk University, Erzurum, Turkey, kblaker@metu.edu.tr
Yasemin Ozdem, Gaziosmanpasa University, Tokat, Turkey

S6B.7.3 Impact of a Methods Course on Pre-Service Elementary Teachers with Negative Attitude and Low Self-Efficacy
Mahsa Kazempour, Penn State Berks, muk30@psu.edu

S6B.7.4 Prospective Elementary Teachers Enjoy Science: Orientations and Experiences that Influence their Development
Lucy Avraamidou, University of Nicosia, avraamidou.l@unic.ac.cy
Maria P. Evagorou, University of Nicosia

S6B.7.5 Understanding Aspects of Pre-service Teacher Questioning Skills
Stephanie B. Philipp, University of Louisville, stephanie.philipp@louisville.edu
Melissa L. Shirley, University of Louisville

S6B.7.6 Preservice Teachers’ Understanding and Implementation of Inquiry: Initial Findings from a Longitudinal Study
Liesl M. Hohenshell, University of Wisconsin-Whitewater, hohenshl@uww.edu

S6B.7.7 Preservice Elementary Teachers’ Learning about the Five Essential Features of Classroom Inquiry
Mandy Biggers, University of Iowa, mandy-biggers@uiowa.edu
Cory T. Forbes, University of Iowa

S6B.7.8 Student-teachers’ Primary vs. Secondary Research Influences on Socioscientific Actions
John L. Benecke, OISE, University of Toronto, larry.benecke@utoronto.ca
Erin Sperling, OISE, University of Toronto

S6B.7.9 A Tool to Measure Planning-With-Curriculum Practices of Pre-Service Elementary Science Teachers
Jennifer Cartier, University of Pittsburgh, jcartier@pitt.edu
Leslie Lancaster, University of Pittsburgh
Ellice Forman, University of Pittsburgh
Linda Deafenbaugh, University of Pittsburgh

Strand 8: In-service Science Teacher Education
S6B.8 Poster Session B
4:15pm – 5:15pm, Grand Sierra D

S6B.8.1 Impact of an Immersion Course on K-8 In-service Teachers’ Understanding of Implementing Reformed Teaching Practices
Margaret D. Nolan, Boston University, noland@mersd.org
Peter Garik, Boston University
Charles Winnrich, Boston University
Donald Derosa, Boston University
Andrew Duffy, Boston University
Manher Jariwala, Boston University
Russell Faux, Davis Square Research Associates
Nicholas Gross, Boston University
Bennett Goldberg, Boston University
Glenn Stevens, Boston University

S6B.8.2 Supporting Elementary Teachers’ Evaluation and Adaptation of Science Curriculum Materials: The PIESEC3 Professional Development Model
Cory T. Forbes, University of Iowa, cory-forbes@uiowa.edu
Kimberly Gasaway, Davenport Community Schools
Mandy Biggers, University of Iowa
Laura Zangori, University of Iowa
S6B.8.8 A Comparison of Exemplary Biology, Chemistry, Earth Science, and Physics Teachers’ Goals, Enactment, and Conceptions of Inquiry
Wayne G. Breslyn, University of Maryland, College Park, wbreslyn@yahoo.com
J. Randy McGinnis, University of Maryland, College Park

S6B.8.4 Improving Indigenous Schools: Effectiveness of a Field-based Professional Development Program in Rural Schools
Terence P. McClafferty, Curtin University, Perth, Western Australia, terry.mcclafferty@curtin.edu.au

S6B.8.5 Science Teachers’ Initial Conceptions of 21st Century Skills and Their Implementation in Grade 3-8 Classrooms
Augusto Z. Macalalag, Stevens Institute of Technology, augusto.macalalag@stevens.edu
Christian Jurado, Stevens Institute of Technology

S6B.8.6 Impact of a New Master’s Program for K-8 Teachers on Their Knowledge and Practices
Yasemin Copur, ycopur2@illinois.edu
Hatun Zengin
Barbara Hug

S6B.8.7 Using Physics Education Research Literature in Teacher Professional Development
Charles Winrich, Boston University, cwinrich@bu.edu
Peter Garik, Boston University
Margaret D. Nolan, Boston University
Yann Benétreau-Dupin, Boston University
Andrew Duffy, Boston University
Arthur Eisenkraft, University of Massachusetts - Boston
Luciana Garafayo, University of Texas - El Paso,
Department of Philosophy
Nicholas Gross, Boston University
Manher Jariwala, Boston University
Russell Faux, Davis Square Research Associates

S6B.8.8 Qualitative Indicators of Successful Induction: Case Studies of Three Beginning Secondary Science Teachers’ Induction Experiences
Angela W. Webb, University of North Carolina at Greensboro, awwebb@uncg.edu

Strand 9: Reflective Practice
S6B.9 Poster Session B
4:15pm – 5:15pm, Grand Sierra D

S6B.9.1 An Elementary School Teacher’s Reflection on Implementing Constructivist Instruction in Science Classroom
Kuo-Chung Hsu, Jhungjing Primary School, Kaoshung, Taiwan, shukuochung@hotmail.com
Jing-Ru Wang, National Pingtung University of Education, Pingtung, Taiwan

S6B.9.2 Avenues for Chemistry Teachers’ Reflection: Comparing a Video Annotation Tool to Written Journals
Youngjin Song, University of Northern Colorado, ysong@unco.edu
Steve J. Oliver, University of Georgia

Strand 10: Curriculum, Evaluation, and Assessment
S6B.10 Poster Session B
4:15pm – 5:15pm, Grand Sierra D

S6B.10.1 Multimodal Generative Learning Theory: A New Model of Evaluating Representations of Science Principles
Suzanne M. Donnelly, Longwood University, donnellysm@longwood.edu

S6B.10.2 Teaching and Learning Concepts of Scientific Evidence: A Design-based Research and Development Study
Susan Kirch, New York University, susan.kirch@nyu.edu
Kara Naidoo, New York University
Anna Stetsenko, CUNY Graduate Center
Catherine E. Milne, New York University

S6B.10.3 Pilot-testing the Astrobiology in Secondary Classrooms (ASC) Curriculum: Focusing Upon Diverse Students and Teachers
De La Rubia Leigh S. Arino, Tennessee State University Nashville, TN, leigh.arinodelarubia@gmail.com
Todd P. Gary, Tennessee State University
Susan Kuner, Topaz Canyon Group, LLC
Doug Robinson, Dragonfly Enterprises, Inc.
Judy Butler, Dragonfly Enterprises, Inc.

S6B.10.4 The Case of the Missing Sun: An Analytical View of Water Cycle Representations
Dane L. Schaffer, University of Missouri-Columbia, dlszh3@mail.missouri.edu
Lloyd H. Barrow, University of Missouri-Columbia
S6B.10.5 Persistent Student Difficulties in Understanding the Particulate Nature of Matter
David F. Treagust, Curtin University of Technology, d.treagust@curtin.edu.au
Julianne Crowley, Curtin University of Technology
Mauro Mocerino, Curtin University
A.L. Chandrasegaran, Curtin University

S6B.10.6 Computerized Formative Assessment in Secondary Science: Toward a Customised, Individualized Learner-centred Program of Learning
James F. Law, Curtin University, famlaw@xtra.co.nz
David F. Treagust, Curtin University of Technology

S6B.10.7 Students’ Alternative Conceptions About Alternative Energy
I. Poh-Ai Cheong, Universiti Brunei Darussalam, irene.cheong@ubd.edu.bn
Hih Hardimah Hj Mohd Said, Universiti Brunei Darussalam
Marlizayati Hj Johari, Universiti Brunei Darussalam
David F. Treagust, Curtin University of Technology

S6B.10.8 Students’ Understanding of Light Propagation and Visibility of Objects in Different Contexts in Singapore and Korea
Hye-Eun Chu, Nanyang Technological University, Singapore, hyeeun.z@nie.edu.sg
David F. Treagust, Curtin University of Technology
Alexander Kauertz, Weingarten University of Education

S6B.10.9 Cognitive Accessibility Levels of Turkish Level Determination Examination: Living Things and Life Learning Area
Yilmaz Kara, yilmazkaankara@yahoo.com

S6B.11 Poster Session B
4:15pm – 5:15pm, Grand Sierra D

S6B.11.1 Re-presenting Gender Differences in Science Achievement
Kathryn Scantlebury, University of Delaware, kscantle@udel.edu
Jane Kahle, Miami University
Yue Li, Miami University
Constance Blasie, University of Pennsylvania

S6B.11.2 Equitable Written Assessments for English Language Learners: How Scaffolding Helps
Somnath Sinha, University of Missouri, ssq9@mail.mizzou.edu
Marcelle A. Siegel, University of Missouri
Deepika Menon, University of Missouri
Nattida Promyod, University of Iowa
Cathy Wissehr, University of Arkansas
Kristy L. Halverson, University of Southern Mississippi

S6B.11.3 The Influence of Teacher-Scientist Partnerships on Urban Middle School Students’ Science Learner Characteristics
Rommel J. Miranda, Towson University, Rminarda@towson.edu

S6B.11.4 How Do Minorities within the Minority Identify with Science and Engineering? A Focus on Middle School Students’ Identity Negotiations Regarding Science
Kristen Molyneaux, University of Wisconsin, Madison, molyneaux@magnet.fsu.edu
Roxanne Hughes, Florida State University/National High Magnetic Field Laboratory

S6B.11.5 How Parent and Child Gender Influences Children’s Attitudes and Problem Solving Skills in Science
Susannah K. Sandrin, Arizona State University, Susannah.Sandrin@asu.edu
Katherine J. Short-Meyerson, University of Wisconsin - Oshkosh

Matthew Weinstein, University of Washington-Tacoma, mattheww@u.washington.edu

S6B.11.7 Effect of Culture on High-School Students’ Question-Asking Ability Resulting from an Inquiry-Oriented Chemistry Laboratory
Iyad M. Dkeidek, Weizmann Institute of Science, iyad.dkeidek@weizmann.ac.il
Rachel Mamlok-Naaman, Weizmann Institute of Science
Avi Hofstein, Weizmann Institute of Science

S6B.11.8 Collaborating to Transform Urban Science Education: Theory and Methods
Kenneth G. Tobin, CUNY, ktobin@gc.cuny.edu
Strand 12: Educational Technology
S6B.12 Poster Session B
4:15pm – 5:15pm, Grand Sierra D

S6B.12.1 Analysis of Greenhouse Effect Simulation Implementation in 8th Grade Science Course
Edward C. Cohen, Rutgers University, ecohen@pway.org
Timothy Zimmerman, Rutgers University

S6B.12.2 Children Learning Technological Design and Engaging in Problem Solving with an ALERT Robot
Katherine Nilsen, University of California, Santa Barbara, knilsen@education.ucsb.edu
Danielle B. Harlow, University of California, Santa Barbara

S6B.12.3 Leveraging on Interactive Animation to Facilitate Student Science-Process Skill Learning
Yu-Ta Chien, National Taiwan Normal University, Taipei, Taiwan, danmg0722@yahoo.com.tw
Chun-Yen Chang, National Taiwan Normal University, Taipei, Taiwan

S6B.12.4 Prediction and Explanation as Design Mechanics in Conceptually-Integrated Digital Games to Help Players Articulate the Tacit Understandings they Build Through Gameplay
Douglas B. Clark, Vanderbilt University, doug.clark@vanderbilt.edu
Mario Martinez-Garza, Vanderbilt University
Brian C. Nelson, Arizona State University
Kent J. Slack, Arizona State University
Cynthia M. D’Angelo, University of Wisconsin

Strand 13: History, Philosophy, and Sociology of Science
S6B.13 Poster Session B
4:15pm – 5:15pm, Grand Sierra D

S6B.13.1 The Nature of Scientific Laws in Biology and Chemistry: Implications for Science Curriculum and Instruction
Zoubeida R. Dagher, University of Delaware, zoubeida@udel.edu
Sibel Erduran, University of Bristol

S6B.13.2 Cross-Cultural Epistemological Orientations to Socioscientific Issues
Dana L. Zeidler, University of South Florida, USA, zeidler@usf.edu
Mitch Ruzek, University of South Florida, USA
Wardell A. Powell, University of South Florida, USA
Jeff Orasky, University of South Florida, USA
Scott Applebaum, Palm Harbor University High School, USA
Chi-Chin Chin, National Taichung University, Taiwan
Shu-Sheng Lin, National Chiayi University, Taiwan
Cedric Linder, Uppsala University, Sweden & University of the Western Cape, South Africa
Anne Linder, Uppsala University, Sweden
Mark Herbert, University of the Western Cape, South Africa

Strand 14: Environmental Education
S6B.14 Poster Session B
4:15pm – 5:15pm, Grand Sierra D

S6B.14.1 Crafting a Balanced Message: Negotiating the Values and Goals of Climate Scientists Engaged in Outreach
Elizabeth M. Walsh, University of Washington College of Education, ewalsh2@u.washington.edu
Philip Bell, University of Washington College of Education

S6B.14.2 Families Visiting an Environmental Center: Understanding Ecological Relationships
Heather Toomey Zimmerman, Pennsylvania State University, heather@psu.edu
Lucy R. Mcclain, Pennsylvania State University
Li-Chun Wang, Pennsylvania State University
Sameer Honwad, Rutgers, The State University of New Jersey

S6B.14.3 Embedding Education for Sustainability into Pre-Service Primary Teacher Education
Lyn C. Carter, Australian Catholic University, lyn.carter@acu.edu.au
Caroline J. Smith
Phil C. Clarkson

S6B.14.4 Girls and Going Green: Adolescent Girls and Their Understandings of Environmental Issues
Kimberly A. Haverkos, Miami University, haverkka@muohio.edu
Nazan U. Bautista, Miami University

S6B.14.5 Development of an Urban Environmental and Geoscience Place-based Curriculum Using Cogenerative Dialogue
Amy E. Defelice, City University of New York Graduate Center & Brooklyn Academy of Science and the Environment, amyferguson3@hotmail.com
Jennifer D. Adams, Brooklyn College-CUNY
Ishmael Akahoho, Brooklyn Academy of Science and the Environment
Strand 15: Policy
S6B.15 Poster Session B
4:15pm – 5:15pm, Grand Sierra D

S6B.15.1 Whose Nature is It?: Exploring The Nature of Engineering in Science Education
Catherine M. Koehler, Illinois Institute of Technology, ckoehler@iit.edu

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

Evening/Social Events

Membership and Elections Committee
Sponsored Session
Graduate Student Forum
The Graduate Student Forum aims to guide and encourage beginning researchers by discussing 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 – 6:30pm, Grand Sierra F
Jomo W. Mutegi, Indiana University, Indianapolis, jmutegi@iupui.edu
Kathryn F. Drago, University of Michigan

JRST Editorial Board Meeting/Reception
Meeting open/Reception by invitation
6:30pm – 8:30pm, Grand Sierra G & H

Graduate Student and Early Career Scholars
Informal Social
6:30pm – 7:30pm, Poolside
Committee Meetings
7:00am – 8:15am

NARST Outstanding Paper Award Committee Selection Meeting
7:00am - 8:15am, Curacao 1

Outstanding Doctoral Research Award Selection Committee Meeting
7:00am - 8:15am, Bonaire 1

JRSST Award Selection Committee Meeting
7:00am - 8:15am, Bonaire 2

Early Career Research Award Selection Committee Meeting
7:00am - 8:15am, Bonaire 3

Distinguished Contributions in Research Award Committee Meeting
7:00am - 8:15am, Bonaire 4

