21st International Conference of the ASTE

The Southwest Region of ASTE welcomes you to San Antonio. During your stay, we hope that you will visit the historical sites, dine on delicious Tex-Mex, BBQ, or other cuisine, enjoy the beautiful expanded Riverwalk and the many other sights of San Antonio. As the seventh largest city in the United States, San Antonio has all the amenities of a large city, but the downtown area does not have a big city feel. We know that you will enjoy your stay and are happy that we can showcase our city and experience the hospitality of Texas, “The Friendship State.”

The Riverwalk is accessible from the lobby level of the Hyatt and includes a great assortment of bars, shops and restaurants or just a pleasant place to walk along the banks of the San Antonio River. San Antonio recently celebrated completion of the Riverwalk Mission Reach: 8 miles of reclaimed waterways connecting downtown to the historic Spanish missions located south of city center. The San Antonio Riverwalk now provides something for everyone: from the restaurant/bar section many of you are familiar with to the natural feel of the mission reach area and the new upscale museum reach section. And of course, don’t forget the Alamo.

We extend a special thank you to Alladin Hammoudeh for creating the artwork on the cover of this program.

Gil Naizer and Janice Myer, 2014 ASTE Conference Co-Chairs on behalf of the Southwest Region

Program Cover Art by Alladin Hammoudeh; Art Teacher at J. Frank Dobie High School, Pasadena ISD

In order to control conference registration costs the number of meal functions that are included are limited. Meals included with full registration are:

  Thursday evening – dessert reception
  Friday morning – continental breakfast
  Saturday – luncheon

There are dozens of restaurants within a few blocks of the hotel offering a variety of options to fit any budget.
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Welcome to the 2014 Conference from the ASTE President

Dear Friends and Colleagues:

Welcome to the Lone Star State and the 21st Annual ASTE Conference! The Texas state motto, Friendship, fits very well with the nature of our organization. As we gather for our annual sharing of ideas and celebration of our successes, we also visit with familiar friends and make new connections in our professional and personal networks. San Antonio, with its rich culture and history, serves as our conference site this year. Our conference hotel, the Hyatt Regency San Antonio, offers a prime location directly on the River Walk, overlooking the historic Alamo, and within walking distance to many historic sites, excellent restaurants, and exciting entertainment.

As most of you know, the conference is planned and executed through tireless efforts of ASTE members who graciously volunteer to host us each year. Thanks to the extraordinary efforts of this year’s conference chairs, Gil Naizer and Janice Meyer, our program offers many diverse and interesting options. We owe a tremendous debt of gratitude to Gil and Janice who organized and attended to every detail of this meeting so that each of us can enjoy a pleasant and professionally rewarding experience. Be sure to express your personal thanks when you see them this week.

With our host state’s deep and historic connections to space exploration and research (after all, “Mission Control” is in Houston!), it’s no surprise that both keynote speakers’ talks include a space related topic. Dr. David Kring, Director of the Center for Lunar Science and Exploration, will speak with us about “The Effect of Impact Cratering on the Evolution of the Earth and Moon.” And Dr. Larry DeLucas from the Center for Macromolecular Crystallography will share his work and experiences as a payload specialist on the United States Microgravity Laboratory-1 flight, Mission STS-50 in his talk on “A Career in Science: Expect the Unexpected.”

Conference attendees will have opportunities to learn as well as interface with nature during the Environmental Education Forum’s fieldtrip to the Canyon Lake Gorge and Comal Springs, and the Science Teacher Shuffle will traverse amongst the lush vegetation along the River Walk. Other special event options include the Mentor Program and the Women in Science Education (WISE) dinner. A variety of interesting and informative concurrent sessions and workshops, both preconference and embedded, offer many stimulating opportunities to challenge and expand our thinking. Without a doubt, the 2014 ASTE Conference offers a wide array of possibilities to learn, explore, and connect with the science teacher education community.

On behalf the ASTE Board of Directors, I welcome you to San Antonio and wish you a successful new semester/quarter as well as a prosperous and productive new year!

Warmest regards,

Kathy Cabe Trundle, President
Types of Concurrent Sessions at ASTE 2014

**Traditional Paper Set** – Each one hour set will consist of two to four presenters whose papers usually relate to the same thread. Each presenter will discuss a research study, philosophical viewpoint, position, or innovative idea. The session presider will manage the time and facilitate the transition from one presenter to the next. Approximately 20 minutes per presenter.

**Themed Paper Set** – Each set should consist of 2-4 papers decided upon by the authors to share a common theme. Each presenter will discuss research, a philosophical viewpoint, position, or innovative idea. Themed Paper Set will last 60 minutes. Authors will determine how to use the allotted time.

**Poster Presentation** – Each presenter will prepare and display a visual representation of research (completed or in-progress), issue, or practice related to science teacher preparation. Appropriate displays include posters or other creative formats. Presenters will participate in one-on-one conversations about their displays. Free standing poster board stands & push pins will be provided. Suggested poster dimensions 3X4 feet.

**Roundtable** – Each 1 hour roundtable offers the opportunity for participants to share and discuss syllabi, creative pedagogy, issues and trends, culture, history, and research in an intimate and informal manner. Each participant will provide a brief (2-3 minutes) synopsis prior to allowing the audience to circulate among tables.

**Syllabus Sharing** – This format has been designed for the purpose of sharing science education syllabi. Presenters should include evidence of outcomes or student learning to support the course activities and assessments shared.

**Experiential Session** – Each presenter will facilitate a 1 hour hands-on session in which participants interact with specific materials/equipment, methods, activities, or technology applications.

**Professional Development Workshop** – Each 1-3 hour workshop provides information and interaction with a new approach to some aspect of science teacher preparation. Workshops will be offered during both the pre-conference and conference sessions.
Special ASTE Sponsored Sessions

**Presider Training** – Dr. Meta VanSickle will offer a one-hour special training and information session for Presiders on two occasions. Wednesday at 5:30 PM in Pecos and Thursday at 8:00 AM in Chula Vista.

**Meet the ASTE Board** – Meet the members of the ASTE Board and see how you can help serve your organization. Ask any questions. Friday at 8:00 AM in Pecos.

**Town Hall Meeting** – This is an opportunity to share ideas about ASTE with board members and is open to all conference attendees. Friday at 1:30 PM in Chula Vista.

**ASTE as a Catalyst for Leadership Development**
The first ASTE leadership workshop is the beginning of an effort by the Executive Board to make leadership development more explicit and intentional in the activities of the organization. Thursday at 2:45 PM in Directors.

**Mentor/Mentee and First Time Attendees** – This session offers new members and first time attendees an opportunity to learn about the conference, meet experienced members of ASTE, and connect with a mentor to begin developing a professional connection to the Association. Details to be determined & communicated via email from the Membership committee.

**Interviewing Room** - Members wishing to interview potential candidates may sign up to use the Chula Vista Boardroom on a first-come first-served basis. The room will be available between other sessions and open Wednesday through Saturday. Please limit use to no more than 1.0 hour at a time. The sign-up time sheet will be posted outside the room and at the Registration Desk.

**ASTE Publications: Reviewing for the journal** – Meet and talk with the editors of ASTE journals. Editors will provide information about acceptance rates, submission guidelines, and upcoming monographs and journal issues. Friday at 9:15 AM in Pecan.

**ASTE Publications: Meet the Editors/submitting to the journal** – Meet and talk with the editors of ASTE journals. Editors will provide information about acceptance rates, submission guidelines, and upcoming monographs and journal issues. Friday at 2:45 PM in Bowie A.

**Forum Meetings** – All forum meetings will be held Thursday & Friday during lunch hours. Please see pages 13 & 46 for locations.

**Committee Meetings** - Committee meetings will be held Friday during breakfast hours with a few exceptions – see page 35 for locations. The Equity Committee will meet twice, Thursday at 7:00 AM and Friday at 1:30 PM in the Chula Vista Boardroom. The Oversight committee will meet Saturday at 8:00 AM in Chula Vista Boardroom.

**Regional ASTE Meetings** – The ASTE regions will meet as individual groups on Friday at 4:00 PM. See page 59 for locations.

**Women in Science Education Forum and Dinner** – Join your friends at the annual dinner. This year the event, meeting and dinner will be held at Casa Rio on the Riverwalk.
Thread Coordinators

Allan Feldman  
Sami Kahn & Eun Ju Lee  
Ingrid Weiland & Kristin Cook  
Paula Magee  
Beth Lewis  
Carla Johnson & Andrea Milner  
Catherine M. Koehler  
Ian Binns & Mark Bloom  
David Slykhuis  
John Pecore  
Sharon Schleigh  
Brenda Weiser & Vanessa Dodo Seriki

College and University Science  
Curriculum, Pedagogy, and Assessment  
Equity and Diversity  
Preservice Science Teacher Preparation  
Science Teacher Professional Development  
Student Learning P-12  
Policy and Reform  
History, Philosophy, and Nature of Science  
Educational Technology  
Informal Science Education  
STEM Education  
Environmental Education

Proposal Reviewers

Issam Abi-El-Mona  
Valarie Akerson  
Jennifer Albert  
Daniel Alston  
Len Annetta  
Stephen Bartos  
Nazar Bautista  
Meredith Bell  
Karen Bengtson  
Daniel Bergman  
Devarati Bhattacharya  
Ian Binns  
Margaret Blanchard  
Mark Andrew Bloom  
Phillip Boda  
Alec Bodzin  
Sarah Boesdorfer  
SueAnn Bottoms  
Leslie Bradbury  
Stacey Britton  
Julie Brown  
Stephen Burgin  
Andrea Burrows  

Rowan University  
Indiana University  
North Carolina State University  
Clemson University  
George Mason University  
Middle Tennessee State University  
Miami University  
Texas Tech University  
College of St. Benedict/St. Johns University  
Wichita State University  
University of Minnesota  
University of North Carolina at Charlotte  
North Carolina State University  
Dallas Baptist University  
Columbia University: Teachers College  
Lehigh University  
University of Northern Iowa  
Oregon State University  
Appalachian State University  
University of Mississippi  
University of Florida  
Old Dominion University  
University of Wyoming
Brendan Callahan
Brenda Capobianco
Janet Carlson
Nate Carnes
Tina Cartwright
Jeffrey Carver
Robert Ceglie
Elaine Cerrato Fisher
Angela Chapman
Wai Ki Rebecca Cheng
Renee Clary
Michael Clough
Selena Connealy
Arthur Corvo
Theresa Cullen
Jeni Davis
Kathleen Davis
Seyithan Demirdag
Vanessa Dodo Seriki
Sharon Dotger
Shannon Dubois
Mia Dubosarsky
Eva Erdosne Toth
Susan Everett
Xavier Fazio
Allan Feldman
Frederick Freking
Jennifer Frisch
Cory Fuller
Alejandro Gallard
Nicole Glen
David Goodman
Aimee Govett
Lisa Gross
Mark Guy
Rita Hagevik
Deborah Hanson
Deborah Hanuscin
Richard Hechter
Deb Hemler
Ben Herman
Kennesaw State University
Purdue University
BSCS
University of South Carolina
Marshall University
West Virginia University
Mercer University
University of South Florida
University of Texas - Pan American
George Mason University
Mississippi State University
Iowa State University
Texas Tech University
Loyola University Maryland
University of Oklahoma
University of South Florida
University of Massachusetts Amherst
University of Oklahoma
University of Houston Clear Lake
Syracuse University
The University of Georgia
Worcester Polytechnic Institute (WPI)
West Virginia University
University of Michigan-Dearborn
Brock University
University of South Florida
University of Southern California
Kennesaw State University
University of South Carolina
Georgia Southern University
Bridgewater State University
Texas Tech University
East Tennessee State University
Appalachian State University
University of North Dakota
The University of North Carolina at Pembroke
Hanover College
University of Missouri
University of Manitoba
Fairmont State University
University of South Florida
Ron Hermann
Kathleen Hill
Althea Hoard
Robert Hollon
Brenda Hungerford
Charles Hutchison
Lori Ihrig
Karen Irving
Paul Jablon
Dionne Jackson
Lynda Jenkins
Melissa Jurkiewicz
Sami Kahn
Brandi Kamp
Engin Karahan
Meredith Kier
Sungho Kim
Elizabeth Klammer
Vanessa Klein
Catherine Koehler
Jerrid Kruse
Lucy Kulbago
Richard Lamb
Timothy Laubach
Zane Laws
Eun Ju Lee
Soon Chun Lee
Carole Lee
Anna Lewis
Elizabeth Lewis
Mary Lightbody
Shiyu Liu
Kimberly Lott
Christine Lotter
Lauren Madden
Jennifer Maeng
Paula Magee
Lisa Martin-Hansen
Kristina Maruyama Tank
William (Bill) McComas
James McDonald

Towson University
Arizona State University
Columbia University-Teachers College
University of Wisconsin - Eau Claire
Texas Tech University
Univ. of North Carolina at Charlotte
Iowa State University
The Ohio State University
Lesley University
Hendrix College
Dalton State College
University of Georgia
University of South Florida
Clemson University
University of Minnesota - Twin Cities
North Carolina State University
The University of Iowa
Dallas Arboretum and Botanical Gardens
Kent State University
Southern CT State University
Drake University
Kent State University
George Mason University
University of Oklahoma
Cisco College
University of Missouri, Columbia
University of Nebraska, Lincoln
University of Maine at Farmington
University of South Florida
University of Nebraska-Lincoln
The Ohio State University Newark
University of Minnesota
Utah State University
University of South Carolina
The College of New Jersey
University of Virginia
Indiana University - Indianapolis
California State University Long Beach
University of Minnesota
University of Arkansas
Central Michigan University
<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
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<tbody>
<tr>
<td>Wayne Melville</td>
<td>Lakehead University</td>
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<tr>
<td>Felicia Moore Mensah</td>
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<tr>
<td>Helen Meyer</td>
<td>University of Cincinnati</td>
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<td>Janice Meyer</td>
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<td>Rommel Miranda</td>
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<td>Monica Mobley</td>
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<td>Patricia Morrell</td>
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<td>Judith Morrison</td>
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<td>Bridget Mulvey</td>
<td>Kent State University</td>
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<td>Miriam Munck</td>
<td>Eastern Oregon University</td>
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<tr>
<td>Gil Naizer</td>
<td>Texas A&amp;M University - Commerce</td>
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<td>Younkyeong Nam</td>
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<td>George O'Brien</td>
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<td>Dilek Ozalp</td>
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<td>John Pecore</td>
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<td>Wardell Powell</td>
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<td>Rose Pringle</td>
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<td>Babara Rascoe</td>
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<td>Melanie Reap</td>
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<td>John Rhea</td>
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<td>Kelly Riedinger</td>
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<td>Jose Rios</td>
<td>University of Washington, Tacoma</td>
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<td>Seema Rivera</td>
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<td>Gillian Roehrig</td>
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<td>Darcy Ronan</td>
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<td>Soleil Roper</td>
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<td>Heather Rudolph</td>
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<td>Dannah Schaffer</td>
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</table>
Adele Schepige
Sharon Schleigh
David Slykhuis
Jennifer Smith
Mandy Smith
David Sparks
Camille Stegman
Susan Stratton
Karthigeyan Subramaniam
Shannon Sung
Lauren Swanson
Sebastian Szyjka
Stephen Thompson
Peggy Tilgner
Christine Tippett
Sara Tolbert
Amy Trauth-Nare
Brenda Turgeon
David Vallett
Vanessa Vernaza Hernandez
Eugene Wagner
Michael Wavering
Angela Webb
Ingrid Weiland
Molly Weinburgh
Lindsay Wheeler
Brooke Whitworth
Heidi Wiebke
Jesse Wilcox
Tiffany Wild
KT Willhite
Robert Williams
Rachel Wilson
Lisa Wood
Yael Wyner
Sandra Yarema
Ibrahim Yeter

Western Oregon University
Purdue Calumet University
James Madison University
Iowa State University
The Ohio State University
University of Texas at Arlington
Storey County Schools
SUNY Cortland
University of North Texas
The University of Georgia
Whittier College
Western Illinois University
University of South Carolina
University of Nebraska Lincoln
University of Ottawa
University of Arizona
Towson University
Purdue University Calumet
University of Nevada Las Vegas
University of South Florida
University of Pittsburgh
University of Arkansas, Fayetteville
Louisiana State University
University of Louisville
Texas Christian University
University of Virginia
University of Virginia
Indiana University
Iowa State University
The Ohio State University
University of Wisconsin - La Crosse
University of Texas at Austin
Appalachian State University
University of Arkansas
City College of New York - CUNY
Wayne State University
Texas Tech University
Workshop Reviewers

Patricia Morrell
University of Portland
Kathleen Blouch
Elizabethtown College
Cathi Koehler
Southern Connecticut State University
Wayne Melville
Lakehead University
Sharon Schleigh
Purdue Calumet University
Andy Cavagnetto
Washington State University
Thomas Diana
Utica College
Stacey Britton
University of Mississippi
Kim Lott
Utah State University
Kate Baird
IUPUC
SueAnn Bottoms
Oregon State University
Kevin Finson
Bradley University
Dee Goldston
University of Alabama