Equity and Ethics Committee Meeting
7:00am – 8:15am, Curacao 2

External Policy and Relations Committee Meeting
7:00am – 8:15am, Curacao 3

Research Committee Meeting
7:00am – 8:15am, Curacao 4

Membership and Election Committee Meeting
7:00am – 8:15am, Curacao 5

International Committee Meeting
7:00am – 8:15am, Curacao 6

Program Committee Meeting
7:00am – 8:15am, Curacao 7

Publications Advisory Committee Meeting
7:00am – 8:15am, Curacao 8

Concurrent Session #7
8:30am – 10:00am

The Equity and Ethics Committee Sponsored Session
S7.1 Jhumki Basu Scholars Symposium: Global Sustainability and Public Understanding of Science -- The Role of Science Education in the International Community
8:30am – 10:00am, Antigua 1

Presider:
Mamta Singh, Martin University

Discussant:
Lisa Martin-Hansen, Georgia State University

Presenters:
Tapati Sen, Arizona State University
Ashraf Shady, Queens College, CUNY
Reizelle Barreto-Espino, Towson University

Strand 1: Science Learning, Understanding and Conceptual Change
S7.2 Interventions Supporting Student Learning in the Physical Sciences
8:30am – 10:00am, Curacao 1

Presider:
Shulamit Kapon, University of California Berkeley

S7.2.1 Comparing the Effects of Sequencing of Physical and Virtual Manipulatives on Student Learning and Confidence
Adrian Carmichael, Kansas State University, carmichaelam@gmail.com
Jacquelyn J. Chini, Kansas State University
Elizabeth Gire, University of Memphis
N. Sanjay Rebello, Kansas State University
Sadhana Puntambekar, University of Wisconsin, Madison

S7.2.2 The Effect of Metaconceptual Teaching Activities on High School Students’ Understanding of States of Matter
Zubeyde Demet Kirbulut, Middle East Technical University, kirbulut@metu.edu.tr
Omer Geban, Middle East Technical University

S7.2.3 Progressions of Students’ Mental Models of Magnetism
David Sederberg, Purdue University, dsederbe@purdue.edu
Anna-Leena Latvalla, University of Jyväskylä
Anssi Lindell, University of Jyväskylä
Lynn A. Bryan, Purdue University
Jouni Viiri, University of Jyväskylä
S7.2.4 Comparing Benefits of Hypertext Exploration versus Virtual Experimentation on Students’ Analysis of Physical Experiments
Jacquelyn J. Chini, Kansas State University, jackiehaynicz@gmail.com
Adrian Carmichael, Kansas State University
Elizabeth Gire, University of Memphis
N. Sanjay Rebello, Kansas State University
Sadhana Puntambekar, University of Wisconsin, Madison

Strand 1: Science Learning, Understanding and Conceptual Change
S7.3 Symposium - Learning Progressions - German and Swiss Studies on Models of Competence Development
8:30am – 10:00am, Bonaire 4
Presider: Reinders Duit, IPN Kiel
Discussant: Joseph S. Krajcik, University of Michigan
Presenters:
Sascha Bernholt, IPN Kiel
Ilka Parchmann, IPN Kiel
Knut Neumann, IPN Kiel
Hans E. Fischer, University Duisburg-Essen
Andrea Möller, University of Vechta
Jürgen Mayer, University of Kassel
Susanne Metzger, Zurich University of Teacher Education
Peter Labudde, University of Applied Sciences Northwestern Switzerland

S7.4 Exploring Varying Approaches to Inquiry
8:30am – 10:00am, Curacao 2
Presider: Georgia W. Hodges, University of Georgia

S7.4.1 Models of Students Learning in Different Inquiry Settings Influenced by Teachers PCK
Klaara Kask, researcher, PhD, klaara.kask@ut.ee
Mia Rannikmäe, professor
Jack Holbrook, professor

S7.4.2 The Separation of Lab and Class in Middle School Science
Phillip M. Stewart, Teachers College, Columbia University, pms2127@columbia.edu
Ann E. Rivet, Teachers College, Columbia University
Alissa Berg, Teachers College, Columbia University

S7.4.3 Guided Inquiry as Appropriate Instructional and Learning Method for Science Knowledge Retention in Elementary Students
Bhaskar Upadhyay, University of Minnesota, bhaskar@umn.edu
Kristina Maruyama-Tank, University of Minnesota
Brian Fortney

S7.4.4 The Effects and Moderators of Inquiry-Based Instruction in Taiwan - A Meta-Analysis
Jing-Ru Wang, National Pingtung University of Education, mail100@mail.npue.edu.tw
Sheau-Wen Lin, National Pingtung University of Education
Huey-Lien Kao, National Pingtung University of Education
Kuo-Chung Shu, Chuang Ching Elementary School
Hsin-Jung Tai, Chung Hsiao Elementary School

Strand 2: Science Learning: Contexts, Characteristics and Interactions
S7.5 Symposium - Young People’s Engagement in Scientific Argumentation: The Importance of Context, Curriculum, and Developmentally Appropriate Expectations
8:30am – 10:00am, Bonaire 8
Discussant: Brian J. Reiser, Northwestern University
Presenters:
Tiffany R. Lee, University of Washington, tlee13@u.washington.edu
Kari Shutt, University of Washington
Giovanna Scalone, University of Washington
Leah A. Bricker, University of Washington
Nancy Vye, University of Washington
John D. Bransford, University of Washington
Philip Bell, University of Washington
Nancy L. Salgado, University of Washington

Strand 3: Science Teaching—Primary School (Grades preK-6): Characteristics and Strategies
S7.6 Building Scientific Explanations
8:30am – 10:00am, Curacao 3
Presider: Rogers Meredith A. Park, Indiana University

S7.6.1 Elementary Students’ Enhanced Epistemic Understanding through the Appropriation of Argumentation Norms
Suna Ryu, UCLA, sunaryu@ucla.edu

S7.6.2 Explaining Explanations: Teachers’ Verbal Scaffolds Associated with Three Elementary Grades Students’ Building of Scientific Explanation
Nancy B. Songer, University of Michigan, songer@umich.edu
Ashima Mathur, University of Michigan
Sarah Fick, University of Michigan

S7.6.3 Students’ Negotiation of Claims and Evidence Through Online and In-Class Discussions
Aeran Choi, Kent State University, aeran-choi@hotmail.com
Brian M. Hand, University of Iowa
Lori A. Norton-Meier, University of Louisville
S7.6.4 A Comparison of Teaching Strategies for Promoting Argumentation in Elementary Science
Elizabeth Redman, University of California, Los Angeles, elizabeth.redman@gmail.com
William A. Sandoval, University of California, Los Angeles
Noel Enyedy, University of California, Los Angeles

Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies
S7.7 Knowledge and Strategies for the Life Sciences
8:30am – 10:00am, Curacao 4
President: Toth Eva Erdosne, West Virginia University

S7.7.1 Teaching About Behaviour: Beyond Choice Chambers
Jenny Lewis, CSSME, University of Leeds, j.m.lewis@education.leeds.ac.uk
Indira C. Banner, CSSME, University of Leeds

S7.7.2 Mapping Out the Integration of the Components of Pedagogical Content Knowledge (PCK) for Teaching Photosynthesis and Heredity
Soonhye Park, University of Iowa, soonhye-park@uiowa.edu
Ying-Chih Chen, University of Iowa

S7.7.3 A Beginning Biology Teacher’s 3-Year Journey in Learning to Teach Natural Selection through Inquiry
Aaron J. Sickel, University of Missouri, ajsrhc@mail.missouri.edu
Patricia M. Friedrichsen, University of Missouri

S7.7.4 A Regional Study of the Prevalence of Biological Evolution-related Misconceptions in Secondary School Biology Teachers
Tony B. Yates, Oklahoma Baptist University, tony.yates@okbu.edu
Edmund A. Marek, University of Oklahoma

S7.8.1 Measuring and Replicating Science and Mathematics Faculty Perceptions of Traditional and Reformed Teaching and Learning Practices over Time
Chad Ellett, CDE Research Associates, Inc., cderesearch@att.net
Abdulkadir Demir, Georgia State University
Chad Ellett, Georgia State University
Judith Monsaas, University System of Georgia
Judy Awong-Taylor, Georgia Gwinnett College
Nancy Vandergrift, University of Georgia
Chuck Kutal, University of Georgia

Strand 5: College Science Teaching and Learning (Grades 13-20)
S7.8 Faculty & Instructor Professional Development
8:30am – 10:00am, Curacao 5
Presider: Abdulkadir Demir, Georgia State University

S7.8.2 The Impact of Disciplinary Teaching and Learning Center Activities on Faculty Professional Development
Gili Marbach-Ad, University of Maryland, glim@umd.edu
Kathryn L. Schaefer, University of Maryland
Katerina V. Thompson, University of Maryland

S7.8.3 Defining the Readiness of High School Students to Pursue First Year University Physics
Unmesh D. Ramnanin, University of Johannesburg, uramnanin@uj.ac.za

Strand 6: Science Learning in Informal Contexts
S7.9 Tell Me a Story: Using Narratives in Informal Science Education
8:30am – 10:00am, Curacao 6
Presider: John H. Falk, Oregon State University

S7.9.1 Pupils’ Responses to Cues from the Natural World: Studies in Two cultures Using Multiple Analytic Perspectives
Sue Tunnicliffe, University of London, lady.tunnicliffe@me.com
Michael J. Reiss, University of London
Carol Boulter, University of London
Sandra Selles, Universidade Federal Fluminense, Rio de Janeiro

S7.9.2 Using Stories to Scaffold Students in Science Centers
Mai Murmann, Copenhagen University, mai@experimentarium.dk

S7.9.3 Changes in Scientific Attitudes and Beliefs by Participants in an Astronomy Citizen Science Project
Aaron Price, AAVSO/Tufts University, aaronp@aaovo.org
Hee-Sun Lee, Tufts University
S7.9.4 Beyond Earth: Fostering Native Science Knowledge at Multiple Cultural/Geographical Sites in Informal Settings
Tim R. Young, University of North Dakota, tim.young@und.edu
Mark Guy, University of North Dakota
Kerry Hartman, Fort Berthold Community College
Randy Phelan, Fort Berthold Community College
Kathy Froelich, Sitting Bull College
Linda Different Cloud-Jones, Sitting Bull College

Strand 7: Pre-service Science Teacher Education
S7.10 Preservice Teacher Self-Efficacy
8:30am – 10:00am, Curacao 7

S7.10.1 Preservice Teachers’ Sentiments, Attitudes, Concerns and Self-Efficacy about Inclusive Education: Validation of SACIE Scale
Mustafa Cansiz, Artvin Coruh University, mustafacansiz@gmail.com
Nurcan Turker, Ataturk University

S7.10.2 How Would they Know? Developing Elementary Preservice Teachers
Tina J. Cartwright, Marshall University, johnson516@marshall.edu
Suzi Smith, Marshall University

S7.10.3 Correlates of Elementary Preservice Teachers’ Science Teaching Efficacy Beliefs
Pamela Cantrell, Brigham Young University, pamela_cantrell@byu.edu
James A. Cantrell, Utah Valley University
Michael R. Patch, Utah Valley University

S7.11 Topics in Science, Technology, Society, and the Environment
8:30am – 10:00am, Bonaire 7

S7.11.1 Impact of an STS-Oriented Methods Course on Prospective Teachers’ Level of Environmental Literacy
Aidin Amirshokoohi, Fairfield University, aamirshokoohi@fairfield.edu

S7.11.2 An Exploration of Preservice Science Teachers’ Written Argumentation about the Global Climate Change Issue
Dilek Karisan, Yuzuncu Yil University, dilekkarisan@gmail.com
Mustafa S. Topecu, Yuzuncu Yil University

S7.12 Related Paper Set - Professional Development Models to Support Teachers to Teach Nature of Science and Inquiry
8:30am – 10:00am, Curacao 8

S7.12.1 Project ICAN: A Program to Enhance Teachers and Students’ Understandings of Nature of Science and Scientific Inquiry
Norman Lederman, Illinois Institute of Technology
Judity Lederman, Illinois Institute of Technology

S7.12.2 Project Guided Inquiry: Effect of Guided Inquiry and Traditional Instruction on Student Understanding of Chemistry Concepts and Science as Inquiry in High Schools
Anil C. Banerjee, Columbus State University

S7.12.3 Teacher Professional Development through Student-Teacher-Scientist Partnerships
Ana Houseal, University of Illinois at Urbana Champaign
Fouad Abel-El-Khaliek, University of Illinois at Urbana Champaign

S7.12.4 Engaging Teachers in Authentic Science Research: What Impacts Classroom Practice?
Renee’ Schwartz, Western Michigan University

S7.13 Teacher Learning through Reflection
8:30am – 10:00am, Bonaire 6

S7.13.1 How does Reflection on Inquiry and Practice-teaching Result in Changes in Teacher Pedagogical Theories?
Ralph E. Spraker, South University, rspraker@southuniversity.edu
Christine Lotter, University of South Carolina
Gregory R. Rushton, Kennesaw State University
S7.13.2 Teachers’ Perspectives of Professional Learning Communities in the Schools
Sarah W. Robert, North Carolina State University, sarahwrobert@gmail.com
M. Gail Jones, North Carolina State University
Laura E. Robertson, North Carolina State University

S7.13.3 Developing Preservice Science Teachers in Video-Centered Communities of Practice
Ron Tinsley, Richard Stockton College of New Jersey, ron.tinsley@stockton.edu
Kimberly Lebak, Richard Stockton College of New Jersey

S7.13.4 Helping Preservice Teachers Find Meaningful Engagement in Scientific Inquiry: A Self-study of Relational Teacher Education
Amy Trauth-Nare, Indiana University Bloomington, amtrauth@indiana.edu
Gayle A. Buck, Indiana University Bloomington
Nicolette Beeman-Cadwallader, Indiana University Bloomington

S7.14 Selecting Evolution
8:30am – 10:00am, Bonaire 1
Presider:
Mehmet Aydeniz, The University of Tennessee

Minsu Ha, The Ohio State University, ha.101@osu.edu
Ross H. Nehm, The Ohio State University

S7.14.2 Design and Research of an Evolution and Medicine High School Curriculum Intervention
Paul M. Beardsley, BSCS, pbeardsley@bscs.org
Molly A.M. Stuhlsatz, BSCS
Mark Bloom, BSCS
Anne L. Westbrook, BSCS
Rebecca A. Kruse, BSCS

S7.14.3 A Conceptual Analysis of the Conceptual Inventory of Natural Selection: Improving Diagnostic Utility through within Item Analysis
Erin Marie Furtak, University of Colorado at Boulder, erin.furtak@colorado.edu
Deborah L. Morrison, University of Colorado at Boulder
Heidi Iverson, University of Colorado at Boulder
Michael J. Ross, University of Colorado at Boulder

S7.14.4 Assessing Middle and High School Students’ Understanding of Evolution with Standards-based Items
Jean C. Flanagan, AAAS Project 2061, jflanaga@aaas.org
Jo Ellen Roseman, AAAS Project 2061

S7.15 Persistence and Success in the STEM Pipeline
8:30am – 10:00am, Bonaire 2
Presider:
Gillian U. Bayne, Lehman College of the City University of New York

S7.15.1 Evaluating an Intervention to Support Undergraduate Women in STEM Majors
Barbara A. Burke, California State Polytechnic University, Pomona, baburke@csupomona.edu
Dennis W. Sunal, University of Alabama, Tuscaloosa
Cynthia V. Sunal, University of Alabama, Tuscaloosa

S7.15.2 The Current Influences on Women’s Persistence in STEM fields at the Undergraduate Level
Roxanne Hughes, Florida State University/National High Magnetic Field Laboratory, hughes@magnet.fsu.edu

S7.15.3 STEM Graduate Students’ Multiple Identities: How Can I Be Me and Be a Scientist?
Josephine A. Gasiewski, UCLA, joski@ucla.edu
Minh C. Tran, UCLA
Felisha Herrera, UCLA

S7.15.4 A Survey of the Scientific Epistemological Views of College Students: Assessing the Impact of an Implicit Curriculum in Science Education
Leigh S. Arino De La Rubia, Tennessee State University Nashville, leigh.arinodelarubia@gmail.com
John Mark Hunter, Tennessee State University Nashville

S7.16 Modeling and Video Tools in Science Education
8:30am – 10:00am, Bonaire 3
Presider:
Jacqueline McLaughlin, The Pennsylvania State University

S7.16.1 A Study of Modeling-based Teaching with Computer Simulation Inquiry
Jen-Chin Lin, National Kaohsiung Normal University, Taiwan, jclin@nknu.dcs.nknu.edu.tw
Jeng-Fung Hung, National Kaohsiung Normal University, Taiwan
S7.16.2 I just Want to Make It Work: Examining Students' Programming Actions Impeding Productive Model-based Inquiry
Lin Xiang, School of Education, University of California, Davis, lixiang@ucdavis.edu
Cynthia Passmore, School of Education, University of California, Davis

S7.16.3 Practicality in Virtuality: Finding Student Meaning in Video Game Education.
Timothy M. Barko, University of Florida, tim.barko@ufl.edu
Troy D. Sadler, University of Florida

S7.16.4 Investigating the Role of Video to Support Student Understanding of the Nature of Scientific Work
Kasey McCall, University of Michigan, kaseyl@umich.edu
Leeann M. Sutherland, University of Michigan
Namsoo Shin, University of Michigan

Strand 14: Environmental Education
S7.17 Sociocultural Perspectives in Environmental Education
8:30am – 10:00am, Bonaire 5
Presider: Heather Toomey Zimmerman, Pennsylvania State University

S7.17.1 Using Informal Reasoning to Consider Trade-offs and Resolve Dilemmas
Meena M. Balgopal, Colorado State University, Meena.Balgopal@colostate.edu
Alison M. Wallace, Minnesota State University Moorhead
Steve Dahlberg, White Earth Tribal and Community College

S7.17.2 Same Curriculum - Different Cultures: Same Knowledge and Attitudes Concerning Socio-scientific Issues?
Aviva Kliger, Beit Berl Academic College, aviva@yavin-yeda.com
Tili Wagner, Beit Berl Academic College
Alon Fragman, Beit Berl Academic College

S7.17.3 A Sociocultural Investigation of the Goals for the Environmental Science Course: Teacher and Student Perspectives
Erica Blatt, College of Staten Island, erica.blatt@unh.edu

Strand 15: Policy
S7.18 Standards and Accountability for Science Teaching
8:30am – 10:00am, Antigua 2
Presider: Todd L. Hutner, The University of Texas at Austin

S7.18.1 Science Standard Specificity and the Increasing Targets of Formative Assessments in High School Chemistry
Carlos C. Ayala, Sonoma State University, carlos.ayala@sonoma.edu
Andrea Chase, Sonoma State University

S7.18.2 The Scientific Theory of... Lessons Learned from Florida’s 2008 Science Standards Adoption
Lance E. King, Florida State University, king@bio.fsu.edu
Sherry A. Southerland, Florida State University

S7.18.3 The Accountability Variable: Science Achievement and Differing Methods of Accountability in the United States
Eugene Judson, Eugene.Judson@asu.edu

Break
10:00am – 10:30am

PL2 Plenary Session #2
10:30am – 12:00pm, Grand Sierra E
Human Identity & Environmental Challenges
Presider: J. Randy McGinnis, University of Maryland
Keynote Presenter: Tim Kasser, Knox College

Awards Luncheon
12:00pm – 2:00pm, Grand Sierra Hall F, G, H, & I

Concurrent Session #8
2:15pm – 3:45pm
Equity and Ethics Sponsored Session
S8.1 Symposium - Thinking Globally, Acting Locally – Initiatives to Improve Science Learning for All
2:15pm – 3:45pm, Antigua 1
Presider: Sumi Hagiwara, Montclair State University
Presenters:
Nirmala Ramlakhan, University of Central Florida
Mika Munakata, Montclair State University
Ken Wolff, Montclair State University
Mary Lou West, Montclair State University
Judith Lombana, Museum of Science and Industry, Tampa, Florida
Doris Ash, University of California, Santa Cruz
Jrene Rahm, Universes de Montreal
Strand 1: Science Learning, Understanding and Conceptual Change
S8.2 Uncovering Students’ Ideas in Science
2:15pm – 3:45pm, Curacao 1
Presider:
David F. Treagust, Curtin University

S8.2.1 U.S. and Colombian Students’ Conceptions about Effects of Global Warming on Animals: A Cross-Cultural Study
Ingrid M. Sanchez, University of Michigan School of Education, ingridsas@umich.edu

S8.2.2 Consistency of Students’ Ideas about the Concept of Rate across Different Contexts
Behzat Bektasli, Hacettepe University, belizbektasli@gmail.com
Gultekin Cakmakci, Hacettepe University

S8.2.3 Applying Cognitive Science to Assessment of Evolution Education
John E. Opfer, The Ohio State University, opfer.7@osu.edu
Ross H. Nehm, The Ohio State University
Judith S. Ridgway, The Ohio State University
Katherine Mollohan, The Ohio State University
Elizabeth Perrin, The Ohio State University

S8.2.4 The Earth as a Cosmic Body: Conceptual Understandings and Spatial Ability of Elementary/Middle Preservice Teachers
Alice (Jill) A. Black, Missouri State University, ablack@missouristate.edu

Strand 2: Science Learning: Contexts, Characteristics and Interactions
S8.3 Argumentation and Reasoning
2:15pm – 3:45pm, Curacao 2
Presider:
Vincent Amodeo, University at Albany

S8.3.1 Embodied Experiences as a Resource for Children’s Mechanistic and Mathematical Reasoning in an Engineering Curriculum
Molly S. Bolger, Vanderbilt University, molly.bolger@vanderbilt.edu
Paul J. Weinberg, Vanderbilt University
Marta A. Kobiela, Vanderbilt University
Robert J. Rouse, Vanderbilt University
Richard Lehrer, Vanderbilt University

S8.3.2 Seeing the Invisible: Body Semiotics of Knowing and Learning Science/Mathematics
Sungwon Hwang, Nanyang Technological University, Singapore, sungwonhwang@nie.edu.sg
Michael Wolff-Roth, University of Victoria, Canada

S8.3.3 Trends in Research on Argumentation: Content Analysis of Science Education Journals
Sibel Erduran, University of Bristol, United Kingdom, Sibel.Erduran@bristol.ac.uk
Yasemin Ozdem, Middle East Technical University, Turkey
Jee Young Park, Seoul National University, Korea

S8.3.4 Understanding the Challenges Faced by 6th Grade Turkish Science Students While Developing Written Arguments
Fatma Caner, canerfatma@gmail.com
Mehmet Aydeniz

Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies
S8.4 Related Paper Set - Teaching Evolution to Young Children: Rethinking Pedagogy and Possible Understandings
2:15pm – 3:45pm, Curacao 3
Presider:
Kathleen E. Metz, University of California, Berkeley

S8.4.1 Instruction and Student Outcomes Through the Lens Of Pedagogical Design Principles and Learning Progression
Kathleen E. Metz, University of California, Berkeley

S8.4.2 So What Happens in the Classroom? Analysis of a Prototype Activity Structures to Support Reasoning About Natural Selection
Stephanie Sisk-Hilton, San Francisco State University
Eric Berson, University of California, Berkeley

S8.4.3 Iterative Design of Visual Representations to Support Young Children
Nicole Wong, University of California, Berkeley

S8.4.4 Teleological, Personification, and Essence-Transformationist Challenges: Impact of the Instruction on Children
Uyen Ly, University of California, Berkeley

Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies
S8.5 Scientific Inquiry in the Classroom and the Field
2:15pm – 3:45pm, Curacao 4
Presider:
Jaimie Miller-Friedmann, Harvard University
S8.5.1 Inquiry based Science and Technology Enrichment Program for Female Middle School Students
Hanna Kim, DePaul University, hkim13@depaul.edu

S8.5.2 Linking Pedagogy to Practice: Improving Student Motivation and Academic Performance in STEM Courses Through Inquiry-Based Instruction
Amanda D. Wimpey, Palmetto High School Mathematics, WimpeyM@anderson1.k12.sc.us
Lisa C. Benson, Clemson University
Carol H. Wade, Clemson University

S8.5.3 Using Discrepant Events as Science Demonstrations to Promote Engagement and Develop Meaningful Student-Led Inquiry Investigations
Vincent Mancuso, Brighton Central School District-Rochester, NY, vince_mancuso@bcasd.org

S8.5.4 Teaching and Learning in the Urban Wild: Teachers Leading Field Investigations with Secondary School Students
Amanda P. Jaksha, University of Arizona, College of Education, ajaksha@email.arizona.edu
Christopher J. Harris, Center for Technology in Learning, SRI International

S8.6 Collaborative Learning in College Science Courses
2:15pm – 3:45pm, Curacao 5

S8.6.1 Student Interactions and Approaches to Studying in Self-Formed Study Groups
Karen Christian, University of Arizona, christik@email.arizona.edu
Vincente Talanquer, University of Arizona

S8.6.2 The Effect of Collaborative Group Testing on the Performance and Perceptions of Students in a Biotechnology Course for Non-Majors
Tina M. Roberts, University of Missouri, robertsti@missouri.edu
Carina M. Rebello, University of Missouri
Stephen B. Witzig, University of Missouri
Marcelle A. Siegel, University of Missouri
Sharyn K. Freyermuth, University of Missouri
Kemal Izci, University of Missouri

S8.6.3 Collaborative Activities, Discourse and Self-Reported Learning of Students Working on Ill-Structured Capstone Projects
Nasser M. Juma, Kansas State University, mhuninas@phys.ksu.edu
Elizabeth Gire, University of Memphis
Brian Washburn, Kansas State University
Kristan Corwin, Kansas State University
N. Sanjay Rebello, Kansas State University

S8.6.4 Self-Directed Learner Development Through Project-Based Learning Environment: A Comparative Study of Engineering and Physics Courses
Jennifer A. Simonovich, F. W. Olin College of Engineering, jennifer.simonovich@students.olin.edu
Emily Towers, F. W. Olin College of Engineering
Yevgeniya V. Zastavker, F. W. Olin College of Engineering

S8.7 Towards Increased Understanding of Epistemology and Cognition in Informal Science Education
2:15pm – 3:45pm, Curacao 6

S8.7.1 Shooting Stars and Matching Games: Audiences’ Understanding of Scientific Terms and Concepts in a Planetarium
Jean Creighton, University of Wisconsin-Milwaukee Planetarium, jean@gravity.phys.uwm.edu
Sandra T. Martell, University of Wisconsin

S8.7.2 Socio-Cognitive Scaffolding in the Studio: Informal STEM Learning and Identity
Carol B. Brandt, Virginia Polytechnic Institute and State University, cbbrandt@vt.edu
Andrea Motto, Virginia Polytechnic Institute and State University
Christine Schnitka, University of Kentucky
Michael A. Evans, Virginia Polytechnic Institute and State University
Brett D. Jones, Virginia Polytechnic Institute and State University

S8.7.3 The Development and Use of a Concept Mapping Assessment Tool with Young Children on Family Visits to a Live Butterfly Exhibit
Jennifer Mesa, University of Florida, uloa@ufl.edu
Linda Cronin-Jones, University of Florida

S8.7.4 Learning in an Informal Context: An Epistemological Perspective
Marshall Karen Benn, Professor, karen.marshall@montgomerycollege.edu
Strand 7: Pre-service Science Teacher Education
S8.8 Elements of Science Content and Methods Courses
2:15pm – 3:45pm, Curacao 7

Presider:
Deborah C. Smith, The Pennsylvania State University

S8.8.1 Unpacking what Makes an Elementary Science Methods Course Practice-oriented
Ashima Mathur, University of Michigan, amath@umich.edu

S8.8.2 Idealization versus Reality in Elementary Science Methods Instruction: A Statewide Analysis
Carole K. Lee, University of Maine Farmington, yuen11222@hotmail.com
William F. McComas, University of Arkansas

S8.8.3 A Study on a Metacognitively Oriented Learning Environment in a Science Laboratory Course
Birgul Cakir, Agri Ibrahim Cecen University Middle East Technical University, cbirgul@metu.edu.tr
Hanimde Ertepinar, Middle East Technical University
Ozgul Yilmaz-Tuzun, Middle East Technical University

Strand 7: Pre-service Science Teacher Education
S8.9 Topic-Specific Content Knowledge and Pedagogical Content Knowledge
2:15pm – 3:45pm, Bonaire 7

Presider:
Eunmi Lee, DePaul University

S8.9.1 Exploring the Pre-Service Science and Technology Teachers’ Technological Pedagogical Content Knowledge (TPCK) and Classroom Practices Involving the Topic of Photosynthesis and Cellular Respiration
Zehra Kaya, Firat University, Elazig-Turkey, sualpk@yahoo.com
Osman N. Kaya, Firat University, Elazig-Turkey
Omer Yilayaz, Firat University, Elazig-Turkey
Selcuk Aydemir, Firat University, Elazig-Turkey
Didem Karakaya, Firat University, Elazig-Turkey

S8.9.2 Development of Pre-service Chemistry Teachers’ Pedagogical Content Knowledge for Teaching Nature of Science
Betul Demirdogen, Zonguldak Karaelmas University, dbetul@metu.edu.tr
Esen Uzuntiryaki, Middle East Technical University

S8.9.3 Pre-service Elementary Teachers’ Misconceptions about Change and Constancy
Charlotte A. Otto, University of Michigan-Dearborn, cotto@umich.edu
Susan A. Everett, University of Michigan-Dearborn

Strand 8: In-service Science Teacher Education
S8.10 Collaboration and Mentoring
2:15pm – 3:45pm, Curacao 8

Presider:
Toth Eva Erdosne, West Virginia University

S8.10.1 Addressing Elementary Teacher Misconceptions in Science and Supporting Peer Learning through Curriculum Mapping
Michael Giamellaro, University of Colorado, Denver, michael.giamellaro@email.ucdenver.edu
Ruíz-Primo Maria Araceli, University of Colorado, Denver
Min Li, University of Washington, Seattle
Ming-Chih Lan, University of Washington, Seattle

S8.10.2 Science Teacher Induction and Student Achievement in Science: Is There a Link?
Toni Ivey, Oklahoma State University, toni.ivey@okstate.edu
Carol L. Stuessy, Texas A&M University
Dane Bozeman, Texas A&M University
Tori Hollas, Texas A&M University

S8.10.3 Revisiting Vygotsky’s Zone of Proximal Development in the context of In-service Science Teacher Education
Colette Murphy, Queen's University Belfast, c.a.murphy@qub.ac.uk
Kathryn Scantlebury, University of Delaware

Strand 8: In-service Science Teacher Education
S8.11 Teaching in Multicultural Settings
2:15pm – 3:45pm, Bonaire 8