Presiders

Stephen Bartos
Tim Laubach
Tim Laubach
Nazan Bautista
Mary Lightbody
Meredith Bell
Shiyu Liu
Barbara Billington
Edmund Marek
Mark Bloom
Anita Martin
Katie Milton Brkich
Lisa Martin-Hansen
Phillip Boda
Stacy McCormack
Andrea Burrows
Karen McNallen
Andy Cavagnetto
Wayne Melville
Selena Connealy
Felicia Moore Mensah
Art Corvo
Judith Morrison
Theresa Cullen
Gil Naizer
Brian Foley
Erin Peters-Burton
Marcie Galbreath
Stephanie Philipp
David Goodman
Barbara Rascoe
Larry Enochs
Melanie Reap
Rita Hagevik
David Sparks
Rita Hagevik
Camille Stegman
S. Maxwell Hines
Debra Stork
Pamela Jett
Terry Sutton
Carla Johnson
Scott Townsend
Carla Johnson
Sungho Kim
Amy Trauth-Nare
Elizabeth Klammer
David Vallett
Michelle Klosterman
Lindsay Wheeler
Catherine Koehler
Kristin Whittenburg
Michele Hollingsworth Koomen
Brooke Whitworth
Rich Lamb
Bryan Wunar
xii
Sponsors

Carolina Biological Supply Company.  
(Awards)

Lunar & Planetary Institute  
(Keynote Speaker – Dr. Kring;  
and Program Printing)

Our Lady of the Lake University, San Antonio, TX  
(Technology Room)

Andrews Institute of Mathematics & Science Education  
College of Education, Texas Christian University

Exhibitors

Sense Publishers  Springer Publishing

Vernier Software & Technology

Special Thanks to the Following People for Extra Assistance  
Before and During the Conference  
Bob Hollon, ASTE Executive Director  
Meta VanSickle, Presider Training
**Wednesday, January 15, 2014 At A Glance**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>9:00 AM – 5:30 PM</td>
<td>Pre-conference Field Trip</td>
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<td>1:00 – 3:00 PM</td>
<td>Pre-conference Workshop</td>
<td>Pecos</td>
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<td>3:00 – 5:00 PM</td>
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<td>3:00 – 5:00 PM</td>
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<td>5:00 - 9:00 PM</td>
<td>Registration</td>
<td>Los Rios Foyer</td>
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<tr>
<td>5:15 – 7:15 PM</td>
<td>Pre-conference Workshop</td>
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<tr>
<td>5:30 PM</td>
<td>Presider Training</td>
<td>Pecos</td>
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**Pre-Conference Field-trip  Wednesday 9:00 AM - 5:30 PM  Canyon Lake Gorge & Comal Springs**

The ASTE Environmental Education Forum is sponsoring a pre-conference all-day field trip. The field trip will include a tour and hike through the Canyon Lake Gorge and a visit to Comal Springs at Landa Park.

The Glen Rose limestone throughout Central Texas was laid down during the Cretaceous Era over millions of years. But within a few weeks following the dramatic Flood Event of 2002, “the Power of Water” carved a gorge into the landscape below the Canyon Lake Spillway. A true treasure was “unearthed.” On our 1.2 mile guided hike, you will view the geology of central Texas, including Hidden Valley Fault (within the Balcones Fault Zone), geologic formations, the Trinity Aquifer in action, as well as springs and waterfalls. Bring a camera for the spectacular scenery. We will also view biologic succession, 110-million-year-old dinosaur tracks, and examine the numerous Cretaceous marine fossils uncovered during the gorge formation. Hiking through the Gorge can be physically demanding, and is not recommended for people with heart conditions, bad knees, ankles or in poor physical health. Comal Springs is an awesome example of an artesian well and provides a good example of the karst geology/aquifer. We will be joined by an educational specialist from the Guadalupe Blanco River Authority.
### Writing compelling proposals for NSF funding in science teacher education
*David Haury, National Science Foundation; David Campbell, National Science Foundation*

This session will focus on funding opportunities within the National Science Foundation for research and development efforts relating to science teacher education. Practical information and guidance will be provided for writing compelling proposals that are more likely to be competitive for funding.

### Generating effective feedback for science teachers: Using an iPad app to improve classroom practices
*Craig Berg, University of Wisconsin-Milwaukee; Scott Ashmann, University of Wisconsin-Green Bay*

We have developed an iPad application that is designed to gather valid, reliable, and objective data of both teacher and student behaviors during a science lesson. These behaviors become a running record that can be analyzed in multiple ways to provide useful feedback to the teacher being observed. We will use hands-on activities to explore the capabilities of this new classroom observation tool.

### Teaching the nature of science: The rationale, structure, content and administration of a course designed to communicate key NOS ideas to pre and inservice science teachers
*William (Bill) McComas, University of Arkansas; Erin Peters-Burton, George Mason University; Lisa Martin-Hansen, California State University Long Beach*

Participants will engage in an immersive and resource-rich presentation of the content, structure and rationale for a NOS course for pre- and in-service science teachers. Each participant will receive all materials necessary to develop a NOS class or enhance an existing one.

### Integrate iPad® and BYOD with Vernier technology
*David Carter, Vernier*

In this hands-on workshop, you will use Vernier’s digital tools (LabQuest2, probeware) to conduct an investigation with either Graphical Analysis for iPad, or Vernier Data Share for tablets, Chromebooks, and BYOD environments. These tools can help you address NGSS Practices and Performance Expectations, as well as many states’ standards.

### Presider Training
*Wednesday 5:30 – 6:30 PM*

Presiders will learn the expectations of their role and tips for keeping sessions on schedule.
Thursday, January 16, 2014 At A Glance

6:45 AM  Fun Run/Walk  Lobby

Start off the conference by joining colleagues for a 3 mile fun run or a 2 mile walk along the River Walk. There’s no better way to start the day than with a little exercise in a non-threatening atmosphere with terrific company.

7:00 – 5:00 PM  Registration  Los Rios Foyer (Ballroom Level)

7:00 - 8:00 AM  Breakfast on your own

Numerous restaurants are within a few blocks of the hotel.

7:00 - 8:00 AM  Equity Committee Meeting  Chula Vista Boardroom

8:00 - 9:00 AM  Presider Training Sessions  Chula Vista

8:00 - 10:00 AM  Professional Development Workshops

8:00 - 10:15 AM  Sessions

10:30 - Noon  Keynote Speaker: David Kring  Regency Ballroom East

Noon – 1:30 PM  Lunch on Your Own

Numerous restaurants are within a few blocks of the hotel.

12:30 - 1:30 PM  Forum Meetings  See Page 13

Scientist/Science Educator Collaboration

Seniors as Resources for Science Education

Environmental Education

Women in Science Education Meetings

1:30 - 3:30 PM  Professional Development Workshops

1:30 - 5:00 PM  Sessions

5:00 – 7:00 PM  Dinner on your own

7:30 - 9:30 PM  Dessert Reception & Poster Session (see Page 26)  Rio Grande Ballroom

Poster Presenters set up at 7:00 PM
<table>
<thead>
<tr>
<th>Equity Committee Meeting</th>
<th>Thursday 7:00 - 8:00 AM</th>
<th>Chula Vista Boardroom</th>
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<tr>
<td>The Equity Committee works to ensure that the Association, in all forms and representations, addresses equity issues, including representation, access, and compliance with ASTE SOPs and By-Laws.</td>
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<tr>
<th>Presider Training</th>
<th>Thursday 8:00 - 9:00 AM</th>
<th>Chula Vista</th>
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<td>Presiders will learn the expectations of their role and tips for keeping sessions on schedule.</td>
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<tr>
<th>Embedded Workshop</th>
<th>Thursday 8:00 - 10:00 AM</th>
<th>Directors</th>
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<tr>
<td>The good, the bad, and the reality of writing: Reworking your personal writing strategies</td>
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<tr>
<td>Michelle Klosterman, University of Missouri; Stephen Witzig, University of Massachusetts Dartmouth; Deborah Hanuscin; University of Missouri</td>
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<tr>
<td>Emerging scholars are often overwhelmed by the pressure of &quot;publish or perish.&quot; Join our group of experienced and emerging scholars to discuss the good, the bad, and the reality of writing. An emphasis will be placed on personal writing strategies, writing for publication, submitting manuscripts, and the peer-review process.</td>
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<th>Embedded Workshop</th>
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<th>Live Oak</th>
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<td>Assisting graduate students through the lonely job search process part 1 - the job market, creating CVs, and the interview</td>
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<td>Lori Ihrig, Iowa State University; Lloyd Barrow, University of Missouri; Joanne Olson, Iowa State University; Ryan Walker, Mississippi State University</td>
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<td>This session will address topics pertinent to graduate students looking for faculty positions in science education, the job market, creating CVs, and the interview. Also join us for Part 2 of this workshop focusing on the professoriate and the experiences of a new professor.</td>
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<th>Traditional Paper Set</th>
<th>Thursday 8:00 - 9:00 AM</th>
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<tr>
<td>Thread: Student Learning P-12</td>
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<tr>
<td>Presider: David Goodman</td>
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<td>Socioscientific intertextuality in secondary science</td>
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<tr>
<td>Alandeom Oliveira, State University of New York at Albany; Troy Sadler, University of Missouri; Christina Nash, State University of New York at Albany</td>
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<td>This study examines socioscientific intertextuality, how writers juxtapose and connect across multiple texts for collaboratively making sense of socioscientific issues. Our intertextual analysis focuses on teacher and student writing during implementation of two biology cases written by teachers familiar with case-based pedagogy.</td>
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Death and dying in school science
Michele Snyder, University at Albany, SUNY; Alandem Oliveira, University at Albany, SUNY; Giuliano Reis, University of Ottawa; Daniel Chaize, University at Albany, SUNY
This study examines how three elementary teachers approach the task of facilitating whole-class discussions about nonhuman death. Our findings reveal the variety of ways in which animal death is cognitively, socioculturally, and morally organized in elementary science discussions.

A longitudinal study of teaching the cell unit in introductory high school biology
Joseph Oliver, The University of Georgia; Georgia Hodges, University of Georgia; Wendell Rogers, University of Georgia; Kyung-A Kwon, University of Georgia; Sara Raven, University of Georgia; Melissa Jurkiewicz, University of Georgia; Shannon Dubois, University of Georgia
The purpose of this presentation is to discuss findings from a longitudinal study of the implementation of computer-based modules in biology classrooms. We will discuss implications as they relate to the instructional use of the modules by teachers as well as evidences of student learning we can document utilizing proximal and distal measures.

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<th>Traditional Paper Set</th>
<th>Thursday 8:00 - 9:00 AM</th>
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<tr>
<td>Thread: Educational Technology</td>
<td>Presider: Camille Stegman</td>
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Reason Racer: An on-line game to support learning of scientific argumentation
James Ellis, The University of Kansas; Center for Research on Learning; Janis Bulgren, The University of Kansas; Marilyn Ault, The University of Kansas; Jana Craig-Hare, The University of Kansas
This paper reports the results of an quasi-experimental study of an NSF-supported research project, the Evidence Game, to investigate the feasibility of a developing an on-line game, Reason Racer, to support middle-level science teachers in motivating and engaging students in developing the knowledge and abilities of scientific argumentation.

Analysis of two computer simulation professional development programs
Amanda Gonczi, University of Virginia; Randy Bell, Oregon State University; Brooke Whitworth, University of Virginia
This study compared participant computer simulation use following two different professional development programs.

Assessment of student 21st Century Skills using Serious Educational Games in the science classroom
Richard Lamb, Washington State University; David Vallett, University of Nevada Las Vegas; Leonard Annetta, George Mason University
The science education community has entered a new era in assessment. One possible way to meet this requirements for the changing model of assessment is through real-time (computer adaptive) cognitive diagnostic assessments using 21st Century Skills as a framework.
Engaging students in the science and engineering practices of the Next Generation Science Standards (NGSS) with Computer Supported Collaborative Science (CSCS)

*Norman Herr, California State University, Northridge; Mike Rivas, California State University, Northridge*

Computer Supported Collaborative Science (CSCS) is a methodology that uses collaborative cloud-based resources to engage all learners in the collection, analysis, and interpretation of individual data in the context of whole-class data so as to engage learners in the scientific and engineering practices required by NGSS.

Reducing stereotype threat in the science classroom

*David Sparks, University of Texas at Arlington; Gil Naizer, Texas A&M University-Commerce*

A recent study of African American engineering students sheds light on the needs of minorities and females in Science, Technology, Engineering, and Mathematics (STEM) college majors. Implications for the science classroom will be discussed as well as strategies for reducing stereotype threat faced by female students and students of color.

Characteristics of effective scientist-educator outreach partnerships and their impact on urban middle school students’ science learner characteristics

*Rommel Miranda, Towson University*

The study investigated astronomers’ and teachers’ beliefs about the characteristics of effective outreach partnerships in formal classroom settings and their broader impact on urban middle school students’ science learner characteristics. The findings suggest that outreach partnerships may enhance urban students’ learning experiences in astronomy.

Entrepreneurial teachers in STEM education: A theoretical model

*Ray Price, University of Illinois; Anita Martin, University of Illinois*

Situating "entrepreneurship" in K-12 public education, this study defines entrepreneurial teacher leaders, discusses a theoretical framework, and distinguishes between high innovators and how they differ from their low innovator counterparts. Data analysis focuses on distinct differences in reasoning and perceptions and propensity for risk.

Correlation of metacognition and logical mathematical intelligence in science Japanese students

*Irma Suwarma, Shizuoka University; Yoshisuke Kumano, Shizuoka University; Ilman Anwari, Shizuoka University*
This proposal will share information about the relationship of metacognition score and logical mathematical intelligence of undergraduate science student in Shizuoka University. This proposal will be of interest for educational researchers who are interested in pedagogy development. The results of this study will give new ideas for creating new method learning.

**Effect of experience learning and knowledge in solving complex problems of chemistry**
*I*man Anwari, Shizuoka University; *Kumano Yoshisuke*, Shizuoka University; *Ratnaningsih Sardjono*, Indonesia University of Education; *Wiwi Siswaningsih*, Indonesia University of Education

In order to solve the complex problem required knowledge, intelligence, and metacognition. The goal is to investigate the effect of knowledge and experience toward metacognitive skills. The participants are second year and third year undergraduate students of an university in Indonesia. It shows knowledge and experience in problem solving.

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<th>Traditional Paper Set</th>
<th>Thursday 8:00 - 9:00 AM</th>
<th>Presider: Elizabeth Klammer</th>
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</table>
| Thread: Preservice Science Teacher Preparation | Blanco | **Model of Research-Based Education (MORE) for science teacher preparation**
*Matthew Miller*, Western Washington University; *Chris Ohana*, Western Washington University; *Dan Hanley*, Western Washington University

The MORE for Teachers project, sponsored by NSF, for elementary teacher preparation includes:
1) a preparation infrastructure that includes rigorous science content, focused teaching methods, and integrated field experiences with an emphasis on quality mentoring from cooperating teachers, with
2) a conceptual framework for how people learn science.

“**You need to do it all, now**” in order to maintain success as an urban elementary science education professor
*Paul Jablon*, Lesley University

A description is given of a highly effective self-sustaining, interdependent support matrix among preservice elementary students, college science and science education faculty, public school teachers and staff developers, and public school students in New York City. Each component could not be created or sustained by itself.

**Preparing 21st Century Teachers for 21st Century Students: The new challenge for science teacher educators**
*Anthony Bartley*, Lakehead University; *Wayne Melville*, Lakehead University

This presentation examines how our work in preparing secondary science pre-service teachers for 21st Century Pedagogy in the context of the NSTA Standards for Science Teacher Preparation (2011). We shall look at how course structure, activities and assignments have changed in recognition of redefined needs for teaching and learning.
Informing professional development delivery in real-time: Self-regulated learning microanalysis as a tool

*Erin Peters-Burton, George Mason University*

Self-regulated learning (SRL) microanalysis was used to inform a professional development experience on elementary inquiry of earth science. As the professional development progressed, teachers learned how to set goals, self-monitor their performance, and adapt their learning strategies.

Noticing as organizing structures for science teacher professional development

*Donna Ross, San Diego State; Meredith Houle Vaughn, San Diego State*

Teachers’ professional attending to student thinking forms the basis for research and professional development for 32 secondary science and math teachers. In this presentation we will share our professional development model, science noticing instrument development, and examples from teachers’ analysis of clinical interviews and teaching videos.

Using hands-on performance assessment in K-12 classrooms: assessing mastery of both the science practices and DCIs

*Deborah Tucker, Science Education Consultant; Grant Gardner, Assessment Services, Inc.*

Explore hands-on science performance assessment and its relationship to students’ mastering the Next Generation Science Standards. Learn various uses and purposes of hands-on science assessment, both formative and summative. Discover strategies to implement this powerful set of resources in your science education courses.