Presider:
Cynthia Passmore, University of California, Davis

S8.11.1 The Road to Culturally Relevant Science: Exploring How Teachers Navigate Change in Pedagogy
Carla C. Johnson, University of Cincinnati, carla.johnson@uc.edu
Virginia Jennings, Utah State University
Tammy Miller, University of Cincinnati

S8.11.2 Job-embedded Professional Development for Urban Elementary Teachers: Lessons Learned from Year One of a Multi-year School-university Partnership
Jeffrey C. Nordine, Trinity University, jnordine@trinity.edu
Patricia Norman, Trinity University
S8.11.3 Secondary Science Teachers’ Translation of Professional Development through Affinity – and Institution-identity
Elizabeth B. Lewis, University of Nebraska-Lincoln, ebl@unlserve.unl.edu

S8.12 Related Paper Set – Meta-reflecting on the Realities of Curriculum and Teaching: Stories from Singapore
2:15pm – 3:45pm, Bonaire 6
Presider: Tang Wee Teo, University of Illinois

S8.12.1 Meta-reflecting on the Realities of Curriculum and Teaching: Stories from Singapore
Aik-Ling Tan, National Institute of Education

S8.12.2 Two Mirrors Facing Each Other
Lee-Jiun Karen Ng, St Theresa’s Convent

S8.12.3 Finally Someone is Listening
Lay Khim, Jasmine Tan, Greendale Primary School

S8.12.4 From Personal and Private Reflection to Dialogic Reflection
Song Ling Yong, Henry Park Primary School

S8.12.5 Developing a Deeper Appreciation through Teaching
Guohui Ng, St Theresa’s Convent

S8.13 Scientific Inquiry Instruction and Assessment
2:15pm – 3:45pm, Bonaire 1
Presider: Senay Purzer, Purdue University

S8.13.1 Examining the Effect of Inquiry-Based Teaching on Students’ Motivation, Science Self-Efficacy, and Science Achievement
Nai-En Tang, University of Missouri, naientang@gmail.com
Lloyd H. Barrow, University of Missouri
Chia-Lin Tsai, University of Missouri

S8.13.2 Teachers’ Cumulative Curriculum Implementation Experience, Fidelity of Implementation, and Student Learning
Hee-Sun Lee, Tufts University, University of California, Berkeley, heesun.lee@tufts.edu
Ou L. Liu, Educational Testing Service
Keisha Varma, University of Minnesota
Marcia C. Linn, University of California, Berkeley

S8.13.3 Modeling and Assessing Scientific Methods
Nicole Wellnitz, Institute of Biology Education, nicole.wellnitz@uni-kassel.de
Jürgen Mayer, Institute of Biology Education

S8.13.4 Comparative Analysis of Two Inquiry Observational Protocols: Striving to Understand the Quality of Inquiry-based Instruction
Jeff C. Marshall, Clemson University, marsha9@clemson.edu
Julie B. Smart, Presbyterian College
Christine Lotter, University of South Carolina

Strand 11: Cultural, Social, and Gender Issues

S8.14 Students and Science: Attitudes and Participation in Discursive Practices
2:15pm – 3:45pm, Bonaire 2
Presider: Katie L. Brkich, University of Florida

S8.14.1 The Science Student Role: Exploring its Creation and Enactment through Interaction
Marie-Claire Shanahan, University of Alberta, mcshanahan@ualberta.ca
Robert Bechtel, University of Alberta
Gregory Henkelman, University of Alberta

S8.14.2 Reproduction of Inequalities in the Teaching and Learning of Science
Anna Jobér, ESERA, anna.jober@mah.se

S8.14.3 Challenges of Korean Immigrant Students in Science Classroom Participation
Minjung Ryu, University of Maryland-College Park, mryu@umd.edu

S8.14.4 ‘There is no Chance for Personal Development in it’. Why Students Choose not to Study Science at Universities
Henriette T. Holmegaard, University of Copenhagen, htholmegaard@ind.ku.dk
Lars Ulriksen, University of Copenhagen
Lene M. Madsen, University of Copenhagen
Strand 12: Educational Technology
S8.15 Use of Technology Artifacts as Means of Knowledge Construction
2:15pm – 3:45pm, Bonaire 3

**Presider:**
Houbin Fang, University of Southern Mississippi

S8.15.1 Taking Drawing Digital: Using Student-generated Drawings to help Students Learn about Molecules
Jennifer L. Albert, North Carolina State University, jennifer_albert@ncsu.edu
Eric N. Wiebe, North Carolina State University

S8.15.2 Show Me the Evolution! Assessing Effectiveness of a New Teaching Resource
Anastasia Thanukos, University of Berkeley
Lauren Kendall, University of North Carolina at Chapel Hill

S8.15.3 Co-Constructing Knowledge Artifacts for Understanding the Physiology of Human System Diseases
Vanessa L. Peters, University of Michigan, vlpeters@umich.edu

S8.15.4 Hands-on Activities and the Use of Video Clips for Learning How to Identify Fish Species in an Aquarium
Vanessa D.I. Pfeiffer, University of Duisburg-Essen, Germany, vanessa.pfeiffer@uni-due.de
Katharina Scheiter, Knowledge Media Research Center, Tuebingen, Germany
Angela Sandmann, University of Duisburg-Essen, Germany
Sven Gemballa, University of Tuebingen, Germany

Strand 13: History, Philosophy, and Sociology of Science
S8.16 Strand Sponsored Symposium - Applying Research in the Science Classroom: An Overview of Approaches to Teaching Nature of Science
2:15pm – 3:45pm, Bonaire 4

**Presenters:**
Norman G. Lederman, Illinois Institute of Technology
Sherry A. Southerland, Florida State University

Strand 14: Environmental Education
S8.17 Socio-scientific Issues: Addressing Controversy, Ethics, and Decision-making through the Environment
2:15pm – 3:45pm, Bonaire 5

**Presider:**
Maurice DiGiuseppe, University of Ontario Institute of Technology (UOIT)

S8.17.1 Fostering Decision-Making Competence in Socio-Scientific Issues Concerning Sustainable Development: An Intervention Study
Helge Gresch, hgresch@uni-goettingen.de
Marcus Hasselhorn
Susanne Bögeholz

S8.17.2 The Effects of Argumentation and Traditional-Based Courses on Preservice Science Teachers’ Knowledge about Climate Change Issue and Attitudes towards Environment
Mustafa S. Topcu, Yuzuncu Yil University, msamitopcu@gmail.com
Dilek Karisan, Yuzuncu Yil University

S8.17.3 Analyzing Yorktown’s GloFish® Ethics: EcoJustice through Socioscientific Issues (SSI)
Michael P. Mueller, University of Georgia, mmueller@uga.edu
Dana L. Zeidler, University of South Florida

S8.17.4 Turning Citizen Science on it’s Head: Exploring the Philosophy of Connecting People and Nature
Jenkins L. Lynda, Dalton State College, lljenkins@daltonstate.edu
Michael P. Mueller, University of Georgia

Strand 15: Policy
S8.18 Policy Implementation
2:15pm – 3:45pm, Antigua 2

**Presider:**
Sharon Lynch, George Washington University

S8.18.1 Policy Implications for Virginia Initiative for Science Teaching and Achievement: Investing in Innovation (i3) Grant
Donna R. Sterling, George Mason University, dsterlin@gmu.edu
Wendy M. Frazier, George Mason University
Juanita Jo Matkins, College of William and Mary
Jacqueline T. McDonnough, Virginia Commonwealth University
Randy L. Bell, University of Virginia

S8.18.2 Science Teacher Retention: Examining a Link between Deprofessionalization and Dissatisfaction for Teachers
Georgia W. Hodges, University of Georgia, georgia.hodges@gmail.com
Steve J. Oliver, University of Georgia
Deborah J. Tippins, University of Georgia
Concurrent Session #9
4:00pm – 5:30pm

Equity and Ethics Committee Sponsored Session
S9.1 Poster Symposium - Moving the Equity Agenda Forward: Equity Research, Practice, and Policy in Science Education
4:00pm – 5:30pm, Antigua 3

Presiders:
Julie A. Bianchini, University of California, Santa Barbara
Valarie L. Akerson, Indiana University
Angela M. Calabrese-Barton, Michigan State University
Okhee Lee, University of Miami
Alberto J. Rodriguez, San Diego State University

Presenters:
George E. Deboer, American Association for the Advancement of Science
Sherry A. Southerland, Florida State University
Nancy W. Brickhouse, University of Delaware
Alejandro Gallard
Sonya Martin
Beth Wassel
Kathryn Scantlebury, University of Delaware
Bhaskar Upadhyay, University of Minnesota
Gayle A. Buck, Indiana University
Leon Walls, University of Vermont
Cassie F. Quigley, Clemson University
Miyoun Lim
Edna Tan
Bryan Brown
Emily J. Kang
Maria S. Rivera Malucci, Barnard College
Felicia Moore-Mensah, Columbia University
Gail Richmond, Michigan State University

Discussants:
Michael J. Reiss, University of London
Lyn C. Carter, Australian Catholic University
Tali Tal, Technion University in Israel
Mei Hung, National Taiwan Normal University
Melina Furman, University of San Andres

Strand 1: Science Learning, Understanding and Conceptual Change
S9.3 Related Paper Set - Learning Progression for Carbon-transforming Processes in Socio-ecological Systems
4:00pm – 5:30pm, Curacao 1

Discusant: Joseph S. Krajcik, University of Michigan

S9.3.1 Cohesion and Consistency in Students’ Accounts of Carbon-transforming Processes
Hui Jin, Ohio State University, jinhui2009@gmail.com
Charles W. Anderson, Michigan State University

S9.3.2 The Role of Informal Discourses in Students’ Accounts of Carbon-transforming Processes
Hamin Baek, Michigan State University
Charles W. Anderson, Michigan State University

S9.3.3 Argumentation in Students’ Accounts of Carbon-transforming Processes
Onyancha Kennedy, Michigan State University
Charles W. Anderson, Michigan State University

S9.3.4 Developing Reliable and Valid Assessment Items to Assess K-12 Students’ Learning Progression of Carbon Cycling
Jing Chen, Michigan State University
Yongsang Lee, University of California, Berkeley
Jinnie Choi, University of California, Berkeley
Karen Draney, University of California, Berkeley
Charles W. Anderson, Michigan State University

S9.3.5 The Effects of Teaching Materials and Teachers’ Approaches on Student Learning about Carbon-transforming Processes
Li Zhan, Michigan State University
Dante Cisterna, Michigan State University
Jennifer Doherty, Michigan State University
Yongsang Lee, University of California, Berkeley
Karen Draney, University of California, Berkeley
Charles W. Anderson, Michigan State University
Strand 2: Science Learning: Contexts, Characteristics and Interactions
S9.4 Students’ Perceptions
4:00pm – 5:30pm, Curacao 2

S9.4.1 The Role of Emotional Factors in Building Public Scientific Literacy and Engagement with Science
Huann-Shyang Lin, National Sun Yat-sen University, huannlin@faculty.nsysu.edu.tw
Zuway-R Hong, National Sun Yat-sen University

S9.4.2 Linking Students’ Conceptions of Learning Science with their Metacognition and Science Learning Achievement in Taiwan
Min-Hsien Lee, National Taiwan University of Science and Technology, mihlee@mail.ntust.edu.tw
Chin-Chung Tsai, National Taiwan University of Science and Technology
Chun-Yen Chang, National Taiwan Normal University

S9.4.3 Pupils’ Perceptions About The Efficient School
Mónica Baptista, Instituto de Educação da Universidade de Lisboa, mlabaptista@gmail.com
Ana M. Freire, Instituto de Educação da Universidade de Lisboa

S9.4.4 A Structural Model of High School Students’ Conceptions of Learning Science, Approaches to Learning Science and their Science Self-Efficacy
Guo-Li Chiou, National Chiao Tung University, Taiwan, glehiou@mail.nctu.edu.tw
Jyh-Chong Liang, National Taiwan University of Science and Technology, Taiwan
Min-Hsien Lee, National Taiwan University of Science and Technology, Taiwan
Chin-Chung Tsai, National Taiwan University of Science and Technology, Taiwan

Strand 3: Science Teaching – Middle and High School (Grades 5-12): Characteristics and Strategies
S9.5 Strategies that Promote Student Learning
4:00pm – 5:30pm, Curacao 4

Presider:
Mehmet Aydeniz, The University of Tennessee

S9.5.1 The Evolution of Classroom Physics Knowledge in Relation to Certainty and Uncertainty
Andree Tiberghien, UMR ICAR, France, andree.tiberghien@univ-lyon2.fr
David Cross, UMR ICAR, France
Gérard Sensevy, University of Bretagne Occidentale, France

S9.5.2 Illuminating the Relationship between Inquiry Science Instruction and Student Learning: Results from Three Case Studies
Jacqueline R. Delisi, Education Development Center, Inc., jdelisi@edc.org
Katherine L. Mcneill, Boston College
Daphne D. Minner, Education Development Center, Inc

S9.5.3 The Effectiveness of Epistemologically and Metacognitively Stimulated Learning Cycle Method on 10th Grade Students’ Physics Achievement
Sevda Yerdelen-Damar, yerdelen@metu.edu.tr
Ali Eryilmaz

S9.5.4 The Role of Science Writing Heuristic Approach on Students’ Conceptual Understanding in Chemistry
Sevgi Kingir, Selcuk University, kingirsevgi@gmail.com
Omer Geban, Middle East Technical University
Murat Gunes, Ahi Evran University

Strand 4: Science Teaching – Middle and High School (Grades 13-20)
S9.6 Influencing Students’ Reasoning & Development of Expertise
4:00pm – 5:30pm, Curacao 5

Presider:
Taha Mzoughi, Kennesaw State University

S9.6.1 Investigating the Effects of Solving Synthesis Problems in Introductory Physics Courses
Lin Ding, School of Teaching and Learning, The Ohio State University, ding65@osu.edu

S9.6.2 Physics as a Community of Practice: A Qualitative Interview Study of Three University Physics Professors
Idaykis Rodriguez, Florida International University, irodr020@fiu.edu
Eric Brewe, Florida International University
Laird H. Kramer, Florida International University

S9.6.3 Effects of Visual Attentional Cueing on Beginner Problem Solvers in Physics
Tanner Stevens, University of Minnesota, steve461@umn.edu
Adrian Carmichael, Kansas State University
Adam Larson, Kansas State University
Elizabeth Gire, University of Memphis
Lester Loschky, Kansas State University
N. Sanjay Rebello, Kansas State University
S9.6.4 Scientific Reasoning and Conceptual Knowledge in a College Inquiry Physics Course

Omer Acar, Kocaeli University, acarok@gmail.com
Bruce R. Patton, Ohio State University

Strand 6: Science Learning in Informal Contexts
S9.7 Science Under the Stars: Insights from Science Camps
4:00pm – 5:30pm, Curacao 6

S9.7.1 The Role of Informal Science Program on Middle School Students’ Perceptions of Science and Engineering
Pat Dixon, National High Magnetic Field Laboratory, pdixon@magnet.fsu.edu
Roxanne Hughes, Florida State University/National High Magnetic Field Laboratory
Kristen Molyneaux, University of Wisconsin, Madison

S9.7.2 Lessons Learned in Summer Camp: Learning Paths of Three Campers
Lauren Madden, North Carolina State University, lomadden@gmail.com
John C. Bedward, North Carolina State University
Eric N. Wiebe, North Carolina State University
Claudia R. Benitez-Nelson, University of South Carolina

S9.7.3 Middle School Students’ Identity Development as Learners of Science at an Informal Science Education Camp
Kelly Riedinger, University of Maryland, College Park, krieding@umd.edu

S9.8 Preservice Teachers’ Developing Science Teaching Practice
4:00pm – 5:30pm, Curacao 7

S9.8.1 Examining the Content and Nature of Preservice Teachers’ Early Field Experiences: A Schematic Framework Approach
Karthigeyan Subramaniam, University of North Texas, karthigeyan.subramaniam@unt.edu

S9.8.2 A Long Term Investigation of Science Teacher Resilience
Patricia A. Doney, University of Georgia, patdoney@uga.edu

S9.9.3 Using Third Generation of Cultural-Historical Activity Theory (CHAT) as a Data Analysis Framework to Explain Novice Teachers’ Learning to Teach Science
Ozcelik Arzu Tanis, The Pennsylvania State University, ast252@psu.edu
Asli Sezen, The Pennsylvania State University
Scott P. Mcdonald, The Pennsylvania State University
Gregory J. Kelly, The Pennsylvania State University

Strand 7: Pre-service Science Teacher Education
S9.9 Related Paper Set - Promoting Effective Science Teaching for English Learners: Testing a Model of Pre-Service Teacher Training
4:00pm – 5:30pm, Bonaire 7

Discussant:
Okhee Lee, University of Miami

S9.9.1 Empirical Foundations of ESTELL Pedagogy with Exemplars of Practice
Jerome Shaw, University of California, Santa Cruz

S9.9.2 Meaningful Collaboration: Establishing a Science Methods Course with a Focus on English Learners in Three Different Universities
Alberto Rodriguez, San Diego State University
Meredith Houle, San Diego State University
Isabel N. Quita, San Francisco State University
Alie Victorine, San Jose State University

S9.9.3 ESTELL Professional Development
Cathy Zozakiewicz, San Diego State University
Sara Tolbert, University of California Santa Cruz

S9.9.4 Pre-Service Teacher Efficacy and Practices with Responsive Science Pedagogy for English Learners
Marco A. Bravo, Santa Clara University
Jorge L. Solís, University of California Santa Cruz
Eduardo Mosqueda, University of California Santa Cruz

Strand 8: In-service Science Teacher Education
S9.10 Impacting Teacher Practice
4:00pm – 5:30pm, Curacao 8

Presider:
Bongani D. Bantwini, Kennesaw State University

S9.10.1 Teachers-as-Learners: Characterizing the Relations between Theory and Practice through Teachers’ Questions
Shaharabani Yael Furman, Weizmann Institute of Science, yaelsha@gmail.com
Anat Yarden, Weizmann Institute of Science - Department of Science Teaching
**Strand 10: Curriculum, Evaluation, and Assessment**

**S9.11 Socioscientific Issues and the Nature of Science**
4:00pm – 5:30pm, Bonaire 1

- **S9.11.1 Non-Science Majors Perceptions of Integrating SSI Instruction into High School Curricula**
  John C. Parr, University of Southern Mississippi, john.parr@eagles.usm.edu
  Nasser Syed, University of Southern Mississippi
  Kristy L. Halverson, University of Southern Mississippi

- **S9.11.2 Quantifying Informal Science Educators’ Beliefs about Pesticide Risk: Development of the Pesticide Risk Belief Inventory**
  Catherine E. Leprevost, North Carolina State University, celeprev@ncsu.edu
  Margaret R. Blanchard, North Carolina State University
  Julia F. Storm, North Carolina State University
  Gregory Cope, North Carolina State University

- **S9.11.3 Towards Critical and Emancipatory Science & Technology Education: A Theoretical Framework**
  John L. Bencze, OISE, University of Toronto, larry.bencze@utoronto.ca
  Steven J. Alsop, York University, Toronto
  Erin Sperling, OISE, University of Toronto

- **S9.11.4 Assessing Understanding about Nature of Science in Historical Contexts**
  Irene Neumann, Leibniz Institute for Science and Mathematics Education, ineumann@lpi.uni-kiel.de
  Gary M. Holliday, Illinois Institute of Technology
  Hans E. Fischer, University of Duisburg-Essen
  Alexander Kauertz, University of Education - Pädagogische Hochschule Weingarten
  Judith S. Lederman, Illinois Institute of Technology
  Norman G. Lederman, Illinois Institute of Technology

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**Strand 12: Educational Technology**

**S9.12 Technology Instruction and Implementation Across Contexts**
4:00pm – 5:30pm, Bonaire 3

**Presider:**
Wilhelmina S. Van Rooy, Australian Catholic University

- **S9.12.1 Student Perceptions of Learning and Engagement with Scientific Concepts through Serious Educational Game (SEG) Development**
  Brandi Thurmond, North Carolina State University, bnthurmo@ncsu.edu
  Shawn Y. Holmes, North Carolina State University
  Leonard A. Annetta, George Mason University
  Elizabeth Polta, SUNY-ESF
  Matthew Sears, Hillside New Tech High School
  Rebecca Cheng, George Mason University
  Brandy Bowling, North Carolina University

- **S9.12.2 Models of Instruction for Technology-enhanced Whole-class Inquiry**
  Jennifer L. Maeng, University of Virginia, jlc7d@virginia.edu
  Bridget K. Mulvey, University of Virginia
  Randy L. Bell, University of Virginia

- **S9.12.3 Metric or English Spatial Scales?: An International Comparison of Teachers’ Concepts**
  M. Gail Jones, North Carolina State University, Gail_Jones@ncsu.edu
  Manuela Paechter, University of Graz
  Grant E. Gardner, East Carolina University
  Chiung-Fen Yen, Providence University
  Amy Taylor, University of North Carolina at Wilmington
  Thomas R. Tretter, University of Louisville

- **S9.12.4 A Review of the Research on Successful Implementation of Technology to Teach Science**
  Rebecca M. Krall, University of Kentucky, rebecca.krall@uky.edu
  David A. Slykhuis, James Madison University

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

**S9.13 History and the Science Curriculum**
4:00pm – 5:30pm, Bonaire 4

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

- **S9.13.1 The Preparation Process of Historical Materials Depending on the New Turkish Biology Curriculum**
  Çiçek Dilek Bakanay, Marmara University, Turkey, cicekdilek@yahoo.com
  Serhat Irez, Marmara University, Turkey
  Hayati Seker, Marmara University, Turkey
S9.13.2 A Role for Science Education in the International Community: Exhibiting the Scientific Roots of the European Enlightenment
Michael R. Matthews, School of Education, University of New South Wales, m.matthews@unsw.edu.au

S9.13.3 A Content Analysis of Historical Information Aligned With Physics Curriculum
Burcu G. Guney, burcugulay.guney@yahoo.com
Hayati Seker

S9.13.4 Constructing Historical Instructional Materials: The Case for Secondary Level Chemistry Curricula in Turkey
Serhad S. Barutcuoglu, Marmara University, serhat1983@gmail.com
Ajda Kahveci, Canakkale Onsekiz Mart University
Hayati Seker, Marmara University

Strand 14: Environmental Education
S9.14 Related Paper Set - Innovative Teaching and Learning in Environmental Issues: An Emphasis on Thinking about Complexity
4:00pm – 5:30pm, Bonaire 5

Shiang-Yao Liu, National Taiwan Normal University, Taiwan, liusy@ntnu.edu.tw

S9.14.2 Problem Framing as a Starting Point for Active Participation on the Debate of Environmental Issues
Chuan-Shun Lin, National Kaohsiung Normal University, Taiwan
Shiang-Yao Liu, National Taiwan Normal University, Taiwan

S9.14.3 Promoting Systems Thinking through an Environment Course
Ting-Li Cheng, National Kaohsiung Normal University, Taiwan
Shiang-Yao Liu, National Taiwan Normal University, Taiwan

S9.14.4 The Quality of Students’ Argumentation in a Socio-environmental Debate Activity
Uy-Len Lin, National Kaohsiung Normal University, Taiwan
Li-Ting Cheng, National Kaohsiung Normal University, Taiwan
Jeng-Fung Hung, National Kaohsiung Normal University, Taiwan

S9.14.5 An Exploration of Students’ Reading Strategies in Texts of Environmental Issues
Sung-Tao Lee, Naval Academy, Taiwan
Fu-Fei Hsieh, Kuang-Hua Primary School, Kaohsiung, Taiwan
Yen-Wen Lin, An-Chao Primary School, Kaohsiung, Taiwan

Strand 15: Science Education as One Context for Education for Sustainable Development (ESD) and Environmental Education (EE)
4:00pm – 5:30pm, Antigua 2

Presider:
Teddie Mower, University of Louisville

Presenters:
Teddie Mower, University of Louisville, t0phil01@louisville.edu
David B. Zandvliet, Simon Fraser University
Annette Gough, RMIT University, Australia
Noel Gough, La Trobe University, Australia
Pauline W. U. Chinn, University of Hawaii
Justin Dillon, King's College London, United Kingdom

Evening/Social Events
Membership and Elections Committee Sponsored Session
New Researcher 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, Grand Sierra F
Julie A. Luft, Arizona State University, julie.luft@asu.edu
Reizelie Barreto-Espino, Towson University

IJSME Editorial Board Meeting
By Invitation
5:45pm – 6:45pm, Curacao 8

Publisher Reception – Springer
By Invitation
6:00pm – 8:00pm, Grand Sierra G

Publisher Reception – Routledge/Taylor & Francis
By Invitation
7:00pm – 8:30pm, Grand Sierra H

Equity and Ethics Committee Sponsored Dinner
7:00pm – 9:00pm, Bahamas Breeze Lake Buena Vista
Dinner, including tax and gratuity, is $35.
NOTE: You must have previously registered for this event with your Advance Conference Registration.

Social
Light snacks served and cash bar
8:00pm – 10:30pm, Poolside
Strand Meetings
7:00am – 8:15am

Strand 1: Science Learning, Understanding and Conceptual Change
Meeting – 7:00am – 8:15am, Curacao 1

Strand 2: Science Learning: Contexts, Characteristics and Interactions
Meeting – 7:00am – 8:15am, Curacao 2

Strand 3: Science Teaching--Primary School (Grades preK-6): Characteristics and Strategies
Meeting – 7:00am – 8:15am, Curacao 3

Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies
Meeting – 7:00am – 8:15am, Curacao 4

Strand 5: College Science Teaching and Learning (Grades 13-20)
Meeting – 7:00am – 8:15am, Curacao 5

Strand 6: Science Learning in Informal Contexts
Meeting – 7:00am – 8:15am, Curacao 6

Strand 7: Pre-service Science Teacher Education
Meeting – 7:00am – 8:15am, Curacao 7

Strand 8: In-service Science Teacher Education
Meeting – 7:00am – 8:15am, Curacao 8

Strand 9: Reflective Practice
Meeting – 7:00am – 8:15am, Bonaire 1

Strand 10: Curriculum, Evaluation, and Assessment
Meeting – 7:00am – 8:15am, Bonaire 2

Strand 11: Cultural, Social, and Gender Issues
Meeting – 7:00am – 8:15am, Bonaire 3

Strand 12: Educational Technology
Meeting – 7:00am – 8:15am, Bonaire 4

Strand 13: History, Philosophy, and Sociology of Science
Meeting – 7:00am – 8:15am, Bonaire 5

Strand 14: Environmental Education
Meeting – 7:00am – 8:15am, Bonaire 6

Strand 15: Policy
Meeting – 7:00am – 8:15am, Bonaire 7

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

International Committee Sponsored Session
S10.1 Related Paper Set - Exemplary Research in Science Education from Australia and New Zealand that Fosters Engagement and Understanding
8:30am – 10:00am, Antigua 1

Presider:
Sibel Erduran, University of Bristol, United Kingdom

Discussant:
Alister Jones, The University of Waikato, New Zealand, ajones@waikato.ac.nz

S10.1.1 Expert Science Teachers Notions of Scientific Literacy
Deborah J. Corrigan, Monash University, Australia, debbie.corrigan@monash.edu
Rebecca Cooper
Stephen Keast

S10.1.2 From Chaos to Small Steps and Manageable Chunks: Supporting Australian Science Teachers Transform their Pedagogy to Teach Thinking Skills
Mary Oliver, University of Western Australia, Australia, mary.oliver@uwa.edu.au
Grady Venville
Philip Adey

S10.1.3 Increasing Teachers’ Content Knowledge about the Mining and Mineral Processing Industries by Interacting with Scientists
Dianne Nichols, Education Queensland, Australia, dnich25@eq.edu.au
Dan Churach
Darrell Fisher

S10.1.4 Fostering Parent and Whanau Engagement with Children’s Learning: A Strategy to Enhance Children’s Science Learning
Bronwen Cowie, The University of Waikato, New Zealand, bcowie@waikato.ac.nz
Kathrin Otrel-Cass
Ted Glynn
Helena Kara
Strand 1: Science Learning, Understanding and Conceptual Change
S10.2 Related Paper Set - Becoming Experts in Science and the Role of Culture and Context
8:30am – 10:00am, Curacao 1

S10.2.1 Horizontal and Vertical Learning
Dimensions of Urban Youth Investigating Energy Efficiency
Takumi C. Sato, Michigan State University, tsato@msu.edu
Angela M. Calabrese-Barton, Michigan State University

S10.2.2 Vanilla, Strawberries, & School Garden: I Can Show how to Pollinate the Flowers
Nancy Albrecht, University of Minnesota
Bhaskar Upadhyay, University of Minnesota

S10.2.3 Connecting Environmental Issues to Youths' Place-making in Mapping Activities
Giovanna Scalone, University of Washington
Philip Bell, University of Washington

S10.2.4 Saving Energy Means Saving a lot more Moolah!: The role of Economic and Scientific Discourses in Youths' Involvement in the Change a Light, Change Michigan
Shari Rose, Michigan State University
Angela M. Calabrese-Barton, Michigan State University

S10.2.5 Scaffolding Identity and Expertise Development
Shelley Stromholt, University of Washington

Strand 2: Science Learning: Contexts, Characteristics and Interactions
S10.3 Influences on the Biology Classroom
8:30am – 10:00am, Curacao 2
Presider:
Allan Feldman, University of South Florida

S10.3.1 Framing Evolution Discussion Intellectually
Kristin L. Cook, Indiana University, kshockey@indiana.edu
Alandeon W. Oliveira, State University of New York
Gayle A. Buck, Indiana University

S10.3.2 Factors Potentially Influencing Student Acceptance of Biological Evolution
Jason R. Wiles, Syracuse University & McGill University, jwiles01@syr.edu

S10.3.3 Pleasing Others and Mastery Goals as Predictors of Biology Students' Individual Science Interest
Martina Nieswandt, Illinois Institute of Technology, mnieswan@iit.edu

S10.3.4 Does Whole-Class Talk Influence the Students' Learning in Biology Education?
Julia Rixius, Biology Education, julia.rixius@lrz.uni-muenchen.de
Bingit J. Neuhaus, Biology Education

Strand 4: Science Teaching – Middle and High School (Grades 5-12): Characteristics and Strategies
S10.4 Teachers Learning from Instruction Practice
8:30am – 10:00am, Curacao 4
Presider:
Anne L. Kern, University of Idaho

S10.4.1 Effect of Student Learning on Science Teachers' Teaching: The Case of a Form 3 Science Class in Kenya
Samson M. Nashon, University of British Columbia, samson.nashon@ubc.ca
David Anderson, University of British Columbia