Transitioning to a new level of excellence: How to bridge from NGSS to new instructional practice

*Jeff Marshall, Clemson University; Danny Alston, Clemson University*

The Next Generation Science Standards, NGSS, provide rigorous, high expectations for all students. However, a major gap exists between current practice led in most classrooms and mastering these new expectations. This experiential session provides practice and insights into how to transition from prior standards to the NGSS.

The purpose of the graduate student forum is to foster the development of the graduate students in ASTE. All graduate students are welcome.
## Themed Paper Set

**Thread:** Educational Technology

<table>
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<tr>
<th>Title</th>
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<tr>
<td><strong>Computer Supported Collaborative Science (CSCS): An instructional model for teaching the NGSS</strong></td>
<td>Brian Foley, CSUN; John Reveles, CSUN; Norman Herr, CSUN; Marty Tippens, Woodbury College; Matthew d'Alessio, CSUN; Lorain Lundquist, CSUN; Kelly Castillo, CSUN; Virginia Vandergon, CSUN</td>
</tr>
<tr>
<td>The purpose of this paper is to present an instructional model for teaching the NGSS using online collaboration tools (e.g. Google Docs) with their students to support science inquiry. We discuss our professional development methods and the impact on teacher practice and student learning.</td>
<td><strong>Computer Supported Collaborative Science (CSCS)</strong> is a 4 year effort to train science teachers to use online collaboration tools (e.g. Google Docs) with their students to support science inquiry. We discuss our professional development methods and the impact on teacher practice and student learning.</td>
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## Experiential Session

**Thread:** Curriculum, Pedagogy, and Assessment

<table>
<thead>
<tr>
<th>Title</th>
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<tr>
<td><strong>Binder: Exploring a new web-based tool designed to support beginning teacher lesson planning</strong></td>
<td>Joel Donna, 3Ring - President and CEO; Sarah Hick, Hamline University / 3Ring</td>
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<tr>
<td>This session will help teacher educators and professional developers better support pre-service and beginning in-service science teachers in preparing lessons aligned with using free tools and resources from 3Ring (<a href="http://3ring.org">http://3ring.org</a>).</td>
<td><strong>Binder</strong> is a new web-based tool designed to support beginning teacher lesson planning. This session will help teacher educators and professional developers better support pre-service and beginning in-service science teachers in preparing lessons aligned with using free tools and resources from 3Ring (<a href="http://3ring.org">http://3ring.org</a>).</td>
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## Roundtable

**Thread:** Mixed

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<th>Title</th>
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<tr>
<td><strong>Perspectives on animal dissection and alternatives for biology education</strong></td>
<td>Jan Oakley, Lakehead University; Samantha Suiter, People for the Ethical Treatment of Animals/Trident Technical College; Regina Milano, West Haven High School (CT); Justin Goodman, People for the Ethical Treatment of Animals/Marymount University</td>
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<tr>
<td>This roundtable session will address student and educator perspectives on classroom animal dissection, non-animal alternatives and associated educational, policy and ethical issues. The discussion will facilitated by a panel of secondary and college science educators, educational researchers and social scientists.</td>
<td><strong>Perspectives on animal dissection and alternatives for biology education</strong> will address student and educator perspectives on classroom animal dissection, non-animal alternatives and associated educational, policy and ethical issues. The discussion will facilitated by a panel of secondary and college science educators, educational researchers and social scientists.</td>
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## Building school science capacity: Comparison of four urban Catholic grade schools

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<td>Lara Smetana, Loyola University Chicago; Elizabeth Coleman, Loyola University Chicago</td>
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<td>The purpose of this study is to explore leadership and organizational features at the school level in an effort to characterize how four different Catholic elementary schools organize themselves to support science success.</td>
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## Engaging science teachers in culturally relevant science professional development

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<td>Vanessa Dodo Seriki, University of Houston-Clear Lake</td>
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<td>The purpose of this study is to explore leadership and organizational features at the school level in an effort to characterize how four different Catholic elementary schools organize themselves to support science success.</td>
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</table>
Teaching science in meaningful and culturally relevant ways to all learners is important as classrooms become more diverse. This study sought to examine a meaningful way of engaging science teachers in the development of an understanding of race, culture, and class through the use of culturally relevant pedagogy (Ladson-Billings, 1994/1995b).

Repositioning citizen science in the education of teachers: Developing a sense of place, agency and mindfulness

Lynda Jenkins, Dalton State College; Stacey Britton, University of Mississippi; Deborah Tippins, University of Georgia; Elizabeth Pate, University of Texas

In recent years, citizen science has emerged as an exciting and effective teaching pedagogy within science teacher education. This roundtable discussion will allow practitioners to discuss utilization of citizen science in teacher education, specifically in terms of sense of place, agency, and mindfulness.

How teachers (grades 3-8) came to grips with 'actively engaging' their students

Linda Plevyak, University of Cincinnati

This paper reports on the impact of sustained, focused professional development that emphasized reflection, collaboration and communication between teachers. Five math or science teachers were observed by the researcher. Findings showed that ongoing support provided teachers the needed structure to evolve in implementing inquiry instruction.

Academic science vocabulary and depth of knowledge

Catherine Connolly, University of Nevada, Reno; David Crowther, University of Nevada, Reno

This session discusses the results of an experimental, quantitative study where one group was taught academic science vocabulary by integrating it into the lesson, and one group was frontloaded with the vocabulary. The purpose was to determine how vocabulary instruction creates greater vocabulary usage and depth of knowledge of science concepts.

Relating epistemological framing and modes of representation: Perspectives of inservice physics teachers

Richard Hechter, University of Manitoba

The purpose of this research was to explore inservice physics teachers’ (n=20) epistemological framings that impact problem solving strategies, and the use of multiple modes of representation of physics phenomena. Findings provide insight into the tension that forms between students and teachers when their epistemological framings do not coincide.
Traditional Paper Set  Thursday 9:15 - 10:15 AM  Blanco
Thread: Mixed  Presider: Meredith Bell

The effectiveness of web-based curriculum materials to support enactment of a technology-integrated science curriculum
Alec Bodzin, Lehigh University
The implementation of Web-based curriculum materials that includes substantial educative materials designed to support the professional growth of science teachers to implement Web GIS tectonics investigations with limited face-to-face professional development is presented.

The point of Punnett squares: Early career biology teachers’ approaches to teaching heredity
Shannon Dubois, The University of Georgia; Melissa Jurkiewicz, The University of Georgia; Ann Brennan, The University of Georgia; Ben Campbell, The University of Georgia; Julie Luft, The University of Georgia
Little is known about early career teachers’ approaches to teaching certain concepts in biology. To contribute to the knowledge in this area, this research looks at early career biology teachers conceptualizations and enactments of teaching heredity. Implications for science teacher educators pertain to discipline specific teacher education.

Interdisciplinary inquiry pedagogy for elementary school pre-service teachers
Michael Kamen, Southwestern University; Stephen Marble, Southwestern University
This research reports on pre-service teacher experiences learning to teach integrated science and social studies inquiry lessons at an International Baccalaureate (IB) elementary charter school.

Preparing teachers to integrate place-based socioscientific issues in urban classrooms
Kristin Cook, Bellarmine University; Gayle Buck, Indiana University; Ingrid Weiland, University of Louisville
The purpose of this study was to develop a rich understanding of an urban teacher’s experience with implementing place-based instruction on socioscientific issues and to use this understanding to improve our professional development practice.

Secondary science teachers’ understanding of socioscientific issues and its effects on their curriculum implementation plans
Engin Karahan, University of Minnesota; Devarati Bhattacharya, University of Minnesota; Senenge Andzenge, University of Minnesota; Justin McFadden, University of Minnesota; Gillian Roehrig, University of Minnesota
Throughout a professional development workshop on human impacts on a local watershed, six high school teachers participated in focus group and individual follow-up interviews. Focusing on teachers’ understanding of local environmental issues, this study presents how teachers’ understanding of socioscientific issues affect their curriculum ideas.
Collaboration with classroom teachers in conceptual model representation
Anita Roychoudhury, Purdue University; Nicole Goodwine, Jefferson High School; Andrew Hirsch, Purdue University; Daniel Shepadson, Purdue University
We will present a teacher researcher’s (Author 2) collaboration with university-based team to address conceptual issues about teaching greenhouse effect (GHE) with a physical model of greenhouse. In particular her work showed an emphasis on a core practice of science - attention to conceptual model construction through analysis of evidence.

Experiential Session Thursday 9:15 - 10:15 AM Nueces
Thread: Student Learning P-12

Hearts-on, hands-on, minds-on: A model for preschool science learning
Mandy McCormick Smith, The Ohio State University; Kathy Cabe Trundle, The Ohio State University
As an introduction to a theoretical preschool science instructional model, this presentation will inform and engage participants in the three-part, play-based cycle: Hearts-On, Hands-On, Minds-On learning. Participants will experience the instructional model just as young children would during a model lesson using magnets.

Experiential Session Thursday 9:15 - 10:15 AM Pecan
Thread: STEM Education

Integrated STEM - What does it mean to educators?
Andrea Burrows, University of Wyoming; Timothy Slater, University of Wyoming; Mike Borowczak, University of Cincinnati
Join us as we present previous findings and then create an actionable framework for analyzing and enhancing future and present teachers' level of complexity in integrating knowledge, skills, and attitudes across STEM disciplines. What does "STEM integration" mean to teachers and teacher educators?

Themed Paper Set Thursday 9:15 – 10:15 PM Pecos
Thread: STEM Education

EngrTeams: An integrated STEM education mathematics and science partnership project
Gillian Roehrig, University of Minnesota; Tamara Moore, Purdue University; Selcen Guzey, University of Minnesota
EngrTeams strives to increase student learning of science and mathematics (data analysis and measurement), by using an engineering design-based approach for integrated STEM instruction. These three papers address the main strategies for the improving K-12 STEM integration: professional development, curriculum design, and classroom coaching.
Dr. David Kring, Director of the Center for Lunar Science and Exploration, will deliver a talk on “The Effect of Impact Cratering on the Evolution of the Earth and Moon.” His research focuses on what happens when asteroids and comets collide with planetary surfaces, including impact cratering processes and the effects of impacts on the geological and biological evolution of a planet. He is perhaps best known for his work related to the discovery of the Chicxulub impact crater, which has been linked to the mass extinction of dinosaurs and over half of the plants and animals living on Earth 65 million years ago.

Numerous restaurants are within a few blocks from the hotel at both the river and street level.

This session will address topics pertinent to graduate students looking for faculty positions in science education, the professoriate, and the experiences of a new professor during his first years on faculty at an institution with very high research activity. Also join us for Part 1 of this workshop focusing on the job market, creating CVs, and the interview process.

This workshop addresses strategies for overcoming institutional constraints to develop and maintain extensive and demanding research-based secondary science teacher education programs.
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<td>Themed Paper Set</td>
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<td>Medina</td>
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<td>Traditional Paper Set</td>
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The Awards committee will share information about the ASTE awards and provide details about the nomination and review process.

**Awards committee session**

The Awards committee will share information about the ASTE awards and provide details about the nomination and review process.

**Themed Paper Set**

**Thread: Curriculum, Pedagogy, and Assessment**

**Dissecting dissection: Attitudes, practices and policies affecting classroom animal use**

_Justin Goodman, People for the Ethical Treatment of Animals/Marymount University; Jan Oakley, Lakehead University; Regina Milano, West Haven High School_

For ethical, educational, economic and environmental reasons, many students and educators are now critical of the use of animal dissection to teach biology. Yet, the practice is still common. This session presents research on teacher and student perspectives on animal dissection, relevant policies and implications for science teacher education.

**Traditional Paper Set**

**Thread: Mixed**

Presider: David Sparks

**A community-based service-learning project in energy for preservice elementary teachers: Benefits and challenges**

_Carole Lee, University of Maine at Farmington_

This study describes a community-based service-learning project on energy in a science methods course. It examines how the science methods instructor provided an authentic experience for preservice elementary teachers (PSET) to relate their learning of energy to real life situations. Results show a strong positive impact on the learning of PSET.

**Using concept maps as an assessment tool to investigate conceptual change in preservice teachers' understanding of buoyancy**

_Benjamin Kirby, University of North Texas; Pamela Harrell, University of North Texas; Karthigeyan Subramaniam, University of North Texas_

Researchers will present a study that investigated misconceptions in preservice teachers’ understanding of buoyancy and the conceptual change that occurred in response to instructional intervention. Results suggest that preservice programs need to ensure a focus is placed on content acquisition and refinement, in addition to pedagogy and theory.

**Assessing preservice teachers’ concept maps of a science methods course**

_Christine Tippett, University of Ottawa_

A mixed methods study explored instructor assessment of collaboratively created concept maps (CMs). 24 participants produced study guides in the form of CMs showing pedagogical and theoretical ideas discussed during a science methods course. Results indicate that several schemes may be appropriate for rapid, accurate assessment of the CMs.
Science knowledge for teaching: Characterizations from biology and chemistry teachers
Ryan Nixon, University of Georgia; Shannon Dubois, University of Georgia; Melissa Jurkiewicz, University of Georgia; Rene Toerien, University of Cape Town; Benjamin Campbell, University of Georgia; Julie Luft, University of Georgia
This study looks at how biology and chemistry teachers conceptualize their science knowledge for teaching. This is separate from traditional knowledge bases and from the science knowledge of scientists. An analysis of interviews from 16 teachers shows advances in complexity and structure of content knowledge for teaching that comes with experience.

Science teachers’ understandings of science practices in a summer Research Experiences for Teachers (RET) program
Dilek Ozalp, University of South Florida; Allan Feldman, University of South Florida; Angela Chapman, University of South Florida; Fayez Alshehri, University of South Florida; Vanessa Vernaza-Hernandez, University of South Florida
The purpose of this study is to uncover science teachers’ understandings of science practices in an NSF funded summer Research Experiences for Teachers (RET) program. Our findings indicated that the teachers’ understandings of science practices are incomplete or naive. We saw no differences between the preservice and inservice teachers’ responses.

NSU-CAPA: A professional development program to increase the number teachers certified in chemistry and physics
April Adams, Northeastern State University; Saeed Sarani, Oklahoma State Regents for Higher Education; Sophia Sweeney, Northeastern State University; James Hicks, Northeastern State University; Jessica Martin, Northeastern State University
This presentation will focus on the structure of a professional development program, the results and findings from the evaluation of the first-year summer institute, the plans for the next phase of the program based on these findings, and an overview of the Oklahoma Improving Teacher Quality Grant program.

Engineering the story: Professional development program uses children’s’ books to teach engineering practices
Mia lewisarsky, Worcester Polytechnic Institute (WPI)
The Engineering the Story workshop provides PK-6 grade teachers and teacher educators with practical methods to turn any children’s book or classroom text into an engaging engineering design project. The
program models an integration of the NGSS engineering practices with the Common Core standards for Literacy.

**Experiential Session**  
**Thursday 1:30 - 2:30 PM**  
**Pecan**  
Thread: Student Learning P-12

**Using Lego robotics to support math and science content knowledge in K-8 learners**  
*Kate Baird, IUPUC; Davida Harden, IUPUC*  
Join us as we walk through how we are using shared language, science notebooks, Lego Robots, and engineering challenges to build skill for all learners in K-8 classrooms. Lego WeDos were used to develop a model for instruction that is now being tested in Middle School math classes at the Middle school Level.

**Traditional Paper Set**  
**Thursday 1:30 - 2:30 PM**  

**Directors**

**Thread: History, Philosophy, and Nature of Science**

**Presider: Catherine Koehler**

**Developing a professional identity as an elementary teacher of nature of science**  
*Valarie Akerson, Indiana University; Ingrid Weiland, University of Louisville; Vanashri Nargund-Joshi, SUNY Buffalo; Khemawadee Pongsanont, International Olympiad, Thailand*  
This study uses professional identity development as a framework for describing a professor's journey to teaching NOS to elementary children.

**Elementary SPED teachers' initial science inquiry and NOS teaching experiences**  
*Rajlakshmi Ghosh, Kent State University; Bridget Mulvey, Kent State University; Jennifer Chiu, University of Virginia; Randy Bell, Oregon State University*  
This study explored 5 K-5 special education teachers’ nature of science and inquiry instruction and their reflections on that instruction during a graduate-level professional development course. Findings have implications for science teaching methods courses and meeting the needs of all students.

**Preservice elementary teachers’ creation of and experience with historical curricular materials to teach the nature of science**  
*Tiffany Roby, Drake University; Jerrid Kruse, Drake University*  
This paper investigates how elementary preservice teachers created historical short stories to highlight both science content and the nature of science as well as the extent to which the preservice teachers made use of the stories beyond a methods course.

**Embedded Workshop**  
**Thursday 2:45 – 5:00 PM**  

**Directors**

**ASTE as a catalyst for leadership development**  
*Bob Hollon, Executive Director, Association for Science Teacher Education, University of Wisconsin - Eau Claire; Kathy Cabe Trundle, The Ohio State University; Joanne Olsen, Iowa State University*
“The Association for Science Teacher Education (ASTE) promotes leadership and support for professionals involved in the education and development of teachers of science at all levels” is the first sentence in our Mission Statement. The first ASTE leadership workshop is the beginning of an effort by the Executive Board to make leadership development more explicit and intentional in the activities of the organization. **This Workshop costs an additional $15 plus requires advance purchase of the book.