S10.4.2 Factors influencing Secondary Science Teachers’ use of Popular Media: The Complexities of Instructional Practice
Michelle L. Klosterman, Wake Forest University, klosteml@wfu.edu
Troy D. Sadler, University of Florida

S10.4.3 A Method to Reconstruct Content and Content Specific Criteria of Video-Documented Science Instruction
Maja Brückmann, University of Kiel, Germany, mbrueckmann@gmail.com
Reinders Duit, IPN Kiel

S10.4.4 The Value of Self Study in Learning to Teach New Topics in Chemistry: Case Studies from South Africa
Marissa Rollnick, Wits University, South Africa, marissa.rollnick@wits.ac.za
Strand 5: College Science Teaching and Learning (Grades 13-20)
S10.5 Learning in Biology, Biotechnology & Nature of Science
8:30am – 10:00am, Curacao 5

S10.5.1 Building the BIKE: Development and testing of the Biotechnology Instrument for Knowledge Elicitation (BIKE)
Stephen B. Witzig, University of Missouri, sbwitzig@mail.mizzou.edu
Carina M. Rebello, University of Missouri
Marcelle A. Siegel, University of Missouri
Sharyn K. Freyermuth, University of Missouri
Kemal Izci, University of Missouri
Bruce A. McClure, University of Missouri

S10.5.2 Differential Understandings of Nature of Science Among Undergraduate Biology Students
Elisabeth E. Schussler, University of Tennessee - Knoxville, eschussl@utk.edu

S10.5.3 Benefits Observed in the Research Laboratory Setting Don’t Always Generalize to the Classroom Setting
Cheryl C. Berg, Arizona State University, cheryl.berg@asu.edu
Dale R. Baker, Arizona State University

S10.5.4 What’s in a Word: Student Conceptions of and Learning About ‘Allele’
Jennifer L. Momsen, North Dakota State University, jenmomsen@ndsu.edu
Sara A. Wyse, Bethel University
Tammy M. Long, Michigan State University
Speth Elena Bray, St. Louis University

Strand 6: Science Learning in Informal Contexts
S10.6 Symposium - Science Cafés: Lessons Learned and New Directions for Research
8:30am – 10:00am, Curacao 6

Presider:
Susan Foutz, Institute for Learning Innovation

Discussant:
Martin Storksdieck, The National Academies, Board on Science Education

Presenters:
Katey Ahmann, North Carolina Museum of Natural Sciences
Michelle Hall, Science Education Solutions, Inc
Wendy Hansen, Pacific Science Center
Julie Menalley, Pacific Science Center
Christine Reich, Museum of Science, Boston
Menna Selvakumar, Pacific Science Center

Strand 7: Pre-service Science Teacher Education
S10.7 Pedagogical Content Knowledge of Preservice Teachers
8:30am – 10:00am, Curacao 7

Presider:
Frederick Freking, USC Rossier School of Education

S10.7.1 The Connection between Content Knowledge and Pedagogical Content Knowledge in Groups of Pre-service and In-service Physics Teachers
Andreas Borowski, University Duisburg-Essen,
andreas.borowski@uni-due.de
Sophie Kirschner, University Duisburg-Essen
Hans E. Fischer, University Duisburg-Essen

S10.7.2 Examining Pre-service Non-Experienced Secondary Science Teachers’ Pedagogical Content Knowledge
Nadya Rizk, American University of Beirut, ngr03@aub.edu.lb
Saouma B. Boujaoude, American University of Beirut

S10.7.3 Use of a Venn Diagram to Introduce Pedagogical Content Knowledge to Pre-Service Elementary Teachers
Susan A. Everett, University of Michigan-Dearborn, everetts@umd.umich.edu
Charlotte A. Otto, University of Michigan-Dearborn

Strand 8: In-service Science Teacher Education
S10.9 Online Learning
8:30am – 10:00am, Curacao 8

Presider:
Lisa A. Brooks, The University of Toledo

Discussant:
Sherry A. Southerland, Florida State University

Presenters:
Mark Windschitl, University of Washington, mwinds@uw.edu
Jessica Thompson, University of Washington
Melissa Braaten, University of Washington
David Stroupe, University of Washington
Elizabeth Wright, University of Washington

Strand 7: Pre-service Science Teacher Education
S10.8 Raising Performance Expectations for Novice Teachers: The Promise of Pedagogical Tools and Core Practices
8:30am – 10:00am, Bonaire 7

Presider:
Sherry A. Southerland, Florida State University

Discussant:
Frederick Freking, USC Rossier School of Education

Presenters:
Mark Windschitl, University of Washington, mwinds@uw.edu
Jessica Thompson, University of Washington
Melissa Braaten, University of Washington
David Stroupe, University of Washington
Elizabeth Wright, University of Washington
S10.9.1 Teachers’ Professional Development via Distance Learning - Literature Review and Steps towards Implementation
Orit Herscovitz, Technion - Israel Institute of Technology Ort Braude College, orither@technion.ac.il
Zvia Kaberman, Technion - Israel Institute of Technology
Yehudit Judy Dori, Technion - Israel Institute of Technology

S10.9.2 Examining the Student Impact Following an Online Professional Development Course for High School Biology Teachers
Scott Strother, Education Development Center, sstrother@edc.org
Lauren B. Goldenberg, Education Development Center

S10.9.3 Classroom Implementation and Student Engagement in an Online Inquiry Involving Scientists as Mentors
Carol L. Stuessy, Texas A&M University at College Station, c-stuessy@tamu.edu
Laura Ruebush, Texas A&M University at College Station
Cheryl Ann Peterson, Texas A&M University at College Station
Julia Johnston, Texas A&M University at College Station
Tori Hollas, Texas A&M University at College Station

S10.10 Related Paper Set - Teacher Entrepreneurial Leadership for Transforming Science Teaching and Learning
8:30am – 10:00am, Bonaire 8

S10.10.1 [MSP]: The Partnership’s Conceptual Framework and Approach
Fouad Abd-El-Khalick, University of Illinois at Urbana-Champaign, fouad@illinois.edu
Anita Martin, University of Illinois at Urbana-Champaign
Ryan Summers

S10.10.2 From Procedural Change to Substantive Innovation: Science Teachers and the Entrepreneurial Mindset
Jeanne Koehler, University of Illinois at Urbana-Champaign
Liora Bresler, University of Illinois at Urbana-Champaign
Fouad Abd-El-Khalick, University of Illinois at Urbana-Champaign

S10.10.3 Learning, Leadership, and Innovation in Science Teaching as Manifested in Teachers’ Social Networks
Wei Gao, University of Illinois at Urbana-Champaign
Fouad Abd-El-Khalick, University of Illinois at Urbana-Champaign
Caroline Haythornthwaite, University of British Columbia

S10.10.4 A Framework for Catalyzing Innovation for Student, Class, and School Impact as Manifested by the Actions of Entrepreneurial Teacher Leaders
Raymond Price, University of Illinois at Urbana-Champaign
Janet Gaffney, University of Illinois at Urbana-Champaign

Strand 10: Curriculum, Evaluation, and Assessment
S10.11 Science, Language, and Literacy
8:30am – 10:00am, Bonaire 1

S10.11.1 Student Learning Gains: Results from a PD Program which Incorporated Language Development Strategies in Science
Lauren M. Shea, University of California, Irvine, lshea@uci.edu
Therese B. Shanahan, University of California, Irvine

S10.11.2 Lexical Ambiguity in Evolutionary Discourse: Implications for Teaching, Learning, and Assessment
Meghan A. Rector, The Ohio State University, rector.43@osu.edu
Ross H. Nehm, The Ohio State University
Minsu Ha, The Ohio State University

S10.11.3 Development and Validation of Instrument to Measure Scientific Literacy for the 21st Century
Kyunghee Choi, Ewha Womans University, khehoi@ewha.ac.kr
Sung-Won Kim, Ewha Womans University
Hyunjoo Lee, Ewha Womans University
Kongju Mun, Ewha Womans University
Sung-Youn Choi, Ewha Womans University
Joseph S. Krajcik, University of Michigan
Namsoo Shin, University of Michigan

S10.11.4 Assessing Scientific Literacy: Content Knowledge, Skills, and Contextualization
Cathy L. Farrar, University of Missouri-St. Louis, farrarcat@gmail.com
Jennifer M. Hope, University of Missouri-St. Louis
Strand 11: Cultural, Social, and Gender Issues
S10.12 Students and Science: Issues of Cultural Capital
8:30am – 10:00am, Bonaire 2
**Presider:**
Barbara A. Burke, Cal Poly Pomona University

S10.12.1 Shelter Design: Problem Solving Lesson Using a Culturally Relevant STEM Topic
Younkyeong Nam, University of Minnesota, younkyeong@gmail.com
Mi Sun Park, University of Minnesota
Young Rae Kim
Gillian H. Roehrig, University of Minnesota
Tamara Moore, University of Minnesota

S10.12.2 Urban Fifth Graders Connecting Geoscience to their Spaces and Places
Katie L. Brkich, University of Florida, ecobeagl@yahoo.com

S10.12.3 What Inuit Students Have to Say about Science Teaching and Learning
Brian E. Lewthwaite, University of Manitoba, Lewthwaite@xtra.co.nz
Barbara Mcmillan, University of Manitoba
Rebecca Hainnu, Qikiqtani School Operations

S10.12.4 Silencio en Ciencia: A Longitudinal Case Study of Julio’s Silencing in School Science
Jean Rockford, The University of North Carolina, jrockfo@uncg.edu
Heidi B. Carlone, The University of North Carolina at Greensboro

Strand 12: Educational Technology
S10.13 Symposium - Video Analysis to Support Teacher Learning: Approaches, Impact, Challenges, and Gaps
8:30am – 10:00am, Bonaire 3
**Presider:**
Kathleen Roth, BSCS, kroth@bscs.org
**Discussant:**
Robert Hollon, University of Wisconsin, Eau Claire

**Presenters:**
Karen B. Givvin, University of California, Los Angeles (UCLA)
Carla Zembal-Saul, Pennsylvania State University
Maria S. Rivera Maulucci, Barnard College

Strand 13: History, Philosophy, and Sociology of Science
S10.14 Nature of Science and Science Teachers
8:30am – 10:00am, Bonaire 4
**Presider:**
Lisa Martin-Hansen, Georgia State University

S10.14.1 Developing Inservice Teachers’ Views of NOS and Inquiry: Immersion in Authentic and Relevant Paleontological Research
Barbara A. Crawford, Cornell University, bac45@cornell.edu
Daniel K. Capps, Cornell University
Maya Patel, Cornell University
Robert Ross, Paleontological Research Institution in Ithaca, New York

S10.14.2 Understanding Pre-Service Teachers’ Frameworks for Perceiving the Risks of New Technologies
Grant E. Gardner, East Carolina University, gardnerg@ecu.edu
M. Gail Jones, North Carolina State University
Sarah W. Robert, North Carolina State University

S10.14.3 Developing Prospective Teachers’ Ideas about Scientific Models in a Science Content Course
Renee Schwartz, Western Michigan University, tschwartz@wmich.edu
Brandy Skjold, Western Michigan University

S10.14.4 Experienced Science Teachers’ NOS Teaching Practices and Associated Factors Accounting for Those Practices
Benjamin C. Herman, University of South Florida, bcherman@usf.edu
Michael P. Clough, Iowa State University
Joanne K. Olson, Iowa State University

Strand 14: Environmental Education
S10.15 Symposium - Place-based Education in the Urban Environmental Context: What Have We Learned as Science Educator and Scientists about Engaging Urban Students in Environmental Studies?
8:30am – 10:00am, Bonaire 5
**Presider:**
Jennifer D. Adams, Brooklyn College-CUNY

**Presenters:**
Rebecca Boger, Brooklyn College-CUNY
Kimberly Handle, Brooklyn College-CUNY
Kendall Eskine, The Graduate Center-CUNY
Jesse John, Brooklyn College-CUNY
Adam Johnson, The Graduate Center-CUNY
Michael Magee, The Graduate Center-CUNY
Sheila Nightingale, The Graduate Center-CUNY
Reena Rahi, The Graduate Center-CUNY
Amy Ferguson, Brooklyn Academy of Science and the Environment and The Graduate Center-CUNY

**Concurrent Session #11**
10:15am – 11:45am
International Committee Sponsored Session
S11.1 Symposium - NARST’s LSEP and SAARMSTE’s 2010 Research School
10:15am - 11:45am, Antigua 1

Presiders:
Bill Kyle, University of Missouri-St.Louis, USA
Sibel Erduran, University of Bristol, United Kingdom

Presenters:
Marissa Rollnick, Witwatersrand University, South Africa
Mariana G. Hewson, Synthesis Consulting in Healthcare and Education
Julie A. Luft, Arizona State University, USA
Eduardo F. Mortimer, Universidade Federal de Minas Gerais, Brazil
Audrey Msimanga, Witwatersrand University, South Africa
Simasiku Siseho, University of the Western Cape, South Africa
Washington Dudu, Witwatersrand University, South Africa
Linda Keen-Rocha, Witwatersrand University, South Africa

Strand 1: Science Learning, Understanding and Conceptual Change
S11.2 Related Paper Set - Implications of Research on K-12 Student and Teacher, and Undergraduate Apprenticeships for Science Teaching and Learning
10:15am – 11:45am, Curacao 1

Presider:
Troy D. Sadler, University of Florida

S11.2.1 WYDIWYL: What do High School Students Really Learn through Research Apprenticeships?
Gail Richmond, Michigan State University, gailr@msu.edu
Troy D. Sadler, University of Florida

S11.2.2 Take 10 Teachers, Add 2 Scientists, Stir in the National Reform Goals, and Let Marinate for 6 Weeks
Margaret R. Blanchard, North Carolina State University
Victor D. Sampson, Florida State University

S11.2.3 Authentic to Whom? A comparison of two different models for Research Experiences for Teachers
Barry Golden, Florida State University
Sherry A. Southerland, Florida State University

S11.2.4 Student Learning in a Research Experience for Undergraduates Program
Allan Feldman, University of South Florida
Dilek Ozalp, University of South Florida
Sarah Johnstone, University of South Florida

S11.2.5 What Happens when you Engage Teachers and Children in Authentic Paleontological Work?
Barbara A. Crawford, Cornell University

Strand 2: Science Learning: Contexts, Characteristics and Interactions
S11.3 Students’ Attitudes
10:15am – 11:45am, Curacao 2

Presider:
Lawrence Flick, Oregon State University

S11.3.1 Conceptual and Methodological Issues in the Measurement of Attitudes Towards Science
Michael R. Kotowski, University of Tennessee, Knoxville, mkotowsk@utk.edu
Mehmet Aydeniz, University of Tennessee, Knoxville

S11.3.2 Adolescents’ Declining Motivation to Learn Science: Inevitable or not?
David Fortus, Weizmann Institute of Science, david.fortus@weizmann.ac.il
Dana Vedder-Weiss, Weizmann Institute of Science

S11.3.3 Teaching and Learning Physics: The Impact of Classroom Management on Student Achievements
Katharina Fricke, University of Duisburg-Essen (Germany), katharina.fricke@uni-due.de
Hans E. Fischer, University of Duisburg-Essen (Germany)

Strand 5: College Science Teaching and Learning (Grades 13-20)
S11.4 Conceptual Reasoning and Problem Solving in Physics
10:15am – 11:45am, Curacao 5