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<td>Thread: Environmental Education</td>
<td>Presider: Mary Lightbody</td>
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**Influence of an intensive, field-based life science course on preservice teachers’ self-efficacy for environmental science teaching**
*Amy Trauth-Nare, Towson University*
We conducted a case study an environmental science methods course to evaluate its effectiveness in enhancing preservice teachers’ self-efficacy for teaching environmental science. Data indicated that combining content and methods coursework with an environmental-based practicum supported positive self-efficacy development.

**In-service teachers’ argumentation and epistemology about global climate change**
*Shiyu Liu, University of Minnesota; Gillian Roehrig, University of Minnesota; Anne Loyle-Langholz, University of Minnesota; Devara Bhattacharya, University of Minnesota*
The present study examines in-service teachers’ argumentation and epistemological understanding of global climate change. This work provides important implications for professional development in climate change education and contributes to the current efforts in enhancing the teaching of scientific argumentation.

**NOS beliefs and socioeconomics: Factors that influence willingness to mitigate global warming**
*Benjamin Herman, University of South Florida*
Using stratified random sampling, this quantitative study links Florida secondary marine science students’ (N=326) beliefs about the scientific methods used to understand global warming and socioeconomic culture to their willingness to act to mitigate global warming impacts.

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<th>Traditional Paper Set</th>
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**Examining elementary students’ science conceptual understanding through engineering design**
*Chelsey Dankenbring, Purdue University; Brenda Capobianco, Purdue University*
This paper outlines the process used to develop and implement open response items that examine elementary students’ conceptual understanding of the cause of the seasons following the completion of an engineering design task. Draw-and-explain tasks coupled with open response questions provides snapshots of students’ mental models.
A case study of an elementary teacher’s orientations to teaching science through engineering design
Madeline Rupp, Purdue University; Brenda Capobianco, Purdue University
This presentation utilizes a case study approach to describe a 6th grade science teacher’s goals and practices when implementing engineering design-based tasks. By examining the teacher’s purposes for instruction and observing the pedagogical methods employed, a characterization of the teacher’s orientation toward teaching is formed.

Elementary STEM inservice professional development in a large urban school district: Implications for practice
Carolyn Parker, The Johns Hopkins University School of Education; Yolanda Abel, The Johns Hopkins University School of Education; Audrey Moshfeghian, The Johns Hopkins University School of Education
Our presentation describes a study that examines a large-scale, urban elementary STEM initiative. The initiative included the development of an integrated STEM curriculum for grade K-5 with accompanying teacher professional development. Findings inform the development for an integrated, elementary STEM approach at the elementary level.

Themed Paper Set             Thursday 2:45 - 3:45 PM        Medina
Thread: Science Teacher Professional Development

U.S. science classes compared to top performing countries: Trends in international mathematics and science studies analysis
Deborah Henry, Texas Christian University; Channa Barrett, Texas Christian University; Katherine Fogelberg, Texas Christian University; Melissa Patterson, Texas Christian University; Hayat Hokayem, Texas Christian University
This paper set focuses on analysis of video clips provided by the TIMSS 1999. We compared U.S. science classes to top performing countries with respect to lesson structure, visual representations, and classroom discourse. We found that while authentic inquiry is still lagging behind, there were some aspects from which we can learn.

Themed Paper Set             Thursday 2:45 - 3:45 PM        Llano
Thread: Curriculum, Pedagogy, and Assessment

Is it worth it? What can a complex student-centered science learning environment offer to students learning science?
Carol Stuessy, Texas A&M University; Cheryl Peterson, Texas A&M University; Jennifer LeBlanc, Texas A&M University; Gokhan Ozturk, Texas A&M University; Baki Cavlazoglu, Texas A&M University; Abbie Perkins, Texas A&M University; Stephen Scogin, Texas A&M University
Experienced science teachers may feel like novices when orchestrating an unfamiliar complex learning environment requiring additional expenditures in time, resources, and energy. The context for papers in this paper set is the complex inquiry-based PlantingScience learning environment used to answer questions about the value of moving from an acquisition to a participation model for teaching science.
Examining persistent myths for teaching science
Daniel Bergman, Wichita State University
30 years ago, the article “You Graduate More Criminals Than Scientists” in the The Science Teacher (Leyden, 1984) discussed 5 myths of teaching science. To determine if these myths exist today, this study collected survey data from 140 science teachers. Discussion includes how this article and data can be used to teach and research future teachers.

Preservice teachers’ clustering of pedagogical content knowledge components while learning to teach science
Rebecca Schneider, University of Toledo; Kellie Plasman, University of Toledo
Cluster analysis was used to identify components of pedagogical content knowledge (PCK) that preservice science teachers draw on while planning, teaching, and reflecting. This teacher educator’s perspective reorganizes PCK based on how preservice teachers develop and link PCK ideas within the tasks of learning to teach.

A balancing act: Teacher challenges with integrating engineering in physical science classrooms
Emily Dare, University of Minnesota STEM Education Center; Joshua Ellis, University of Minnesota STEM Education Center; Gillian Roehrig, University of Minnesota STEM Education Center
This study investigated classroom practices for physics and engineering integration for physical science teachers following an intensive professional development program. Finding that physics content often disappeared in these lessons, we attempt to understand what support teachers might need to move from engineering to integrated STEM.

Research goes to school: Lessons learned from an observation study
Nicole Cook, Purdue University; Gabriela Weaver, Purdue University
Research Goes to School is a professional development program that offers secondary teachers workshops that combine cutting edge research and problem-based learning. This presentation will describe the results of a study that examines how teachers implemented the workshop strategies. Implications for professional development will also be discussed.

Connecting STEM teachers and STEM faculty: Results from the Thomas More College STEM Initiative Grant Project
Kimberly Haverkos, Thomas More College; Manish Sharma, Thomas More College; Chris Lorentz, Thomas More College
This presentation will share the results of a three year grant project that connected classroom STEM teachers with STEM faculty both during the school year and during a summer academy. The content
knowledge and professional development fostered during the grant has provided a strong basis for continued relationships between faculty and teachers.

**Experiential Session Thursday 2:45 - 3:45 PM Nueces**

Thread: College and University Science

**Results of the PCK summit: Web-based modules for use in courses and pd**

*Janet Carlson, BSCS; Julie Gess-Newsome, Oregon State University - Cascades*

During this experiential session, participants will explore the components of web-based modules and provide formative feedback about the design of the interface. The purpose of the exploration of the components is to consider how they can be used in different settings to engage others in richer conversations about PCK and PCK research.

**Traditional Paper Set Thursday 2:45 - 3:45 PM Pecan**

Thread: Policy and Reform

**Academic freedom legislation: The latest effort to undermine the integrity of science and science education**

*Ian Binns, UNC Charlotte*

The purpose of this session is to inform the ASTE membership of the legislative attacks on science education throughout the United States. Participants will learn the strategies used by those who promote this type of legislation and how to address them in an informed manner.

**Sustained professional development in science and world language: Implications for internationalizing preservice and inservice science teacher education**

*Wendy Frazier, George Mason University; Rebecca Fox, George Mason University; Mollianne Logerwell, George Mason University*

This study examines the sustained effects of a teacher exchange program for Science, Technology, Engineering, and Mathematics and World Language teachers as part of an initiative to internationalize our university. Implications for internationalizing preservice and inservice science teacher education are considered in context of limited funding.

**Experiential Session Thursday 2:45 - 3:45 PM Mesquite**

Thread: History, Philosophy, and Nature of Science

**Experiencing Research for Teaching Science [ExpeRTS]: Changes in NOS and NOSI views and practices during a 13-month program**

*Renee’ Schwartz, Western Michigan University; Cathy Northcutt, Western Michigan University; Gunkut Mesci, Western Michigan University; Susan Stapleton, Western Michigan University*

Experiencing Research for Teaching Science [ExpeRTS] is a 13-month program for preservice teachers that includes: (1) 10-week science research internship; (2) Explicit/reflective NOS/NOSI instruction,
group sessions, semester course; (3) middle school teaching practicum. We track changes in views and practices over time.

**A new perspective on teachers' conceptions of nature of science and scientific inquiry and their classroom practice**  
*Stephen Bartos, Middle Tennessee State University; Norman Lederman, Illinois Institute of Technology*  
This investigation compared teachers’ knowledge structures for NOS and SI with those communicated in their classroom practice. Results indicated limited congruence between the two conceptions for all participants and underscore the challenges for teacher educators in developing integrated, coherent conceptions of NOS and SI.

**Secondary science teachers' classroom implementation of nature of science short stories**  
*Jennifer Smith, Iowa State University; Michael Clough, Iowa State University*  
Thirteen secondary science teachers utilized short stories about the development of science ideas to teach about NOS concepts. This study investigates factors influencing teachers’ implementation of the stories in their classroom instruction to determine the viability of these types of curricular materials for secondary science instruction.

**Traditional Paper Set**  
**Thursday 4:00 - 5:00 PM**  
**Chula Vista**

**Thread: Environmental Education**  
Presider: Stephanie Phillip

**Maintaining biodiversity through environmental conservation awareness program in school sectors: A case study of Nigeria**  
*Mayowa Abolaji, Osun-State College of Education*  
Abstract: Environmental problems have become a priority on the world political agenda for the last two decades and this is inevitably linked with the general degradation of our environment which calls for ultimate attention

**Elementary teachers’ conceptions environmental literacy**  
*Teresa Shume, Minnesota State University Moorhead*  
The purpose of this qualitative case study was to describe seven elementary teachers’ conceptions of environmental literacy in relationship to a tall grass prairie restoration project. Themes that emerged from qualitative data analysis resonated with David Sobel’s model of progressive stages in children’s relationships with nature.

**Environmental literacy of sixth grade students in Arkansas: Implications for environmental education**  
Lisa Wood, University of Arkansas; Cathy Wissehr, University of Arkansas  
A study was undertaken to assess the levels of environmental literacy (EL) of sixth grade students across Arkansas. Data were analyzed at four levels: student, teacher, school, and state. EL outcomes (domain and composite scores) were compared to the national baseline data reported in the NELA - Phase One report (McBeth et. al., 2008).
Student achievement in the integration of mathematics in a New York middle school science course

*Luisa McHugh, Stony Brook University*

Contemporary research suggests that in order for students to compete globally in the 21st century workplace, pedagogy must shift to include the integration of science and Mathematics. This research study conducted at a school district in New York examines student’s attitude toward integration and achievement in an integrated science classroom.

Engineering an online course: Issues in design, development, and delivery of a six-week engineering education professional development course for elementary and middle school teachers

*Scott Townsend, Eastern Kentucky University; Austin Hitt, Coastal Carolina University; Jennifer Perkins, Eastern Kentucky University*

This session will discuss the development of a six-week online summer course designed to improve K-8 teachers’ understandings of engineering practices. We will share information regarding the development of course content, issues related to its online delivery, and the impacts on teachers’ understanding of engineering within the classroom.

Development and implementation of a evaluation system for mathematics and biology educators using iPads

*Judith Bazler, Monmouth University; Meta VanSickle, College of Charleston; Letty Graybill, Monmouth University; Dorothy Varygiannes, Monmouth University; Xavier Cupe, Monmouth University; Kyle Seiverd, Toms River High School*

Lessons in today's classroom are expected to have a technology component. The technology components vary greatly with lessons using hand-held devices. Questions then arise about which apps are most effective. Our research was to design an evaluative process and to use it to evaluate a list of topics found in a biology and/or mathematics class.

The ability of students’ in an undergraduate research experience to engage in the next generations science standards’ science practices: Implications for science teacher education

*Matthew Liebelt, University of South Florida; Allan Feldman, University of South Florida; Dilek Ozalp, University of South Florida; Faye Alshehri, University of South Florida; Vanessa Vernaza-Hernandez, University of South Florida; Angela Chapman, University of Texas Pan American*
The Next Generation Science Standards specify a set of science practices for all children to learn by the end of 12th grade. This study reports on the practices learned by undergraduates in a summer research experience and its implications for science teacher education.

**Balancing act: Do preservice teachers in an integrated mathematics/science course categorize a levers problem as mathematics or science?**  
*Peter Cormas, Providence College*

Preservice teachers (N=27) took an integrated math/science course centered on constructivist approaches, learning processes, and epistemologies. Teachers were asked to choose and categorize their approach to a physics simulator problem as math or science. Twenty-six of 27 preservice teachers did not correctly categorize the approach.

**Marine biodiversity and conservation: The synergistic opportunities of combining science and public policy**  
*James McDonald, Central Michigan University*

This session addresses the implementation of a new course called Marine Biodiversity and Conservation. Students studied key issues that involved both science and public policy about marine environments while conducting individual research. Findings presented on students’ skill acquisition and application of new laboratory content knowledge.

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**Developing a community of practice with preservice science teachers using blog-based reflections**  
*Lori Andersen, Kansas State University; Juanita Matkins, The College of William and Mary*

This presentation explores the use of blogs as a medium to facilitate critical reflection and the development of a community of practice. The reflections of 10 preservice secondary science teachers in a methods course were assessed, and those findings were used to revise approaches used in the science methods course.

**YouTube science concept movie creation as context for understanding the 5E model**  
*Mark Guy, University of North Dakota; Richard Hechter, University of Manitoba; Cindy Grabe, University of North Dakota*

This research explored preservice teacher creation of YouTube style science concept movies with a goal of enhancing their science concept and teaching pedagogical knowledge. Findings indicate the activity was valuable for preservice elementary teachers in terms of learning science concepts, working with video tools, and understanding the 5E model.

**Learning to teach elementary science using video analysis as reflective tool**  
*Brian Hartman, Oregon State University; SueAnn Bottoms, Oregon State University*
Noticing is a practice that has been studied as a way to help preservice teachers learn to pay attention to what is important and to make connections between practice and theory. Noticing has been described as a way to shift preservice teachers (PST's) to important aspects of classroom interactions.

**Themed Paper Set**  
**Thursday 4:00 - 5:00 PM**  
**Frio**  
Thread: Policy and Reform

**Implementation of edTPA as a community of practice**

_Felicia Mensah, Teachers College, Columbia University; Jessica Riccio, Teachers College, Columbia University; Clement Gomes, Teachers College, Columbia University; Stefania Macaluso, Teachers College, Columbia University; Denise Mahfood, Darcy Ronan, Teachers College, Columbia University; Saroja Barnes, American Association of Colleges for Teacher Education (AACTE)_

The purpose of this interactive symposium is to present findings of our experience in preparing for the implementation of edTPA in our secondary science education program for a spring 2013 pilot with ten teacher candidates.

**Experiential Session**  
**Thursday 4:00 - 5:00 PM**  
**Nueces**  
Thread: Science Teacher Professional Development

**Bridging science practices with culturally relevant pedagogy: Science as a narrative**

_Marco Nava, Los Angeles Unified School District; Imelda Nava, UCLA_

This inquiry process addresses the need for culturally relevant and responsive pedagogy in science education through the use of Next Generation Science Standards (NGSS). Through culturally relevant inquiry based projects, students learn Common Core State Standards (CCSS) content and are engaged in 21st Century Student Outcomes.

**Experiential Session**  
**Thursday 4:00 - 5:00 PM**  
**Pecan**  
Thread: Science Teacher Professional Development

**A vision for sustainability: Transforming schools through coaching**

_Sharon Beddard Hess, ASSET STEM Education; Barbara Williams, ASSET STEM Education_

Many districts receive grants for teacher professional development but how are these changes sustained once the grant is over? Our research comes from a 5 year Investing in Innovation federal grant where coaching has become the model to sustain the Professional Learning Communities within the schools and the change in culture that has resulted.

**Traditional Paper Set**  
**Thursday 4:00 - 5:00 PM**  
**Mesquite**  
Thread: Mixed  
**Presider: Brooke Whitworth**

**Environmental education for all: Preservice special educators‘ inclusion of environmental education in their teaching practice**

_Vanessa Klein, Kent State University_
Science and environmental education (EE) need to be available to all students, it is therefore necessary for preservice SPED teachers to be introduced to science and EE concepts. The intent of this study is to investigate preservice SPED teachers’ views on environmental education within SPED.

Exploring social-cognitive factors that may influence students’ understandings of how science works: A case study of four urban high school students
Margaret Blanchard, North Carolina State University; Meredith Kier, Howard University; Sherry Southerland, Florida State University
This multi-method, year-long study investigated how four urban high school biology students learned about NOS. Although students’ personal epistemologies seemed connected to their initial ability to understand NOS, despite explicit instruction, their conceptions did not become much more sophisticated. Findings will be discussed in light of NGSS.

A science education pioneer with purpose: The legacy of John W. Renner (1924-1991)
Timothy Laubach, University of Oklahoma
This session will provide a historiography reviewing the academic career and writings of Jack Renner (1924-1991). The purpose of the presentation is to highlight the contributions that were made by this pioneer in the field of science education and the influence of a theory base on previous, current, and future science teaching and learning.

Experiential Session Thursday 4:00 - 5:00 PM Live Oak
Thread: Curriculum, Pedagogy, and Assessment

Teaching plant processes using a wholeness approach
Stephen Thompson, University of South Carolina
Participants will interact with a user-friendly, reliable sensor that measures atmospheric gas levels (the Gastec Pump) and gain information about innovative methods (such as historical plant study summaries) for teaching interrelated plant concepts. Participants will also learn how both can be integrated using a wholeness approach to teaching plan.

Experiential Session Thursday 4:00 - 5:00 PM Llano
Thread: Policy and Reform

Teaching youth again: Reflecting on renewal
Michael Dias, Kennesaw State University; Charles Eick, Auburn University; Laurie Dias, Kennesaw State University
Editors of the ASTE Monograph "Science Teacher Educators as K-12 Teachers: Practicing What We Teach" lead a discussion on findings and implications from cross-case analysis of narratives from ASTE professors who returned to K-12 teaching.
Thread: History, Philosophy, and Nature of Science

Finding ASTE’s pioneers in science education
Kevin Finson, Bradley University; Jon Pedersen, University of Nebraska-Lincoln
This poster will present the results of an effort to gather information from ASTE members since last January regarding our collective science education academic family tree.

STEM pioneer Dr. George William Jeffers: A story of a scientist and scholar who put teaching first
Beth Klein, SUNY Cortland; Starlin Weaver, Salisbury University
Through excerpts from writings, and letters from students and colleagues, learn about STEM pioneer Dr. George William Jeffers (1897-1995), an exceptional science teacher educator and biologist. A respected scholar, active in science and science education organizations, he was also a strong advocate of teacher’s colleges.

Thread: Preservice Science Teacher Preparation

Evolution and pre-service science teachers: exploring acceptance and rejection
Amanda Glaze, University of Alabama; M. Jenice Goldston, The University of Alabama
Between their science and education training and entry into the classroom, pre-service teachers make important choices regarding how, or if, they will teach evolution. Understanding this process unlocks the doors between the public and scientific sectors regarding the unifying concept of biology.

Pre-service teachers' personal and professional attitudes towards science
Adam Alsultan, Southern Illinois University; Vivien Chabalengula, Southern Illinois University; Frackson Mumba, Southern Illinois University
We investigated pre-service teachers' personal and professional attitudes towards science. There are differences and positive correlation in the four personal and professional attitude dimensions: personal and professional relevance, personal and professional difficulty, personal and professional enjoyment, and personal and professional anxiety.

Effects of science methods course level on pre-service teachers' science attitudes, understanding and teaching confidence
Ataallah Alatoai, Southern Illinois University; Vivien Chabalengula, Southern Illinois University; Frackson Mumba, Southern Illinois University
We investigated the effect of science education course level on pre-service teachers' science attitudes, understanding and teaching confidence American pre-service elementary teachers’ attitudes, conceptual understanding and teaching confidence. There are differences and positive correlations in attitude, knowledge and teaching confidence.
An exploratory study of prospective elementary teachers’ knowledge and beliefs about engineering design
Dongmei Zhang, The University of Georgia; Barbara Crawford, The University of Georgia; Deborah Tippins, The University of Georgia
This study explored the knowledge and beliefs of prospective elementary teachers about engineering design prior to and following an engineering design experience. Data included the pre-surveys, the video recording of the design process, field notes, and the audio recordings of interviews. Implications for science teacher education are discussed.

Efficacy belief of prospective EC-6 grade teachers toward science teaching
Eun Young Lee, University of North Texas; Karthigeyan Subramaniam, University of North Texas
This presentation addresses how significant factors like gender, race, the number of science courses taken at the university, and science grades attained at high school influence science-teaching efficacy of early childhood pre-service teachers.

Preservice teachers consideration of commercial curriculum focused on the concepts of growing plants, food and hunger
Meredith McAllister, Butler University; Li-Ling Yang, Roger Williams University; Catherine Pangan, Butler University; Orvil White
This poster details a project involving K-8 preservice teachers in a combined science/social studies methods course in an effort to teach/learn about the curriculum of plants, food, and hunger. Professional development regarding curriculum analysis were conducted. This study informs other instructors on the analysis of curriculum in methods courses.

Beginning secondary science teachers’ views of formative assessment
Melissa Jurkiewicz, University of Georgia; Ryan Nixon, University of Georgia; Rene Toerien, University of Cape Town; Ann Brennan, University of Georgia
This study reports on the strategies that beginning secondary science teachers use to implement formative assessments in their classrooms and their views on assessment for learning.

Thread: Educational Technology

Global collaboration using VPython in high school physics
Brenda Hungerford, Texas Tech University
Communication and collaborative problem solving across cultures are skills in high demand, but how can we prepare our students for the global challenges they will face? A case study involving high school physics students in SC and Belize using VPython software is shared. Successes, challenges, and future aims are discussed.
Improving science affect through Serious Educational Game design and development
Len Annetta, George Mason University; Richard Lamb, Washington State University; David Vallett, University of Nevada-Las Vegas; Rebecca Cheng, George Mason University; Karen Peterman, Karen Peterman Consulting, LLC
Infusing innovative technology in a project-based learning paradigm is not a new approach to science learning. With the release of the Next Generation Science Standards call for inclusion of more engineering design principles, this study reports results from an NSF project in which high school students designed and created education video games.

600 to 6 Million: Does size matter in global collaboration projects?
Patricia (Michele) McCurdy, Texas Tech
Do extreme population differences affect students’ ability to relate with each other in global collaboration partnerships? Come learn about the challenges and successes in a partnership between middle/high school science students in Happy, Texas and English as Foreign Language students at Zhejiang Gongshang University.

Student perceptions of intentional iPad usage in successive science courses
Brandi Kamp, Clemson University; Cynthia Deaton, Clemson University
Schools are incorporating mobile technologies more, but the intentional usage of mobile technologies plays a role in its meaningful integration within a classroom and thus student achievement. This study follows college students from freshman to sophomore year as their science professor intentionally integrated iPad technology in the class.

Beyond dissection: Interactive computer-based methods for biology education
Samantha Suiter, MA, People for the Ethical Treatment of Animals (PETA)/ Department of Biology, Trident Technical College
Alternatives to dissection are being sought by science educators to reduce expenses, avoid harmful animal use, integrate technology in the classroom and accommodate students opting out of dissection. This interactive session will provide tutorials in two popular virtual dissection software programs and discuss benefits of replacing animal use.

Thread: Student Learning P-12

From cotton fields to a university in China: A global collaborative science education journey
Kristin Whittenburg, Texas Tech University
This poster presentation will describe a collaborative effort between a high school science class at a small rural school in Texas and an English as a Second Language class in China. Students at each institution used technology to carry out an interactive project during the fall 2013 semester.
An investigation of Chinese middle school students' view of science
Zhe Wang, Washington State University; Andy Cavagnetto, Washington State University; Clif James, Washington State University
This study investigated Chinese middle school students' view of science by asking them to answer three open-ended questions designed to elicit their understanding of the nature and status of science.

Using corn to bridge home and school literacies: A culture-based, after-school curriculum merging science, math, geography, history, reading, and writing
William Medina-Jerez, University of Texas-El Paso; Lucia Dura, University of Texas-El Paso; Meredith Abarca; Consuelo Carr Salas, University of Texas-El Paso; Grace Borjas, Cedar Grove Elementary School; Virginia Hill, The House Authority of the City of El Paso (HACEP)
This proposal describes a project emerging from an after-school program (La Escuelita Project: Promoting Scientific and Literacy Skills through Culture-Based Activities) implemented last year in a local subsidized housing community. The proposed poster session presents an expanded version of last year’s La Escuelita project.

Tracking improvement of students’ critical thinking skills through an Argument-Based Inquiry Approach
Jeong-yoon Jang, The University of Iowa; Luke Fostvedt, Iowa State University; Brian Hand, The University of Iowa
This study examined the effects of an argument-based inquiry (ABI) approach on the development student critical thinking skills. We tracked improvement of students’ critical thinking skills over the two years.

Thread: College and University Science

An investigation of multiple learning platforms in an introductory biology laboratory class
Amber Reece, University of Central Florida; Malcolm Butler, University of Central Florida; Kenneth Fedorka, University of Central Florida
Students in a majors Biology I course were randomly assigned to one of three learning platforms for two laboratory exercises. Platforms included the traditional physical labs, virtual interactive labs, and simulated labs. Pre/post test performance data and questionnaire results on student attitudes were compared for each group.

Science, films and the scientist: A study examining change in students’ conceptions of scientists using mainstream films
Catherine Koehler, Southern Connecticut State University; Ian Binns, University of North Carolina-Charlotte; Mark Bloom, Dallas Baptist University
The purpose of this study is to develop a strategy to foster change in students’ conceptions of the scientist using mainstream films commonly viewed in secondary science classrooms. The results suggest,
the intervention of films successfully improved students’ understandings of the characteristics of scientists.

Thread: Science Teacher Professional Development

Assessing elementary school teachers perceptions of Argument Based Inquiry as seen in their ideas about Good Science Teaching
Kemunto Nyaema, University of Iowa
This multiple case study on Argument Based Inquiry as seen through the Science Writing Heuristic (SWH) approach provides evidence that use of argumentation in the classroom is an idea that needs to be incorporated into more professional development programs in order to help teachers in using this approach more effectively in the Science classroom.

Connecting climate science and inquiry in K-5 classrooms
Mary Lightbody, The Ohio State University Newark
This research identified changes in elementary teachers’ content knowledge, use of inquiry, differentiated instruction, and informational text through a year long PD program structured around the seven Essential Principles for Climate Sciences and the resources from the Beyond Weather and the Water Cycle online professional development web site.

Inservice teachers’ conceptions and enactment of reform-based science following a science adoption
Susan Gran, Purdue University
This poster presentation will proffer findings regarding the differences that exist in the conceptions and practices of inservice elementary teachers who utilize different resources to implement science instruction. Additionally, findings indicate in what way ongoing professional development can affect teachers’ conceptions and implementation.

Teachers transitioning to the Next Generation Science Standards
James McDonald, Central Michigan University
This in-progress research study project is working with teachers in the central Michigan area for one year as they implement the NGSS. Working with local teachers this qualitative research project uses interviews, classroom observations of science lessons, debriefing of lessons, and the team teaching of lessons. Preliminary results will be shared.

What is the best way to reform science education in Saudi Arabia? Lessons learned for professional development
Hiya Almazroa, Princess Noura University; Saeed Alshamrani, Excellence Research Center for Science and Mathematics / King Saud University
Professional development is one significant mechanism for maintaining a high standard in science teaching. In this paper, we intent to provide guidance stems from best practices as highlighted in the relevant literature and analysis of the status of science education in the country.
Biology teachers’ professional development needs for teaching evolution
Ellen Barnett, University of Missouri; Nicholas Linke, University of Missouri; Patricia Friedrichsen, University of Missouri
We will present the findings of a survey of secondary biology teachers’ professional development needs for teaching evolution.

Exploring inservice and preservice science teacher efficacy beliefs
Maria Rivera Maulucci, Barnard College, Columbia University
This mixed methods study explores the impact of a science teacher professional development seminar on inservice and preservice teachers’ science teaching self-efficacy. Teachers’ self-efficacy beliefs related to personal and contextual factors, such as their awareness of the complexities of effective science teaching in urban contexts.

Thread: STEM Education

Introducing true integration of STEM with elementary pre-service teachers
Sarah Carrier, North Carolina State University; Valerie Faulkner, North Carolina State University; Laura Bottomley, North Carolina State University
This interdisciplinary STEM assignment took place during the pre-service teachers’ (PST) first semester of methods courses. Many of the PST struggled with goals for developing deep knowledge of the science concepts of force and motion or sound and rich mathematical understandings of the meanings behind measurement.

The examination of a pullout STEM program for urban upper elementary students
Daniel Dickerson, Old Dominion University; Craig Stewart, University of Memphis; Angela Eckhoff, Old Dominion University; Stephanie Hathcock, Old Dominion University; Billy McConnell, Old Dominion University
The purpose of this study is to determine whether a pull-out STEM program (STARBASE) makes reading and math scores decrease and examine its impact on urban 4th, 5th, and 6th grade students’ and their parents’ attitudes and perceptions regarding STEM education and careers.

Effectiveness of an elementary STEM program in raising student content, cognitive, and affective outcomes
Rebekah Lamb, R & R Educational Consulting; Richard Lamb, Washington State University
Students within the United States struggle to maintain an adequate position within the context of international testing and competitions in STEM subjects. Researchers selected two-hundred and fifty four students for this study, from grades, K, 2 and 5. Grade and age progressions, allow for a pseudo-longitudinal analysis of STEM program intervention
Effects of Science, Technology, Engineering, and Mathematics (STEM) program based on engineering design and scientific inquiry on students’ attitude toward STEM
Hyonyong Lee, Kyungpook National University; Kyunguk PARK, Kyungpook National University; Bohyun SEO, Kyungpook National University; Byunyeol PARK, Kyungpook National University; Jaedon JEON, Kyungpook National University
Within the literature the increased interest and positive attitude toward STEM may be more important than students’ academic achievement. This study investigated the effects of the STEM education program which was developed based on the engineering design and scientific inquiry on students’ attitude toward STEM.

How to use integrated Science, Technology, Engineering and Mathematics (STEM) projects like robotics to help students participate productively in engineering and scientific practices and discourse and also learn the science content
Celestin Ntemngwa, The University Of Georgia
Recently, there has been a lot of emphasis on integrating STEM learning. I have developed ways to show how science educators can infuse integrated STEM topics/projects like robotics project into the science classroom in a way that will support students’ effort to participate productively in engineering and scientific practice and discourse.

Thread: Curriculum, Pedagogy, and Assessment

Qualitative analysis of science teachers’ approach towards students’ misconceptions: A comparative study of US and South Korea
Kyungwoon Seo, University of Iowa; Soonhye Park, University of Iowa
A qualitative study was performed to investigate science teachers in the US and South Korea with a constructivist lens. It explored how the teachers approach students’ misconceptions when teaching photosynthesis in secondary level. While teachers were teacher-centered in general, US teachers showed more student-centeredness than Korean teachers.

Investigating stakeholders’ perceptions of the link between high STD Rates and the current Baltimore City Public Schools’ Sex Education Curriculum
Shenell Bolden, Morgan State University; Catherine Martin-Dunlop, Morgan State University
The purpose of this exploratory study was to examine key stakeholders’ perceptions of the current Baltimore City Public Schools’ (BCPS) sex education curriculum and to gain insight into how they believe the curriculum could be modified to be more effective.

Expected lunar knowledge versus existing lunar knowledge of middle school students
Ibrahim Yeter, Texas Tech University; Walter Smith, Texas Tech University; Kimberly Livengood, Angelo State University
The purpose of the study is to investigate how America’s 50 states standards align with the CMPA-R lunar phases questions in the World MOON Project supporting by the National Science Teachers
Association (2008), National Science Education Standards (NRC, 1996) and Next Generation Science Standards from the National Research Council (NRC, 2012).

**A global collaborative science education experiment**
*Michael Sizemore, Texas Tech University*
In order to accomplish a successful global collaborative science project students, teachers, and project coordinators must overcome a variety of obstacles. This session will describe the experiences of all stakeholders engaged in a global collaborative science project, the obstacles they faced, and the means by which they were overcome.

**How does participation in an online community of science teacher practice impact performance on embedded program assessments?**
*Jenny Ingber, Bank Street College of Education; Frederick Freking, University of Southern California; Anthony Maddox, University of Southern California*
As part of a NSF-funded Noyce Project, USC has created an online community of practice to support beginning science teacher development. This presentation examines the impact of this participation on embedded program assessments, including the EdTPA.

**Thread: Environmental Education**

**Online global collaboration for the hybrid (blended learning) classroom**
*Dale McCurdy, Amarillo College*
This action research study explores the processes, potential barriers, and potential benefits of global science collaboration in the blended-learning (50% online) classroom. Pre-service K-8 education majors will develop online collaborative partnerships with international students to study and share perspective on selected life science topics.

**Vanishing fireflies: A citizen scientist project promoting scientific inquiry and environmental stewardship**
*Michelle Cook, Clemson University; Alex Chow, Clemson University; Juang-Horng Chong, Clemson University*
In this poster, we will describe the activities associated with our firefly watch program, aimed at promoting scientific inquiry and environmental stewardship through local field research.