Presider:
Grant E. Gardner, East Carolina University

S11.4.1 Using Students’ Rating of Problem Similarity to Assess Course-integrated Contrasts and Compare Activities
Frances A. Mateycik, Penn State Altoona, fam13@psu.edu
Sean T. Elward, Penn State Altoona

S11.4.2 Students’ Understanding of Mathematical Integration in Physics Problems Using Graphical and Algebraic Representations
Dong-Hai Nguyen, Kansas State University
N. Sanjay Rebello, Kansas State University
Elizabeth Gire, University of Memphis
S11.4.3 Comparing Physics Content and Representations across Four Introductory College Physics Textbooks
Suzanne M. Donnelly, Longwood University, donnellysm@longwood.edu

S11.4.4 Prior Knowledge and Reflective Reasoning: To What Extent Do College Science Students’ Preconceptions Bias Their Reasoning Processes as They Solve Conceptual Physics Problems?
Ava A. Zeineddin, Wayne State University, eb8533@wayne.edu

Strand 6: Science Learning in Informal Contexts
S11.5 Maximising the Impact of Science Outreach on Students’ Attitudes Towards Science and Careers in Science
10:15am – 11:45am, Curacao 6
Discussant: Leonie Rennie, Curtin University of Technology

S11.5.1 Student and Teacher Feedback on a Science Careers Outreach Program: An ‘Alignment’ Perspective
Sophia Bickford, University of Western Australia, bickfs01@student.uwa.edu.au
Nancy Longnecker, University of Western Australia
Grady Venville, University of Western Australia

S11.5.2 The Impact of a Science Careers Outreach Program on Students: An ‘Identity’ Perspective
Grady Venville, University of Western Australia
Nancy Longnecker, University of Western Australia
Leonie Rennie, Curtin University of Technology

S11.5.3 The Olympiad Informal Science Experience: A ‘Passion’ Perspective
Mary Oliver, University of Western Australia
Grady Venville, University of Western Australia

S11.5.4 Evaluating School Focused Science Outreach: An ‘Impact’ Perspective
Kira Husher, The University of Newcastle
John O’Connor, The University of Newcastle
Sid Bourke, The University of Newcastle
Adrian Page, The University of Newcastle

Strand 7: Pre-service Science Teacher Education
S11.6 Preservice Teachers Conceptions and Perceptions of Science Practices and Curriculum
10:15am – 11:45am, Curacao 7
Presider: Meredith A. Park Rogers, Indiana University

S11.6.1 Concept-Focused Inquiry (CFI): Using a Theory of Instruction to Enhance Understanding of Constructivist-based Teaching
Austin M. Hitt, Coastal Carolina University, amhitt@coastal.edu
Denise B. Forrest, Coastal Carolina University

S11.6.2 Who Has Control Over the Science Curriculum?
Felicia Moore-Mensah, Columbia University, moorefe@tc.columbia.edu
Tara O’Neill, University of Hawaii, Manoa

S11.6.3 Pre-service Elementary Teachers’ Conceptions of Inquiry: Classroom Scenarios vs. Classroom Observations
Youngjin Song, University of Northern Colorado, youngjin.song@unco.edu
Nam-Hwa Kang, Oregon State University
Teresa M. Higgins, University of Northern Colorado

Strand 8: In-service Science Teacher Education
S11.7 Teachers and Inquiry
10:15am – 11:45am, Curacao 8
Presider: Peter Meyerson, College of Education & Human Services

S11.7.1 Reflections on Self Classroom Videos and Student’s Perceptions
An-Shun Yu, National Changhua University of Education, nuevoanshun@gmail.com
Kun-Yi Shih, National Changhua University of Education
Hsin-Chuan Ho, National Changhua University of Education
Kuo-Hua Wang, National Changhua University of Education

S11.7.2 The Effect of Professional Development on Teachers’ Beliefs and Pedagogical Content Knowledge for Scientific Argumentation
Katherine L. Mcneill, Boston College, kmcneill@bc.edu
Amanda M. Knight, Boston College

S11.7.3 The Uses of Student Learning Data in Collaborative Teacher Inquiry
Tamara H. Nelson, Washington State University Vancouver, tnelson1@vancouver.wsu.edu
David Slavit, Washington State University Vancouver
Angie Deuel, Washington State University Vancouver
10:15am – 11:45am, Bonaire 1

Discussant:
Yushaneen Wilson, University of Pennsylvania

S11.8.1 One Person’s Internal Evaluation is Another’s Design Study: What Internal Evaluation Brings to Professional Education Programs in Science
Sonya N. Martin, Drexel University, sonya.martin@drexel.edu
Catherine E. Milne, New York University

S11.8.2 Facilitating Responsive Science Teacher Education: Professional Development as Embedded in Teachers’ Everyday Practices and Concerns
Christina Siry, University of Luxembourg

S11.8.3 The Role of e-Portfolios in Documenting Teacher Leadership
Rachel Ruggirello, Washington University in St. Louis

S11.8.4 Program and Policy Changes for Teachers’ Professional Development Based on Evaluation Data
Jane Butler Kahle, Miami University
Kathryn Scantlebury, University of Delaware
Yue Li, Miami University

S11.9 Students’ Attitudes toward and Aspirations in Science: Ethnicity, Religion, and Gender Effects
10:15am – 11:45am, Bonaire 2

Presider:
Cassie F. Quigley, Clemson University

S11.9 .1 (Re)thinking the Influence of Social Class: Science-related Career Aspirations amongst Minority Ethnic Students aged 11-14 in England
Billy Wong, King’s College London, billy.b.wong@kcl.ac.uk

S11.9.2 An Investigation of Boys’ and Girls’ Affective Learning in Science and Big-Five Traits
Zuway-R Hong, National Sun Yat-sen University, a3803429@ms49.hinet.net
Huann-Shyang Lin, National Sun Yat-sen University

S11.9.3 Science-related Aspirations among Elementary School Children: Modeling Early Influences
Jennifer Dewitt, King’s College London, jennifer.dewitt@kcl.ac.uk
Jonathan F. Osborne, Stanford University
Louise Archer, King’s College London
Justin Dillon, King’s College London
Beatrice Willis, King’s College London
Billy Wong, King’s College London

S11.9.4 Muslim Students’ Conceptions of Evolution
Anila Asghar, McGill University, anila.asghar@mcgill.ca
Saouma B. Boujaoude, American University of Beirut
Jason R. Wiles, Syracuse University
Brian Alters, McGill University

Strand 14: Environmental Education

S11.10 Symposium – Theorizing Inquiry, Science Education, and Professional Development from Indigenous Hawaiian and Aboriginal Taiwanese Perspectives
10:15am – 11:45am, Bonaire 5

Presider:
Pauline W. U. Chinn, University of Hawaii at Manoa

Discussant:
Huei Lee, National Dong Hwa University, Hualien, Taiwan

Presenters:
Alyson Barrows, University of Hawaii at Manoa
Huihui Kanahele-Mossman, University of Hawaii at Manoa
Michelle M. Kapana-Baird, University of Hawaii at Manoa
Sabra Kauka, University of Hawaii at Manoa
Gandharva M. Ross, University of Hawaii at Manoa
Kellie Kong, University of Hawaii at Manoa
Chiung-Fen Yen, Providence University, Taichung, Taiwan
Su-Fen Lin, Providence University, Taichung, Taiwan

Lunch – On Your Own
12:00pm – 1:00pm

Concurrent Session #12
1:00pm – 2:30pm

S12.1 Symposium - Managing the Digital Intellectual Life(stream) of a 21st Century Science Education Scholar
1:00pm – 2:30pm, Antigua 1

Presider:
Carla Zembal-Saul, Penn State University

Presenters:
Scott P. Mcdonald, Penn State University
Eric N. Wiebe, North Carolina State University
Strand 1: Science Learning, Understanding and Conceptual Change
S12.2 Related Paper Set - Metacognition in Science Education: Theory and Practice
1:00pm – 2:30pm, Curacao 1

Discussant:
Larry Yore, University of Victoria

S12.2.1 Overview and Discussion of the Forthcoming Book Metacognition in Science Education: Trends in Current Research
Anat Zohar, Hebrew University, msazohar@mscc.huji.ac.il

S12.2.2 Metacognition and a Naive View of Reading Science
Stephen P. Norris, University of Alberta
Linda M. Phillips, University of Alberta

S12.2.3 A Metacognitive Tool and Its Effect on Complex Questions Posed by High School Chemistry Majors
Yehudit J. Dori, Technion, Israel Institute of Technology
Ort Herscovitz, Technion, Israel Institute of Technology
Osnat Eldar, Weizmann Institute of Science
Miki Ronen, Holon Institute of Technology
Bat-Sheva Eylon, Weizmann Institute of Science

Strand 2: Science Learning: Contexts, Characteristics and Interactions
S12.3 Related Paper Set - Contemporary Perspectives on Genetics Learning: Environments for Supporting Student Learning of Genetics and Scientific Practices
1:00pm – 2:30pm, Curacao 2

S12.3.1 Characterizing Conceptual Dependencies in the Development of Students’ Understandings of Classical and Molecular Genetics
Duncan Ravit Golan, Rutgers University, ravit.duncan@gse.rutgers.edu
Nicole Shea, Rutgers University

S12.3.2 Problem-solving in an Authentic Learning Environment: The use of Bioinformatics Tools and Databases for Learning Genetics and Biotechnology
Yossy Machluf, Weizmann Institute of Science
Orna Dahan, Weizmann Institute of Science
Amir Mitchell, Weizmann Institute of Science
Anat Yarden, Weizmann Institute of Science

S12.3.3 Examining Student Understanding of the Genome Sciences: Supporting Connections Between Science and Everyday Life
Katie Van Horne, University of Washington
Hiroki Oura, University of Washington
Andrew W. Shouse, University of Washington
Philip Bell, University of Washington

S12.3.4 Learning Genetics of Human Behavior and Disease Through Exploring Real Scientific Data
Hiroki Oura, University of Washington
Katie Van Horne, University of Washington
Andrew W. Shouse, University of Washington
Philip Bell, University of Washington

S12.3.5 Using Professional Development to Support Classroom Discussions in Genetics and Genomics: Getting Students Talking
Nonye Alozie, Wayne State University

Strand 3: Science Learning: Interactions, Communication and Technology
S12.4 Related Paper Set - Examinations of the Beliefs of Teachers: Exploring a Complex Construct
1:00pm – 2:30pm, Curacao 3

S12.4.1 Relationships between Physics Teachers’ Beliefs about Nature of Science, their General Educational Beliefs, and Self Reported Teaching Behaviour Purpose and Theoretical Framework
Nelleke A.H. Belo, ICLON Leiden University, nbelo@iclon.leidenuniv.nl
Jan H. Van Driel, ICLON Leiden University
Nico Verloop, ICLON Leiden University

S12.4.2 Exploring the Beliefs of Persisting Secondary Science Teachers in General Induction Programs: A Longitudinal Study
Sissy Wong, University of Houston
Julie Luft, Arizona State University

S12.4.3 Context Based Science Education: Chemistry Teachers’ Knowledge and Beliefs, and their Students’ Learning Outcomes
Ineke Henze, ILS Radboud University

S12.4.4 Beliefs of Beginning Secondary Science Teachers Over Five Years: Stability and Change
Julie Luft, Arizona State University
Sissy Wong, University of Houston
Strand 5: College Science Teaching and Learning (Grades 13-20)
S12.5 Learning Chemistry & Measurement Skills
1:00pm – 2:30pm, Curacao 5
**Presider:**
Peter Meyerson, College of Education & Human Services

S12.5.1 Heuristic Reasoning: How do Students Make Decisions in Chemistry?
Vicente Talanquer, University of Arizona, vicente@u.arizona.edu
Lakeisha Mcclary, University of Arizona

S12.5.2 Measuring Volume of Tree: A Problem-driven, Modeling-based Lesson for Preservice Science Teachers
Ji Shen, University of Georgia, jishen@uga.edu

S12.5.3 College Students’ Understanding of the Particulate Nature of Matter Across Reaction Types
James M. Nyachwaya, University of Minnesota, Twin Cities, nyach002@umn.edu
Gillian H. Roehrig, University of Minnesota, Twin Cities
Anne L. Kern, University of Idaho
Nathan Wood, North Dakota State University
Jamie Schneider, University of Wisconsin, River Falls
Abdi-Rizak Mohamed, University of Minnesota, Twin Cities

S12.5.4 Exploring Alternative Conceptions on Molecular Geometry in Postsecondary Chemistry Education
Caroline Cormier, Université de Montréal, caroline.cormier.1@umontreal.ca
Jesús Vázquez-Abad, Université de Montréal

S12.6 Approximations of Practice in an Elementary Science Methods Course: Preservice Teachers Learning to Teach Investigations
Michele Nelson, Graduate Student, University of Michigan, mishmash@umich.edu
Elizabeth A. Davis, Associate Professor of Science Education, University of Michigan

S12.6.2 Providing a Conductive Learning Environment in Content Courses for Elementary Pre-service Teachers’ Understanding of Scientific Modeling
James A. Hagerty, University of Michigan, haijs@umich.edu
Jean P. Krisch, University of Michigan
Elizabeth A. Davis, University of Michigan

Strand 7: Pre-service Science Teacher Education
S12.6 Preservice Teachers’ Learning of Scientific Practices
1:00pm – 2:30pm, Curacao 7
**Presider:**
Cory T. Forbes, University of Iowa

S12.6.1 Qualities of Pre-Service Teachers’ Classroom Questioning
Melissa L. Shirley, University of Louisville, melissa.shirley@louisville.edu
Stephanie B. Philipp, University of Louisville

S12.6.2 Approximations of Practice in an Elementary Science Methods Course: Preservice Teachers Learning to Teach Investigations
Michele Nelson, Graduate Student, University of Michigan, mishmash@umich.edu
Elizabeth A. Davis, Associate Professor of Science Education, University of Michigan

S12.6.3 Providing a Conductive Learning Environment in Content Courses for Elementary Pre-service Teachers’ Understanding of Scientific Modeling
James A. Hagerty, University of Michigan, haijs@umich.edu
Jean P. Krisch, University of Michigan
Elizabeth A. Davis, University of Michigan

S12.6.4 Exploring the Use of Lesson Study to Develop Elementary Preservice Teachers’ PCK for NOS
Khemmawadee Pongsanon, Indiana University, kpongsan@indiana.edu
Valarie L. Akerson, Indiana University
Meredith A. Park Rogers, Indiana University
Ingrid S. Weiland, Indiana University
Strand 8: In-service Science Teacher Education
S12.8 Teacher Beliefs
1:00pm – 2:30pm, Curacao 8
**Presider:**
Mehmet Fatih Tasar, Gazi Universities

S12.8.1 Sociocultural Contexts of Science Teachers’ Beliefs and Practices: Teachers’ Perspective
Nasser Mansour, University of Exeter, n.mansour@ex.ac.uk

S12.8.2 School and Teacher Factors as Contributors to the Effectiveness of an Elementary-Level Professional Development Program
Dina Drits, University of Utah, dina.drits@utah.edu
Louisa Stark, University of Utah

S12.8.3 Exploring the Role of Context in Shaping Indian Science Teachers’ Orientations
Vanashri Nargund-Joshi, Indiana University, Bloomington, vnargund@indiana.edu
Meredith Nargund, Indiana University, Bloomington