**Educator academy in the Amazon rainforest**
*Christine Moseley, University of Texas at San Antonio; Molina Walters, Arizona State University; Christa Dillabaugh, Amazon Rainforest Workshops*
The Educator Academy in the Amazon Rainforest is a 9-day cross-curricular professional development workshop for educators exploring the Amazon rainforest of Peru. The Academy engages participants in hands-on investigations, citizen science research projects, and inquiry-based learning activities.
Thread: Informal Science Education

Monarch migration as a vehicle for global science education collaboration
Jill Nugent, Texas Tech University
This poster will feature monarch butterfly migration programs in the upper elementary classroom and examine how this hands on study and experience can serve to facilitate global science education collaboration.
Friday, January 17, 2014 AT A GLANCE

8:00 - Noon  Registration  Los Rios Foyer
6:30-8:00 AM  Continental Breakfast  Regency Foyer
7:00-8:00 AM  Committee Meetings  See page 36 for locations
8:00 -10:00 AM  Professional Development Workshops
8:00 -10:15 AM  Sessions
10:30 - Noon  Keynote Speaker: Larry DeLucas  Regency Ballroom East
Noon – 1:30 PM  Lunch on Your Own

Numerous restaurants are within a few blocks of the hotel.

12:30 - 1:30 PM  Forum Meetings  See page 47 for locations
Technology
Inclusive Science Education
Policy and Government Relations
1:30 - 3:30 PM  Professional Development Workshops
1:30 - 3:30 PM  Equity Committee Workshop  Live Oak
1:30 - 4:00 PM  Sessions
4:00 – 5:00  Regional Meetings  See page 61 for locations
After 5:00  WISE Dinner  Casa Rio

Dinner on your own
Numerous restaurants are within a few blocks of the hotel.
**Continental Breakfast**  
Friday 6:30 – 8:00 AM  
Regency Foyer

**Committee Meetings**  
Friday 7:00 – 8:00 AM  
Rooms Designated Below

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<thead>
<tr>
<th>Committee Meetings</th>
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<tr>
<td>Awards Committee</td>
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<td>Elections Committee</td>
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<td>Publication Committee</td>
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<td>Committee on Regional ASTE Units</td>
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**Embedded Workshop**  
Friday 8:00 - 10:00 AM  
Live Oak

**Visual data representations: Generating and using them in the science classroom**

*Kevin Finson, Bradley University; Joanne Olson, Iowa State University; Brandon Emig, North Carolina State University*

Learn how visual data representations can be generated as instructional tools. Objectives include helping teachers improve pedagogical understanding, helping students' improve conceptual understanding, improving students' learning about viewing, interpreting, generating, and using visual data representations, and connecting learning to cognitive development theory.

**AM Meet the ASTE Board**  
Friday 8:00 - 9:00 AM  
Pecos

Meet the members of the ASTE Board and see how you can help serve your organization.

**Embedded Workshop**  
Friday 8:00 – 10:00 AM  
Bowie A

**The NSTA Learning Center: A tool to develop science pre-service teachers**

*Al Byers, National Science Teachers Association; Flavio Mendez, National Science Teachers Association; Michael Odell, University of Texas at Tyler; Kate Baird, Indiana University-Purdue University Columbus; Susan Blunck, University of Maryland Baltimore County; Carolyn Mohr, Southern Illinois University; Kathy Sparrow, Florida International University*

Learn about an online system to assist faculty in creating customized e-textbooks using Learning Center interactive and e-print resources for pre-service teachers. Create an account, add resources to the library, assemble collections, make a class landing page, and explore the instructor's dashboard. Ask questions to professors using the system.
Using photo elicitation interview to conceptualize in-service secondary school science teachers’ knowledge base for teaching climate change
Devarati Bhattacharya, STEM Education Center, University of Minnesota; Engin Karahan, STEM Education Center, University of Minnesota; J McClelland, STEM Education Center, University of Minnesota; Shiyu Liu, STEM Education Center, University of Minnesota; Gillian Roehrig, STEM Education Center, University of Minnesota
Photo Elicitation Interviews were used to assess in-service secondary school teachers’ conceptual understanding about global climate change. We found that the participants in our study inclined heavily towards causes and implications of climate change. They misunderstood and/or underestimated feedbacks that occur within the climate system.

Bridging the gap between environmental education and socioscientific issues
Mark Newton, University of South Florida; Benjamin Herman, University of South Florida; Dana Zeidler, University of South Florida
An investigation into the extent to which students’ ability to take multiple perspectives developed throughout an experiential environmental education course. Evidence supports that this course could act as a model for science courses as well as science teacher education courses.

Cultural practices’ impact on Muslim elementary school pupils’ conceptions of nationally-set astronomy concepts
Walid Shihabi, University of Oklahoma and Tulsa Community College/ Assistant Professor; Edmund Marek, University of Oklahoma
This study explores the cultural congruence of specific national elementary education standards focused on astronomy with elementary school age American Muslim students’ antecedent knowledge relevant to their religious practices. This should aid in designing culturally responsive and contextually relevant instruction to this minority group.

The forgotten tribe: Science hobbyists as teachers
M. Gail Jones, NC State University; Thomas Andre, Iowa State University; Gina Childers, NC State University; Elysa Corin, NC State University
In depth interviews were conducted with 107 astronomy and birding hobbyists to document the development of their science hobbies and their outreach to other communities. Results showed a desire to provide service to others and other motivations for participation. The significant role of hobbyists as teacher educators is documented and discussed.
The development and implementation of a research apprenticeship program in STEM for underrepresented high school students
Stephen Burgin, Old Dominion University; William McConnell, Old Dominion University; Alonzo Flowers, Old Dominion University
The Biofuels Research Apprenticeship Program at ODU was developed to provide an authentic out-of-school experience in an informal setting with the potential to impact Nature of Science views, science identities and career aspirations of underrepresented students. The role of science teacher educators in supporting similar experiences is discussed.

On the legal issues of teaching evolution in the public school
Ronald Hermann, Towson University
To effectively teach evolution to all students, even those resistant to learning evolution, science teachers may question the extent to which religion can legally be discussed in the classroom. Evolution is taught from a variety of approaches each of which has legal implications. Four approaches to teaching evolution are provided along with the legal implications for enacting each approach.

Toward an understanding of “Teaching in the Making;” Explaining instructional decision making by analyzing a geology instructor’s use of metaphors
Glenn Dolphin, University of Calgary; Sharon Dotger, Syracuse University
Eric (pseudonym), a geology professor, implemented a curricular intervention in two successive introductory geology classes. Audio recordings and observations show that Eric described teaching in terms of two different metaphors that paralleled each other in terms of his role, the role his students and knowledge, influencing the way he taught.

Meeting the demands of high need schools for science and mathematics teachers
Maria Ferreira, Wayne State University
The clinical-practice model is receiving increasing attention as an alternative approach to teacher preparation. This presentation describes the process a Michigan teacher preparation institution used to develop and implement a clinical-based program to help meet the demand of highly qualified math and science teachers in high need schools.

The effects of emotive reasoning on secondary school students’ ability to evaluate evidence on socioscientific issues
Wardell Powell, University of South Florida; Dana Zeidler, University of South Florida
Students’ ability to evaluate evidence on socioscientific issues revealed their commitment to using newly gained knowledge, experience on the topic, scientific knowledge, and emotions to aid in their evaluation evidence and make informed decisions.

**Using our heads and HARTSS*: Developing perspective-taking skills for socioscientific reasoning (Humanities, ARTs, and Social Sciences)**

*Sami Kahn, University of South Florida; Dana Zeidler, University of South Florida*

We present a theoretical model for developing perspective-taking skills for socioscientific reasoning (SSR). The HARTSS model transforms pedagogical strategies from non-science disciplines into socioscientific contexts for use by science teachers and science teacher educators to promote SSR and functional scientific literacy in their students.

**Immigrant secondary science teachers: Beliefs about science and science teaching**

*Ndindi Kitonga, Longy School of Music of Bard College*

As more immigrants from non-Western nations are recruited to teach science in the U.S., understanding their experiences within the classroom becomes very important for science teacher educators. The purpose of this study was to examine immigrant secondary science teachers’ beliefs about science and science teaching.

**Traditional Paper Set  Friday 8:00 - 9:00 AM  Blanco**

**Using environmental issues in a pre-service elementary science methods course to model inquiry teaching and reduce fears of teaching science**

*Carol Johnston, Mount St. Mary’s College*

Environmental issues were used to engage pre-service elementary teachers in science topics and inquiry teaching strategies with the intent that candidates would incorporate environmental science into their own standards-based lesson plans. Candidates responded well to the course activities, but struggled with their own lesson plans.

**Weather and climate change conceptions of middle-school students**

*Tina Cartwright, Marshall University; Julie Malmberg, University Corporation for Atmospheric Research; Jonathan Atwood, Virginia Tech*

This research will examine changes to middle-school student’s understanding of weather and climate change after participating in From Learning to Research, a subset of The GLOBE Program’s Student Climate Research Campaign.

**The logic of alternative conceptions of earth science concepts**

*Michael Wavering, University of Arkansas, Fayetteville; Katherine Mangione, Middle Tennessee State University; Craig McBride, University of Puget Sound*

The authors of this manuscript looked at relationships between logical reasoning structures used by interviewees and alternative conceptions of earth science concepts. Means to perform analysis was
Piaget's Logic of Meanings. The results revealed that the preservice teachers used logical reasoning structures for responses to questions with logic.

**Themed Paper Set**  
**Friday 8:00 - 9:00 AM**  
**Frio**

Thread: Science Teacher Professional Development

**The Teacher Induction Network (TIN)**  
*Joshua Ellis, University of Minnesota; Justin McFadden, University of Minnesota; Tasneem Anwar, University of Minnesota; Barbara Billington, University of Minnesota; Gillian Roehrig, University of Minnesota*

This paper set discusses the Teacher Induction Network (TIN) online mentoring program. The use of video annotation for reflection on classroom practices, the transformation of beginning science teachers’ reflective practices, and the creation of a classroom culture of trust will be considered in this three-paper set.

**Roundtable**  
**Friday 8:00 - 9:00 AM**  
**Nueces**

Thread: Science Teacher Professional Development  
Presider: Lindsay Wheeler

**Creating coherent conceptual storylines: Teachers’ struggles to implement the 5E learning cycle**  
*Eun Ju Lee, University of Missouri, Columbia; Deborah Hanuscin, University of Missouri, Columbia; Delinda van Garderen, University of Missouri, Columbia*

During this session, we share teachers’ struggle to implement 5E Learning Cycle in the light of developing coherent conceptual storylines. We also present PD tools to help elicit their ability to recognize a coherent conceptual storyline within a 5E lesson sequence.

**Does kit sequence matter: Factors that affect inquiry-based science instruction**  
*Jose Rios, University of Washington, Tacoma*

This research identified four factors that affected inquiry-based science instruction at a local elementary school - training, time, sequence, and materials. Teachers, support staff, and administrators participated in this qualitative research project. It is important to discuss issues related to previous standards in order to avoid repeating history.

**Forging research collaborations between large and small universities: A conversation around science teacher development**  
*Steven Fletcher, St. Edward's University; John Tillotson, Syracuse University*

This presentation centers on the issue of forming productive science teacher education research collaborations between small and large institutions. It aims to build conversation around how to provide avenues to lessen isolation for science educators from small universities and provide new partnerships for those from large research institutions.
Experiential Session  
Friday 8:00 - 9:00 AM  
Pecan

Thread: Policy and Reform

Understanding the 2012 NSTA Science Standards for Teacher Preparation  
**William Veal, College of Charleston**

The purpose of this experiential session is to present the new National Science Teachers Association “Standards for Science Teacher Preparation. The new NSTA-SSTP reflect the knowledge, skills, and dispositions for a newly certified teacher must know and be able to do. Participants will examine good and poorly constructed assessment instruments.

Traditional Paper Set  
Friday 8:00 - 9:00 AM  

Thread: Equity and Diversity  

**Presider: Susan Hawkins**

“Mees, I no understand:” Using inquiry in a classroom of diverse cultures, languages, and English proficiencies  
**Genna Robbins, Teachers College, Columbia University; Felicia Moore Mensah, Teachers College, Columbia University**

This study reports on findings from questionnaires, focus groups, and interviews with English language learners in an inquiry-based science classroom.

The influence of student gender, parent gender and ethnicity on science interests and attitudes  
**Katherine Short-Meyerson, University of Wisconsin Oshkosh; Susannah Sandrin, Arizona State University; Chris Edwards, University of Wisconsin Oshkosh**

We will present our research on the role of ethnicity (Hispanic, non-Hispanic), child gender and parent gender on the science interests/attitudes of 4th graders and their parents. Potential gender biases for different science disciplines, how these biases may differ among ethnic populations, and parental influences will be discussed.

Effects of an authentic science experience on high school students' perceptions and learning of science practices  
**Angela Chapman, University of Texas - Pan American; Allan Feldman, University of South Florida; Fayez Alshhri, University of South Florida; Dilek Ozalp, University of South Florida; Vanessa Vernaza-Hernandez, University of South Florida**

Engaging marginalized student in authentic science experiences is way to narrow the science achievement gap. This study reports on marginalized students’ perceptions of authentic science experiences, their learning of science practices, and the implications for science teacher education.
Publications committee  Friday 9:15 - 10:15 AM  Pecan

*Norman G. Lederman, Illinois Institute of Technology; Judith Lederman, Illinois Institute of Technology; Deborah L. Hanuscin, University of Missouri*

Reviewing for the journal – This session offers new and experienced conference attendees to meet and talk with the editors of ASTE journals. Editors will provide information about acceptance rates, submission guidelines, and upcoming monographs and journal issues.

Traditional Paper Set  Friday 9:15 - 10:15 AM  Chula Vista

**Thread: Environmental Education**

**Linking local communities to school science: Challenges and opportunities**

*Xavier Fazio, Brock University*

This paper presents findings from a systematic review of current literature regarding school science and local communities. Growing interest in science collaborations with schools is evident, but insufficient attention has been given to local communities and school science as a whole. Recommendations for developing a framework will be presented.

**Instructional use of a conceptual model to teach the relationship of daily life and human environmental impact to ecological function**

*Janice Koch, Hofstra University; Yael Wyner, City College of New York/City University of New York*

This study seeks to understand how science teachers bridge the persistent disconnect of daily life from ecology and human environmental impact. Specifically, this study addresses teachers use of a conceptual model for teaching ecology and human environmental impact units that links daily life, human environmental impact and ecological function.

**The globalization of science education: A case study of teacher identity dissonance**

*Raghda Daftedar, Teachers College, Columbia University; Felicia Mensah, Teachers College, Columbia University*

This study reports the findings of a case study conducted on a female Egyptian graduate student completing her student teaching in American elementary classrooms. As new insights of pedagogical practices are developed, critical reflection uncovers a journey of teacher and cultural identity resolution and development.

Traditional Paper Set  Friday 9:15 - 10:15 AM  Pecos

**Thread: Mixed**

**Innovation in science education: A Review on nano technology**

*Ibrahim Yeter, Texas Tech University*

One of the main purposes of the education is to prepare students to apply their knowledge and skills that they learn to experience it throughout the life. Since technology and science are strongly combined
together, innovation in Nano technology in STEM education will take a very important consideration in the future classroom environment.

**Science teacher graduate education: Modes of communication within asynchronous and synchronous communication platforms**

*Lauren Madden, The College of New Jersey; M. Jones, North Carolina State University; Gina Childers, North Carolina State University*

We examined students’ interactions across 3 instructional modes (voice, chat, and discussion board) during a graduate science education distance education course. Interactions were coded according to the target of the interaction, the content, and the type of interaction. Each mode provided clearly different communication opportunities.

**Alternative conceptions or lack of knowledge: Assessing pre-service teachers’ understanding of the water cycle using the Water Cycle Diagnostic Test (WCDT)**

*Dannah Schaffer, University of Missouri; Lloyd Barrow, University of Missouri*

This study examined pre-service elementary education and secondary science teachers’ understanding of the water cycle using the three-tiered WCDT along with a survey of the pre-service teachers’ weather-related experiences. Data analyses revealed 49 potential alternative conceptions or were those alternative conceptions due to lack of knowledge?

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<th>Traditional Paper Set</th>
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<td>Thread: Preservice Science Teacher Preparation</td>
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<td>Presider: Rita Hagevik</td>
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**An international comparison of the preparation and certification of secondary science teachers**

*Ki-Young Lee, Kangwon National University/College of Education; Patricia Morrell, University of Portland/School of Education; Adele Schepige, Western Oregon University/School of Education; Young-Shin Park, Chosun University/College of Education*

Teacher quality is a topic of international concern, as an important factor impacting student learning is the quality of instruction. This ties directly to teacher preparation. This presentation will provide a comparison of undergraduate secondary science teacher preparation programs and certification from universities in South Korea and Oregon.

**How do future secondary science teachers organize their thinking about scientific inquiry?**

*Kevin Zak, University of Minnesota Duluth*

Learn about research results that used concept maps to provide a clearer picture. Implications for science educators in the design of teaching about inquiry and the practices of science in pre-service education programs and professional development opportunities will be examined.

**What is science?: An inquiry into the development of elementary preservice teachers’ understanding of science**

*Yvonne Franco, University of South Florida; Elaine Cerrato Fisher, University of South Florida; Jeni Davis, University of South Florida*
This study examined elementary preservice teachers’ (PSTs) identity formation while they took a science methods course. Our objective was to determine in what ways elementary PSTs conceptualized their response to the question, “What is Science?” throughout the semester. Further, our data depicted their journey as they evolved into elementary science teachers.

Exploring undergraduate teaching assistants’ influence on student science identity and persistence in STEM coursework
Stephanie Philipp, University of Louisville; Thomas Tretter, University of Louisville; Christine Rich, University of Louisville
This study examined the impact that undergraduate teaching assistants had on student science identity and persistence in STEM coursework. Results suggested that some aspects of science identity were stronger and student enrollment in the next required science course was three times more likely for students in UTA-led recitation sections.

College chemistry students’ use of memorized algorithms on the Particulate Nature of Matter
James Nyachwaya, North Dakota State University; Gillian Roehrig, University of Minnesota
To uncover students’ conceptual understanding of PNM, students balanced equations of chemical reactions, and then draw their particulate representations. Results showed a gap between correctly balanced equations and appropriate particulate drawings. Interview data revealed that students relied on memorized algorithms when responding to questions.

C-PaCK: An assessment of climate Pedagogical Content Knowledge (PCK)
Leonard Bloch, University of Georgia
The C-PaCK assesses Pedagogical Content Knowledge (PCK) about climate change. Teacher educators can use items in their own classroom assessments, and educational researchers will have the opportunity to think about developing assessments that integrate science content and practices to assess PCK.

A mixed-methods examination of teachers’ fidelity of implementation and differences in student learning gains in 9th grade physics
Deborah Hanuscin, University of Missouri; Somnath Sinha, University of Missouri; Nilay Muslu, University of Missouri; Jaimie Foulk, University of Missouri
In this study, we purposefully selected teachers with high/low student learning gains to understand how this was related to their fidelity of implementation. We used mixed methods to both capture teachers’ use and modifications to the curriculum and to examine the underlying reasoning and PCK that shaped their implementation.
Developing an assessment of early childhood scientific inquiry
Kimberly Lott, Utah State University
This study outlines the development of an assessment of early childhood knowledge of scientific inquiry skills. Results of the assessment will be given as well as data analysis to determine if there were differences in scores based on age, gender or reading ability.

Traditional Paper Set  Friday 9:15 - 10:15 AM  Blanco
Thread: Science Teacher Professional Development  Presider: Meredith Bell

Relation of elementary teachers argumentation discourse patterns
Sungho Kim, The university of Iowa; Brian Hand, The University of Iowa
This multiple case study investigated how six female elementary teachers’ argumentation discourse patterns related to students’ discussions in the science classroom. One category of classroom characteristics emerged through the analysis of the teachers’ transcripts and recorded class periods: structure of student talk.

The roles of teacher questioning in Argument-based Inquiry (ABI) science classrooms: Approaches that stimulate cognitive thinking and dialogical interaction
Ying-Chih Chen, University of Minnesota; Brian Hand, University of Iowa; Matthew J. Benus, Indiana University Northwest
The purpose of this study was to investigate how elementary teachers adopt different questioning roles to scaffold dialogical interaction, students’ cognitive responses, and the use of evidence for constructing and critiquing ideas for argumentative practices.

Critical response protocol and classroom discourse
Charlene Ellingson, University of Minnesota / STEM Education Center; Mary Hoelscher, University of Minnesota; Gillian Roehrig, University of Minnesota; Janet Dubinsky, University of Minnesota
This study introduces the Critical Response Protocol (CRP) to science classrooms, a technique for facilitating classroom discourse. The protocol is structured, yet open-ended, and emphasizes collective knowledge. This work provides important professional development because it shows teachers how to transform data analysis from a procedural process.

Themed Paper Set  Friday 9:15 - 10:15 AM  Frio
Thread: Science Teacher Professional Development

The role of the science department chair - Context and content
Wayne Melville, Lakehead University; Jeremy Peacock, University of Georgia; Doug Jones, Lakehead Public Schools
This themed paper set considers the work of the chair in the life and work of the secondary science department. Our presentation is in three parts and draws on the historical development of the departments and our work with chairs in Canada and the US. The first part will take an historical view of
concomitant developments in school science departments and science education more generally. The second part addresses the issue of how chairs can more effectively link their instructional leadership role to the wider press for science education reform as outlined in the Framework document. Finally, we are concerned with the moral nature of teachers’ work, and how the conduct of the chair is critical in communicating the moral basis of leadership to the teachers in the department.

### Themed Paper Set
**Friday 9:15 - 10:15 AM**
**Nueces**

**Thread: Science Teacher Professional Development**

**Nurturing early childhood science**
*Charlene Czerniak, The University of Toledo; Eugenia Johnson-Whitt, The University of Toledo; Lacey Strickler, The University of Toledo; Amanda Moser, The University of Toledo; Debra Bloomquist, The University of Toledo; Meredith Reinhart, University of Toledo*

This paper set presents an overview of the development and implementation of a complementary science education learning model that combines inquiry learning, formal and informal education, teachers and parents, schools and the community, in a comprehensive effort to improve science subject interest and sustained science achievement in PreK-grade 3.

### Traditional Paper Set
**Friday 9:15 - 10:15 AM**

**Thread: Mixed**

**Presider: Debra Stork**

**Professionalizing in a Teacher Design Team (TDT) through the development and class enactment of learning material**
*Fer Coenders, University of Twente*

Teachers from different schools plus a teacher educator redesigned in a teacher design team (TDT), in a one year program, learning material for an innovative curriculum, enacted this in class and discussed the outcomes. The PCK teachers acquired and the learning sources were examined. A model for teacher learning was used for data presentation.

**Implementation of informal science education with University faculty**
*Jinichi Okumura, Shizuoka University; Yoshisuke Kumano, Shizuoka University; Tomoki Saito, Shizuoka University*

In conjunction with the Faculty of the Department of Biological Sciences, we conducted an experimental course “What is gene DNA?” Throughout the course, students deepened the understanding of the gene DNA, by experiencing the cutting-edge research from actual university facilities. The purpose was to create an opportunity for researcher training of future teachers with deeper interest, to increase the learning motivation of high school for their future.

**Spatial reasoning from novice to expert: The missing links**
*Deborah Carlisle, UMass Amherst*

How can we foster spatial skill acquisition? Research from a year-long study with chemistry majors at a large research university. Implications for high school and undergraduate courses will be discussed,
hands-on activities and suggestions provided. This research has over-arching significance for all foundational science disciplines.

| General session | Friday 10:30 AM – Noon | Regency Ballroom East |

Dr. Larry DeLucas will review his NASA astronaut training followed by his personal experiences flying on the Columbia Space Shuttle, mission STS-50, launched June 25, 1992. He will describe the materials, biotechnology and medical research performed on his mission followed by a summary of research initiatives currently underway on the International Space Station. Dr. DeLucas will also briefly review his career as a scientist, astronaut and entrepreneur.

| Lunch on Your Own | Friday Noon – 1:30 PM |

Numerous restaurants are within a few blocks from the hotel at both the river and street level.

| Forum Meetings | Friday 12:30 – 1:30 PM |

Technology                     Nueces
Inclusive Science Education     Blanco
Policy and Government Relations Pecos

| Board Town Hall Meeting | Friday 1:30 - 2:30 PM | Chula Vista |

This is an opportunity to share ideas about ASTE with board members and is open to all conference attendees.

| Equity Committee Workshop | Friday 1:30 – 3:45 PM | Live Oak |

The instructional approaches to access, accommodation, and inclusion for students with disabilities in science education

*Chris Atchison, Georgia State University; Lara Smetana, Loyola University Chicago; Michele Koomen, Gustavus Adolphus College*

The workshop is designed to instruct current Science Education faculty and graduate teaching assistants to apply the principles of Universal Design for Learning (UDL) to their own lessons, labs, and field-based learning opportunities in order to accommodate students with disabilities in K-12 science classrooms.
Experiential Session  
Friday 1:30-2:30 PM  
Bowie A
Thread: Preservice Science Teacher Preparation

Turning teacher preparation “Upside Down”: A practice-based, videocase-centric science methods course (and beyond)
Kathleen Roth, BSCS; Jody Bintz, BSCS; Connie Hvidsten, BSCS

Come examine an “upside down” elementary science methods course that is videocase-centric, practice-based, and packaged in an online module. The module includes videocases, analysis tasks, practice teaching tasks, resources such as readings and lesson plans, and an Instructor’s Guide to support teacher educators’ effective implementation.

Traditional Paper Set  
Friday 1:30 - 2:30 PM  
Pecos
Thread: Science Teacher Professional Development
Presider: Art Corvo

Science teacher professional development in an era of reform
Cheryl McLaughlin, University of Florida

The purpose of this position paper is to propose a research-based professional development model for middle school science teachers that aligns with the new framework's vision for K-12 education. A hybrid theoretical framework informed the design of the model.

Developing effective science teaching in in-service teachers: The need for multiple supports
Kimberly Lebak, The Richard Stockton College of New Jersey

This proposal introduces a multi-faceted model for improving the science teaching of in-service teachers. As measured by the observation protocol, The Framework for Teaching, a science teacher significantly improved his science teaching practice as a result of the model. However, multiple support systems were necessary for improvement to occur.

Partnering with school districts: Policies, politics and the implications for practice toward transforming middle school science education
Rose Pringle, University of Florida; Jennifer Mesa, University of Florida; Leela Kumaran, University of Florida

We developed a partnership between IHE and eleven school districts to transform middle school science by preparing teacher leaders knowledgeable of science and reformed pedagogy. Our investigation of the factors that impact the fulfillment of school districts’ commitments includes changes in school and district leadership, and fund allocation.

Traditional Paper Set  
Friday 1:30 - 2:30 PM  
Medina
Thread: Mixed
Presider: Andy Cavagnetto

Outcomes of the science education faculty academy professional development
Tyler St. Clair, Oregon State University; Lindsay Wheeler, University of Virginia; Jennifer Maeng, University of Virginia
College science educators enrolled in the Science Education Faculty Academy Professional Development perceived substantive improvements in their understanding of and proficiency in implementing PBL, NOS, and inquiry instruction in preservice teacher preparation and in-service teacher professional development.

**Biotechnology teaching laboratories: University outreach for science teacher professional development and advanced STEM learning**

*Joan Kiely, Stony Brook University; Angela Kelly, Stony Brook University; Kristen La Magna, Stony Brook University; Daniel Moloney, Stony Brook University; David Bynum, Stony Brook University*

The Biotechnology Teaching Labs at Stony Brook University have enriched science teacher clinical preparation and have increased secondary students’ science interest through cutting-edge experimentation. Data have shown increased student interest and confidence as well as numerous benefits for pre-service and in-service science teachers.

**The impact of a professional development experience on science education faculty**

*Debra Stork, University of Dubuque; Janelle Bailey, Temple University; J. Pomeroy, Univeristy of California, Davis*

Results of a qualitative study of the impact that Faculty Institutes for NASA Earth and Space Science Education (FINESSE), a 3-day professional development workshop, had on the teaching practices of science education faculty gathered over a 5-year time span will be shared.

**Traditional Paper Set**

**Friday 1:30 - 2:30 PM**

**Thread:** College and University Science

**Presider:** Judith Morrison

**Conceptual change, participatory research, and co-generative dialogues: A single case-study**

*Phillip Boda, Columbia University: Teachers College; Samia Rahman, Columbia University: Teachers College*

Utilizing the conceptual change model of learning, this single case-study tracked the conceptual constructs of culture, education, science, and urbanity within one graduate student's experiences during a required graduate course in her master's certification program. Findings were then used to generate conceptual dialogues about these experiences.

**The role of teacher's practical moves in developing students representational fluency - A qualitative case study**

*Abdi-Rizak Warfa, Metropolitan State University; Gill Roehrig, University of Minnesota; Jamie Schneider, University of Wisconsin  River Falls; James Nyachwaya, North Dakota State University*

This paper examines the nature of teacher-initiated discourses during student-teacher encounters in a POGIL (process-oriented guided-inquiry learning) environment and how such discourses influence students’ understanding of the particulate nature of matter.
I can’t teach science!  A case study of an elementary pre-service teacher’s intersection of science experiences, beliefs, attitude, and self-efficacy

Mahsa Kazempour, Penn State University- Berks Campus

This case study focuses on a pre-service teacher with negative attitude and low self-efficacy toward science and science teaching. I will present an in-depth discussion of her pre and post beliefs, attitude, and self-efficacy, the impact of prior science experiences and the science methods course, and the interrelationship between these domains.

Preservice elementary science teachers perceptions and beliefs of Science Educational Technology (SET): Implications for science teacher preparation

Chuck Fidler, Wheelock College; Ellen Faszewski, Wheelock College

This research study identifies and examines preservice elementary teachers’ identification of and beliefs about educational technology and their impact on science teacher education.

Investigating the development of pre-service and early career in-service teachers’ orientations and practices toward teaching science

Stephen Witzig, University of Massachusetts Dartmouth; Todd Campbell, University of Connecticut

We investigate in what ways secondary science methods students conceptualize a new research-based teaching framework that includes tenants of the learning cycle, scientific practices, and student understanding. We follow the progression of student ideas through multiple methods and characterize students’ science teaching orientations.

Preparing inservice teachers to utilize a claims, evidence, reasoning, rebuttal framework to promote the development of 21st Century Skills with at-risk elementary students

Ingrid Weiland, University of Louisville

Through an action-research approach, this study examined how inservice teachers develop an understanding of a claims, evidence, reasoning, rebuttal (CERR) framework in order to focus on science practices, as well the 4C’s of 21st Century Skills (critical thinking, communication, collaboration, and creativity) within the content areas of science.

Creating inclusive K-12 science classrooms: A longitudinal study of the evolution and effects of the STUDI program

Peter Meyerson, University of Wisconsin Oshkosh; Stacey Skoning, University of Wisconsin Oshkosh; John Lemberger, University of Wisconsin Oshkosh
STUDI (Science Teaching through Universal Design and Inquiry) is an ever evolving program that works to support k-12 teachers as they integrate principles of scientific inquiry and Universal Design in their creation of inclusive science classrooms.

The influence of a K-5 science endorsement on the self-efficacy and instructional practices of elementary science teachers
Donna Barrett, Georgia State University; Lisa Martin-Hansen, California State University Long Beach; Anton Puvirajah, Georgia State University
This dissertation study will look at the influence of a K-5 science endorsement has on the instructional practices, self-efficacy and content knowledge of elementary teachers and the interaction of those components. The results a retrospective pretest + post survey of self-efficacy, observations, and interviews will be presented.

RoundtableFriday 1:30 - 2:30 PM Nueces
Thread: Mixed
Presider: Susan Hawkins

College science faculty perspectives regarding underrepresentation support strategies
Robert Ceglie, Queens University of Charlotte
In this session, the findings from a qualitative study of seven college science faculty members perceptions of what types of qualities, attributes, skills and strategies they have found to be highly supportive of women and minorities entering and navigating STEM disciplines in college.

Creating stop-motion videos with iPads to support students’ understanding of cell processes: Because you have to know what you’re talking about to be able to do it
Cynthia Deaton, Clemson University; Benjamin Deaton, Anderson University; Diana Ivankovic, Anderson University
The purpose of this paper is to: (a) describe the implementation of the mobile learning activity, stop-motion videos, to support students understanding of cell processes and (b) present research findings about students’ use of iPads and development of the stop-motion videos during their introductory biology course.

The effects of using myth-busting case studies on improving reasoning in post-secondary allied health biology courses
Peter Daempfle, SUNY at Delahi
Through presenting science myths associated with human Anatomy and Physiology principles, students confronted their misconceptions about health science and demonstrated improved reasoning abilities in health care scenarios.
I bamboozled them: How novice science teachers working to implement reforms-based instruction may resist socialization into school  
Lori Ihrig, Iowa State University; Jesse Wilcox, Iowa State University; Joanne Olson, Iowa State University; Michael Cough, Iowa State University  
New teacher support is generally considered crucial to successful novice teacher socialization. However, the beliefs about effective practice that novice teachers developed in their TEP may not align with the beliefs of their superordinates. This 2-year study investigates the role of superordinates in the socialization of a cohort of novice science.

From apprenticeship toward mastery: First-year teachers’ reflections on key student teaching experiences and how they shaped their beliefs and practices  
Aaron Musson, University of Nebraska-Lincoln; Elizabeth Lewis, University of Nebraska-Lincoln  
Student teaching experiences are highly variable and their long-term effects upon teaching practices are difficult to assess. This study focused on changes in teacher self-efficacy and how student teaching experiences influenced teaching practices of three physical science teachers during their first year of teaching.

Supporting pre-service practice based teaching: enacting assessment in the era of Common Core and NGSS  
Imelda Nava, UCLA  
I examine the enactment of assessment practices by pre-service science teachers within the context of an urban teacher residency program with diversified support structures. The study focuses on three data streams that include classroom observations of assessment moves and engagement of pre-service teachers’ analysis of assessment practices.