S12.8.4 The Impact of Research Experience for Teachers (RET) Professional Development Programs on Teacher Beliefs and Practice
Patrick Enderle, The Florida State University, pje07@fsu.edu
Katrina Roseler, The Florida State University
Barry Golden, The Florida State University
Sherry A. Southerland, The Florida State University

Strand 10: Curriculum, Evaluation, and Assessment
S12.9 Related Paper Set - Impact of Educative Materials and Transformative Professional Development on Teachers’ PCK, Practice, and Student Achievement
1:00pm – 2:30pm, Bonaire 1
**Discussant:**
April L. Gardner, BSCS

S12.9.1 Impact of Educative Materials and Transformative Professional Development on Teachers’ Pedagogical Content Knowledge
Janet Carlson, BSCS, jcarlson@bscs.org
April L. Gardner, BSCS

S12.9.2 The Measurement of Pedagogical Content Knowledge and Its Relationship to Teacher Practice
April L. Gardner, BSCS
Molly A.M. Stuhlsatz, BSCS

S12.9.3 Using HLM to Examine Relationships Among Teachers’ Pedagogical Content Knowledge, Practice, and Student Achievement
Christopher D. Wilson, BSCS
Joseph A. Taylor, BSCS

S12.9.4 Teacher Explanations for Changes in Pedagogical Content Knowledge
Sharon Cardenas, Northern Arizona University
Julie Gess-Newsome, Northern Arizona University
Barbara A. Austin, Northern Arizona University

Strand 11: Cultural, Social, and Gender Issues
S12.10 Symposium - Theoretical and Empirical Analyses of Social Capital and Networking in Science Education: From Global to Local
1:00pm – 2:30pm, Curacao 3
**Discussant:**
Kenneth G. Tobin, The Graduate Center of CUNY, ktobin@gc.cuny.edu

S12.11 Teachers’ and Students’ Attitudes towards Science and Teaching
1:00pm – 2:30pm, Bonaire 2
**Presider:**
Nievita Bueno Watts, Arizona State University

S12.11.1 Compounding Variables: Positionality of African American Girls as Science Learners
Rose M. Pringle, University of Florida, rpringle@coe.ufl.edu
Thomasenia Adams, University of Florida
Cirecie West-Olatunji, University of Florida

S12.11.2 Building a Scientific Identity in the Figured Worlds of Kindergarten Science
Alicia M. Medyre, The Pennsylvania State University University Park, axd252@psu.edu
Deborah C. Smith, The Pennsylvania State University University Park
Circie West-Olatunji, University of Florida

S12.11.3 The Effects of Becoming a Science Focus School in Regards to Urban, Low SES, African American Girls’ Emotional Engagement with Science
Gayle A. Buck, Indiana University, gabuck@indiana.edu
Kristin L. Cook, Indiana University
Cassie F. Quigley, Clemson University
S12.11.4 Discourse of Science: Helping English Language Learners with Speaking, Reading, and Writing
Molly H. Weinburg, Texas Christian University, m.weinburg@tcu.edu
Cecilia Silva, Texas Christian University

Strand 13: History, Philosophy, and Sociology of Science
S12.12 Strategies to teach Nature of Science
1:00pm – 2:30pm, Bonaire 4
*Presider:*
Allan Feldman, University of South Florida

S12.12.1 Impact of a Pure vs. Applied Science Immersion Experiences on Preservice Teachers’ View of NOS
Pongprapan Pongsophon, Kasetsart University, Thailand, feduppp@ku.ac.th
William F. McComas, University of Arkansas

S12.12.2 Using Mainstream Films to Teach Nature of Science and Scientific Inquiry to Preservice Elementary Teachers
Mark Bloom, Texas Christian University, m.bloom@tcu.edu
Ian C. Binns, Louisiana State University
Catherine M. Koehler, Illinois Institute of Technology

S12.12.3 The Application of Nature of Science Understandings into Unfamiliar Contexts: Is It Possible?
Rola Khishfe, American University of Beirut, rk19@aub.edu.lb
Mohammed Estaiteyeh

S12.12.4 Emergent Understandings of Scientific Creativity in the Secondary Science Classroom
Context: Implications for Both Research and Practice
Allison Antink, Illinois Institute of Technology, aantink@iit.edu

Concurrent Session #13
2:45pm – 4:15pm

Strand 1: Science Learning, Understanding and Conceptual Change
2:45pm – 4:15pm, Curacao 1
*Presider:*
Larry D. Yore, University of Victoria

S13.1.1 Going Beyond ‘Science Literacy for All’ as a Slogan to a Cognitive Model: Introduction
Larry D. Yore, University of Victoria

S13.1.2 Changing from Users to Producers of Multimodal Texts: A Theoretical Framework Based on Cognition, Metacognition, Semiotics, and Systemic Functional Linguistics
Christine D. Tippett, University of Victoria
Robert J. Anthony, University of Victoria

S13.1.3 Attachment, Embeddedness, and Integration: Levels of Cohesiveness in Multimodal Writing Tasks and Impact on Student Learning in Science
Mark McDermott, Wartburg College
Brian Hand, University of Iowa

S13.1.4 The Theoretical Basis and the Cognitive, Linguistic and Pedagogical Advantages of Code Switching in Multilingual Classrooms of South Africa to Address the 3-Language Problem (home, school and science)
Mary Grace Villanueva, University of Iowa
Paul Webb, Nelson Mandela Metropolitan University

S13.1.5 Functional Linguistics, Language Tasks and Strategies, and Science Inquiry Using the 5E Approach
Susan Gomez-Zwiep, California State University, Long Beach
Mary Strits, California State University, Long Beach
Lauren Shea, University of California, Irvine
Therese Shanahan, University of California, Irvine

Strand 2: Science Learning: Contexts, Characteristics and Interactions
S13.2 Science Learning in Authentic Contexts: The Impact of Place and Voice on Rural Students’ Experiences
2:45pm – 4:15pm, Curacao 2
*Discussant:*
Angela M. Calabrese-Barton, Michigan State University

S13.2.1 Eliciting, Identifying and Utilizing Rural High School Students’ Funds of Knowledge in the Service of Science Learning in their Backyard
Ellen M. Lloyd, University of Rochester, elllenmloyd@hotmail.com
S13.2.2 Eliciting and Activating Funds of Knowledge in an Environmental Science Community College Classroom
John VanNiel, University of Rochester

S13.2.3 Using Place-Based Pedagogy in a High-Stakes Biology High School Course
Peter Saracino, University of Rochester

S13.2.4 The Use of Exotic Spaces and Experiences to Inspire and Inform Rural Students’ Construction of Personal Science Stories
Joseph A. Henderson, University of Rochester
April L. Luehmann, University of Rochester
Brian Bailey, Nazareth College

Strand 4: Science Teaching--Middle and High School (Grades 5-12): Characteristics and Strategies
S13.3 Symposium - What Works When and How: Investigating Capacity Building in a Large Scale STEM Education Reform Program
2:45pm – 4:15pm, Curacao 4
Presenters:
Susan Yoon, University of Pennsylvania, yoonsa@gse.upenn.edu
Lei Liu, University of Pennsylvania
Jorge Santiago-Aviles, University of Pennsylvania
Sao-Ee Goh, University of Pennsylvania
Dorothea Lasky, University of Pennsylvania
Betty Chandy, University of Pennsylvania
Joyce Wang, University of Pennsylvania
Kira Baker-Doyle, Pennsylvania State University

Strand 5: College Science Teaching and Learning (Grades 13-20)
S13.4 Scientific Literacy & Societal Issues in Science Instruction
2:45pm – 4:15pm, Curacao 5
Presider:
Geoffrey Potvin

S13.4.1 Exploring Genetic Literacy: How Undergraduate Science Majors Reason About Authentic Genetic Dilemma
Nicole Shea, Rutgers University, nlefur@eden.rutgers.edu
Ravit Duncan, Rutgers University
Celeste Stephenson, Rutgers University

S13.4.2 Conceptually Eleven?: The Disconnect between Expectations and Undergraduate Conceptual Understanding in Earth and Related Sciences
Julie Libarkin, Michigan State University, libarkin@msu.edu
Anila Asghar, McGill University

S13.4.3 Measuring the Use of Science Content During Socioscientific Issues Negotiation: The SSI-Q
Samantha R. Fowler, Clayton State University, samantha.fowler@clayton.edu
Dana L. Zeidler, University of South Florida

S13.4.4 Participation in an Interdisciplinary, Socioscientific Issues-Based Human Biology Major and Understanding of Scientific Inquiry
Jennifer L. Eastwood, University of Florida, jleastwood@coe.ufl.edu

S13.4.5 Scientific Literacy of Undergraduate Students Enrolled in Science Faculties
Bulent Cavas, Dokuz Eylul University, Izmir, Turkey, bulentcavas@gmail.com
Yasemin Ozdem, Gaziosmanpasa University, Tokat, Turkey
Pinar H. Cavas, Ege University, Izmir, Turkey
Jale Cakiroglu, Middle East Technical University, Ankara, Turkey
Hamide Ertepinar, Middle East Technical University, Ankara, Turkey

Strand 7: Pre-service Science Teacher Education
S13.5 Symposium - Engaging Pre-service Teachers in Multiple Modal Learning as Animation Creators: International Perspectives on Using Slowmation
2:45pm – 4:15pm, Bonaire 7
Presider:
Allan Feldman, University of Southern Florida, USA
Discussant:
Brian Gravel, Tufts University, USA
Presenters:
Garry F. Hoban, University of Wollongong, Australia, ghoban@uow.edu.au
Wendy Nielsen, University of Wollongong, Australia
Gillian Kidman, Queensland University of Technology, Australia
Pernilla K. Nilsson, Halmstad University, Sweden
Stephen Keast, Monash University, Australia
Rebecca Cooper, Monash University, Australia
Calee Bullard, Monash University, Australia
Denis Jablonski, Southern Oregon University, USA
Strand 8: In-service Science Teacher Education

S13.6 Teacher Beliefs and Self-efficacy
2:45pm – 4:15pm, Curacao 8

Presider:
Lawrence Flick, Oregon State University

S13.6.1 Effect of the SUN Project Workshop on Teacher Self-Efficacy
Ann Batiza, Milwaukee School of Engineering, batiza@msoe.edu
Mary Gruhl, Gruhl Education Consultants LLC
Eric Hagedorn, University of Texas, El Paso
Bo Zhang, University of Wisconsin - Milwaukee
Tim Herman, Milwaukee School of Engineering
Dave Nelson, University of Wisconsin-Madison

S13.6.2 The Achilles’ Heel of Science Inquiry in Elementary Classrooms: Teachers’ Beliefs and Dilemmas
Mijung Kim, National Institute of Education, mijungkim@nie.edu.sg
Aik-Ling Tan, National Institute of Education
Frederick Talaue, National Institute of Education

S13.6.3 A National Study of Elementary Teachers Science Inquiry Professional Development, Knowledge, and Instructional Practice
Gwen C. Nugent, University of Nebraska-Lincoln, gnugent@unl.edu
Jon E. Pedersen, University of Nebraska-Lincoln
Sue Ellen Dechenne, University of Nebraska-Lincoln
Fran Chumney, University of Nebraska-Lincoln
Greg Welch, University of Nebraska-Lincoln

S13.6.4 Elementary Teachers’ Beliefs about Lesson Sequencing
Barbara Austin, Northern Arizona University, baa49@nau.edu
Nena Bloom, Northern Arizona University
Sandie Grinnell, Mount Elden Middle School
Jane Kirkley, Northern Arizona University

S13.7 Nature of Science
2:45pm – 4:15pm, Bonaire 8

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

S13.7.1 Understanding Science: Improving instruction on the nature and process of science
Anastasia Thanukos, University of California Museum of Paleontology, thanukos@berkeley.edu
Molly A.M. Stuhlsatz, BSCS
Judy Scottmoor, University of California Museum of Paleontology

S13.7.2 New Directions: A New Set of Analyses of How Beginning Teachers Change Their Understanding of NOS
Jonah B. Firestone, Mary Lou Fulton Teachers College, Arizona State University, jonah.firestone@gmail.com
Charles Weeks, Arizona State University
Sissy S. Wong, University of Houston
Krista L. Adams, Arizona State University
Irasema B. Ortega, Arizona State University
Julie A. Luft, Arizona State University

S13.7.3 Lasting Impact: Teachers’ Report of How Professional Development in Modeling Has Influenced Their Teaching
Connie Hvidsten, School of Education, University of California, Davis, cjhvidsten@ucdavis.edu
Cynthia Passmore, School of Education, University of California, Davis

S13.7.4 Inquiry-based Instruction in Science Classrooms: Is it Happening?
Daniel K. Capps, Cornell University, dkc39@cornell.edu
Barbara A. Crawford, Cornell University

Strand 10: Curriculum, Evaluation, and Assessment

S13.8 Related Paper Set - Learning Engineering, Engineering to Learn
2:45pm – 4:15pm, Bonaire 1

Presider:
Senay Purzer, Purdue University

S13.8.1 Engineering in the National and State Standards
Senay Purzer, Purdue University
Johannes Strobel, Purdue University
Heidi Diefes-Dux, Purdue University

S13.8.2 Not Your Typical Chair-ity Case: STEM Integration as a Means for Engineering Design
Tamara J. Moore, University of Minnesota
Gillian H. Roehrig, University of Minnesota
Hui-Hui Wang, University of Minnesota
Mi Sun Park, University of Minnesota

S13.8.3 Engineering-design-based Science, Science Content Learning, and Science Attitudes in the Elementary Grades
Kristen Bethke Wendell, Tufts University
Amber Kendall, Tufts University
Merredith Portsmore, Tufts University
Christopher Wright, Tufts University
Linda Jarvin, Tufts University
Chris Rogers, Tufts University
S13.8.4 Parachutes and Solar Ovens: An Evaluation of Engineering Units for Elementary School
Cathy Lachapelle, Museum of Science, Boston
Christine Cunningham, Museum of Science, Boston

S13.8.5 Who Should Learn Engineering? A Case Study of One Teacher's Disparate Teaching Approach with Lower-achieving Students
Christine G. Schnittka, University of Kentucky

Strand 11: Cultural, Social, and Gender Issues
S13.9 Symposium - Ecosystems of Science Across Borders
2:45pm – 4:15pm, Bonaire 2

Presenters:
Sumi Hagiwara, Montclair State University, hagiwaras@mail.montclair.edu
Janell N. Catlin, Teachers College, Columbia University
Tara O'Neill, University of Hawaii - Manoa
Felicia Moore-Mensah, Columbia University
Meghan E. Marrero, U.S. Satellite Laboratory
Jessica F. Riccio, Columbia University
Jonathan Gerlach, Hillsborough County Public Schools
Bhaskar Upadhyay, University of Minneapolis
Kristina Maruyama-Tank, University of Minneapolis
Nancy Albrecht, University of Minneapolis

NARST Executive Board Meeting #3
5:00pm – 10:00pm, Antigua 1 and 2
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Handbook of Research in Asia
Jew Jin Lee (Ed.), National Institute of Education
Singapore

The Culture of Science Education: Its History in Person; Kenneth Tobin, City University of New York and Wolff-Michael Roth (Eds.) University of Victoria, Canada
The book was written for science educators with an interest in the history of science education as it is experienced as lived culture. The book is intended as a reference book for scholars and as

Urban Science Education for the Hip-Hop Generation; Christopher Emdin, Teachers College -Columbia University. The book utilizes autobiography, outcomes of research studies, theoretical explorations, and accounts of students’ experiences in schools to shed light on the causes for the lack of educational achievement of urban youth from the hip-hop generation.

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