Teacher satisfaction and science content learning during professional development at an informal science institution  
Gary Holliday, The University of Akron; Judith Lederman, Illinois Institute of Technology; Norman Lederman, Illinois institute of Technology  
This study looked at a life science course for elementary and middle school teachers that was offered at a large Informal Science Institution (ISI). Teacher satisfaction with the presented content was compared to learning of science content. The findings described are generalizable to all developers of informal science professional development.
Possibilities of informal settings to impact science educators through unique collaborative professional development

John Pecore, University of West Florida; Mandy Kirchgessner, Temple University; Laura Carruth, Georgia State University

This presentation aims to illustrate the features of a unique collaborative partnership between an informal learning site, science educators, and research scientists in order to provide insights into professional development opportunities for K-12 educators and offer unique spaces for realizing the framework of the Next Generation Science Standards.

No one ever failed a museum! How informal science education experiences influence pre-service elementary teachers’ self-efficacy

Ratna Narayan, University of North Texas, Dallas; Lori Petty

This research study examines the perceptions elementary pre-service teachers have about informal science education and how participating in informal science education activities impact their science teaching self-efficacy. Participants were all women, majority Hispanic and first generation college goers enrolled in a science methods course.

Traditional Paper Set 

Friday 1:30 - 2:30 PM 

Mesquite 

Thread: STEM Education

Presider: Catherine Koehler

After school and informal STEM projects: Self-selecting or self-defeating?

David Vallett, University of Nevada Las Vegas; Richard Lamb, Washington State University; Leonard Annetta, George Mason University; Karen Peterman, Peterman Consulting, LLC

A comparison of learners that opted into an NSF funded STEM project with those the chose not to participate, including demographic, cognitive, and affective factors. Discussion of implications for the design of future STEM programs.

Science teachers’ conceptions of teaching engineering in science classrooms

Helen Meyer, University of Cincinnati; Lindsay Owens, University of Cincinnati; Lori Cargile, University of Cincinnati; Kathy Koenig, University of Cincinnati

This presentation shares results of secondary science teachers’ conceptions of engineering, teaching engineering and learning engineering within the context of science classrooms. The qualitative study uses a modified version of Hewson and Hewson (1988) CTS interview protocol to explore in-service teachers’ conceptions of teaching engineering.

The development of the STEM education study in Japan and its future prospects

Tomoki Saito, Shizuoka University; Jinichi Okumura, Shizuoka University; Yoshisuke Kumano, Shizuoka University

Study on Japanese STEM trials will help science teachers to make their classes with integrated disciplinary methods. In this study, the data were collected from Informal science classes, Science camp, Science classes in schools, and Time for the integrated study. Teachers can make materials and its lesson plans and assess students learning.
Meet the Editors/submitting to the journal
Norman G. Lederman, Illinois Institute of Technology; Judith Lederman, Illinois Institute of Technology; Deborah L. Hanuscin, University of Missouri
This session offers new and experienced conference attendees to meet and talk with the editors of ASTE journals. Editors will provide information about acceptance rates, submission guidelines, and upcoming monographs and journal issues.

Assessing confidence levels of preservice elementary teachers in teaching math and science
Eva Ogens, Ramapo College of New Jersey; Donna Crawley
How do we assess the efficacy of courses in teacher education and determine areas in need of improvement? This study assessed preservice teachers’ confidence levels in teaching mathematics and science prior to and following a one-semester course in methods of teaching math and science using a constructivist and inquiry-based approach.

Foundations of science education graduate course syllabi
Rita Hagevik, The University of North Carolina at Pembroke
The Foundation of Science Education course focuses on the philosophy or process of science and its application to the teaching of science through readings, meaningful discourse, extensive reflection, science demonstrations and argumentation lessons.

Seeking a dynamic balance: Instruction and pedagogy in a secondary science methods course
Kimberly Bilica, University of Texas at San Antonio
As a long-time instructor of secondary methods for middle and high school pre-service teachers, I have yet to find a perfect balance between two aspects of quality science teaching: science instruction and science pedagogy. This syllabus share will showcase how peer micro-teaching has become a central course component to emphasize good practice.

Literature and nature - Connecting them in the elementary classroom
Stacey Britton, University of Mississippi
This syllabus sharing highlights three activities which focus on nature and incorporate writing into the science curriculum. The preservice elementary teachers in this course leave with a greater understanding of the science content and how to integrate this knowledge successfully into their diverse elementary classrooms.
Methods in teaching secondary science II: An innovative collaboration between education, arts & sciences and engineering faculty

Karen Irving, Ohio State University; Christopher Callam, Ohio State University; Lin Ding, Ohio State University; Kathleen Harper, Ohio State University; Andrew Heckler, Ohio State University; Lawrence Krissek, Ohio State University; Bruce Patton, Ohio State University; Judy Ridgway, Ohio State University; Kathy Cabe Trundel, Ohio State University; Sandra Stoot, Ohio State University

Critics of science teacher preparation note the low involvement of science and engineering faculty in the pedagogical preparation of teachers. This presentation provides details of a graduate level science methods course co-designed and co-taught by science content experts (6) and science pedagogy experts (3) at a research intensive university.

Teaching elementary school science

James Minogue, North Carolina State University

This syllabus sharing session details the design, delivery, and impact of a condensed elementary science methods course. Student work samples will be included as evidence of impact. The session may provoke discussion around what really matters in elementary science education methods courses; a timely discussion given recent attention to the worth

Preparing teacher candidates for elementary science instruction

Nate Carnes, University of South Carolina

I will share an elementary course syllabus and the impact that it had on elementary teacher candidates. The presentation artifacts will include the course syllabus, samples of completed assignments, and excerpts of candidates’ views on how their professional knowledge of science teaching and learning has grown over the semester.

Collaboration in elementary education science methods courses

Trina Spencer, Virginia State University; Leslie Whiteman, Virginia State University

This paper will explore the ongoing collaboration, initiatives, and research between faculty members in the School of Engineering, Science, and Technology and the School of Education. This presentation will profile the coursework, instructional strategies, assessments, and other activities that were implemented in methods courses to improve preservice teacher education.

Roundtable

Friday 2:45 – 3:45 PM

Addressing interactions between science and religion in science teacher education

Joseph Shane, Shippensburg University of Pennsylvania; Lee Meadows, The University of Alabama at Birmingham; Ian Binns, University of North Carolina Charlotte

An overview of the historical interactions between science and religion will be provided along with a synopsis of anti-evolution movements and disparities between scientists and the general public with regard to religious belief. Suggestions for addressing science-religion interactions in science teacher education will also be discussed.
Connections between the digital and physical world: Angry Birds
Billy McConnel, Old Dominion University; Daniel Dickerson, Old Dominion University
This article describes an inquiry-based learning opportunity that purposefully blends formal and informal contexts to create a learning environment that resonates with students. Specifically, the lesson is centered on the game Angry Birds and how it can be used to help teach physical science and engineering concepts.

Innovation in teacher science education: The World MOON Project
Ibrahim Yeter, Texas Tech University
The World MOON Project purposes to bring a new innovation in teaching science with an inquiry perspective. The project emphasizes and supports the national and international STEM education providing 21st Century Skills by including dozen of teachers and hundreds of students in this collaboration.

Theory to practice transitions: A study of preservice teachers’ early field experiences in elementary science classrooms.
Karthigeyan Subramaniam, University of North Texas; Pamela Harrell, University of North Texas
The purpose of this study was to investigate the nature of the apprenticeship between preservice teachers and their university-based teacher educator during field experiences.

Preparing pre-service elementary teachers to integrate academic language and literacy while teaching science: The effect on students’ science writing
Edward Lyon, Arizona State University; Sara Tolbert, University of Arizona
We report pre/post science writing assessment scores from 183 students (47% ELLs) of nine first-year elementary teachers who were trained in their science methods course to integrate academic language and literacy while teaching science. ELLs and non-ELLs improved their science writing, indicating the intervention's promise for teacher preparation.

Case study of a preservice science methods course consistent with NGSS for elementary schools:
Emergent obstacles to learning
Barbara Spector, University of South Florida; Lois Ball, University of South Florida
We present features of (a) the widening divide between the culture/nature of science and the culture of traditional preservice teachers, (b) obstacles in the current societal context (e.g., millennial generation, high stakes testing, economics) and other identified types of obstacles to achieving NGSS, and (c) suggestions to mitigate obstacles.
Buddy Science K-2-5: Action research through cross-grade science explorations
Katie Brkich, Georgia Southern University; Kristen Shumbera, Southwood Valley Elementary School.
We share how three elementary school teachers collaborated across grade levels (fifth, second, and kindergarten) in a year-long action research project involving cross-grade student partnerships in a high-poverty school of color. Session participants will learn about both action research overall and our specific project.

Using professional identity to examine impacts of professional development
Stephanie Hathcock, Old Dominion University; Joanna Garner, Old Dominion University; Avi Kaplan, Temple University
The goal of this presentation is to discuss research involving an emerging model of teacher professional identity applied to a reform-based PD initiative. We will present the case study of one teacher, whose experiences with the PD showcase changes and tensions in his professional identity system that are the impetus for change in his practices.

Inquiry in Motion: A quantitative and qualitative look at how a professional development program can change teachers’ beliefs about inquiry-based instruction
Daniel Alston, Clemson University; Jeff Marshall, Clemson University
This study examines whether and how middle school mathematics and science teachers changed their beliefs toward inquiry-based instruction after one-year of professional development. It was evident from this study that mathematics and science teachers’ beliefs about the use of inquiry during instruction changed, albeit for different factors.

Coaching for sustainability: Distance-based peer coaching science inquiry in rural schools
Soon Chun Lee, University of Nebraska, Lincoln; Gwen Nugent, University of Nebraska, Lincoln; Gina Kunz, University of Nebraska, Lincoln
This study will identify key aspects and demonstrate the value-added effects of follow-up professional development and distance-based peer coaching practice to retain and improve teachers’ skills in implementing inquiry-based instruction that will also improve students’ inquiry skills and knowledge.

In the field: Bringing STEM and environmental education to K-4 teachers in the rural Ozarks
Jill (Alice) Black, Missouri State University
The Early Elementary Environmental Education (4Es) project works with 37 K-4 teachers from seven of the poorest, most isolated counties in the Missouri Ozarks along the Arkansas border. Now starting its second of three funded years, the project partners two university colleges with several agencies to accomplish eight objectives.
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The effect of “clickers” on attendance and engagement in an introductory statistics course
*Raoul Amstelveen, Johnson & Wales University*
Clickers were implemented into one introductory statistics class. Independent sample t test revealed that attendance in the non-clicker class and attendance in the clicker class did not differ significantly. However, on average, learners had positive perceptions of clickers.

Exploring the impact of virtual classroom technology on learning to teach
*Scott Sander, Miami University*
The virtual classroom technology, TeachLivE, can serve as more than a pedagogical tool. Teacher educators now have a diagnostic tool that exposes the deeply held beliefs of preservice teachers about the nature of science, teaching and learning. This session looks to expand the conversation about TeachLivE as a site of analysis in teacher education.

Nature of technology in preservice teacher education: A lack of critical perspectives in educational technology textbooks
*Kayla Brauer, Drake University; Jerrid Kruse, Drake University*
This study uses the nature of technology to investigate textbooks within preservice education. Findings from the analysis indicate preservice teacher education lacks critical perspectives of technology that would provide more well-rounded technology education and aid future teachers in making more informed decisions regarding technology.

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Update on the implementation and assessment of the Common Core State Standards (CCSS): What are the CCSS, what do they have to do with science teacher education, and where are we now with the CCSS?
*Kathy Norman, California State University Stanislaus*
The Common Core State Standards will affect every K-12 teacher and science teacher educator in the U.S. The CCSS address the literacy and mathematics students need in order to graduate from high school. This session will include an overview of the CCSS, an update on their implementation, assessment plans, and relevance to science teacher education.

How does professional development change elementary teachers and their students understanding of the work of engineers?
*Miriam Munck, Eastern Oregon University*
This study investigates how professional development changes elementary teachers’ ability to recognize and understand engineering in the world around them, and teachers ability to develop the same recognition and understanding of engineering in their students.

**Developing learning and teaching progressions aligned to the NGSS**

*Lori Fulton, University of Hawaii at Manoa; Brian Lawton, University of Hawaii at Manoa*

The introduction of the NGSS requires new curriculum. We share the process used to develop curriculum for Weather and Climate at Kindergarten, including the development of learning and teaching progressions. Participants will consider benefits and drawbacks to our process and discuss how the three dimensions of science are incorporated throughout.

**A mixed-methods study of pre-service teachers conceptions of dissolving**

*Pamela Harrell, University of North Texas; Karthigeyan Subramaniam, University of North Texas*

This presentation reports on the use of concept maps and other qualitative methods to assess pre-service teachers’ conceptual understanding of dissolving. Vygotsky’s theory of concept development served as the framework to classify pre-service teachers’ concepts and thus explicate their conceptions/misconceptions for the concept of dissolving.

**Beginning chemistry teachers’ development of a more responsive repertoire**

*Krissa Adams, University of Nebraska-Lincoln; Julie Luft, University of Georgia*

Teachers must be aware of how students interpret and understand concepts when selecting an instructional strategy. This research focused on how eight beginning chemistry teachers’ develop a more responsive topic specific (i.e., atomic structure) repertoire by studying the teachers’ knowledge of students’ understandings during the first three years.

**Preservice science teachers’ reflections while engaged in physics outreach demonstrations**

*Frederick Nelson, California State University, Fresno*

In this study, the physics outreach demonstration is used as a stimulus for the development of reflection by preservice teachers, who consider their ideas about effective science teaching and learning through a structured process of teacher theorizing.

**Nature-inspired design: A PictureSTEM curriculum for elementary STEM learning**

*Tamara Moore, Purdue University; Kristina Tank, University of Minnesota*

With the increased attention to the integration of engineering and science in the Next Generation Science Standards, it is important to continue to develop an understanding of STEM integration. This
session provides a model for STEM learning that uses engineering and literacy contexts to help facilitate this integration.

**Roundtable**  
**Friday 2:45 - 3:45 PM**  
**Pecan**  
Thread: Mixed  
Presider: Nazan Bautista

**Blending leadership and the Common Core Standards**  
*Angelia Reid-Griffin, UNCW/Watson College of Education; Kelli Slaten, UNCW*

The wiki class space provided a learning community in which students were able to build, edit, contribute, and share ideas related to their own instructional practices and resources grounded on the Common Core Standards and NC Standards. Address the role of using Wikis, as a tool in demonstrating knowledge of standards and leadership qualities.

**Creating and revising an elementary science concentration: Moving towards The Next Generation of Science**  
*Megan Garner, East Carolina University; Tammy Lee, East Carolina University; Bonnie Glass, East Carolina University*

The lack of science content knowledge among elementary pre-service teachers continues to plague elementary science education as it results in non-reform-based practices being implemented in our schools. To meet the demands set forth in the Next Generation of Science Standards, our elementary science education programs must be restructured.

**Identifying preservice elementary teachers’ abilities to attend to students’ scientific thinking**  
*Meredith Park Rogers, Indiana University; Susan Hawkins, Indiana University; Stacy McCormack, Indiana University; Maria Zoretic-Goodwin, Indiana University; Banu Avsar Erumit, Indiana University; Christina Melki, Indiana University; Heidi Wiebke, Indiana University; Mi Yeon Lee, Indiana University*

With this study we share a coding schema we developed for identifying how preservice elementary teachers are learning to attend to students’ scientific thinking. Implications for using the schema to develop teachers questioning techniques to support students’ scientific reasoning will be discussed.
You are free to join any ASTE region. Typically, these are the states associated with each U.S. region.

**North-East Region**
CT, MA, ME, MS, NE, NH, NJ, NY, PA, RI, VT, Eastern Canadian Provinces

**South-East Region**
AL, FL, GA, LA, southern parts of MO, SC

**Mid-Atlantic Region**
DC, DE, KY, MD, NC, southern parts of OH, TN, VA, WV

**North-Central Region**
IA, IL, IN, MI, MN, northern parts of MO, ND, northern parts of OH, SD, WI

**North-West Region**
ID, MT, OR, WA, WY, Western Canadian Provinces

**South-West Region**
AR, CO, KS, NM, OK, TX, UT

**Far West Region**
AK, AZ, CA, HI, NV

**International Region**
Any Resident outside of the United States or Canada

**WISE Dinner**  
Friday Evening  
Meet in Lobby or at Casa Rio

**Women In Science Education (WISE) Friday Night Dinner**

At each ASTE annual conference, the WISE Forum holds a “Greet, Meet, Eat, Share” Reception.
Saturday, January 18, 2014 AT A GLANCE

7:00 - 8:00 AM  Breakfast on your own
                 Numerous restaurants are within a few blocks of the hotel.

8:00 – 9:00 AM  Oversight Committee  Chula Vista Boardroom

8:00 - 11:30 AM Sessions

9:15 – 10:15 AM NTLI Committee  Chula Vista Boardroom

9:15 – 10:15 AM Equity committee meeting  Chula Vista

9:15 – 11:15 AM Professional Development Workshop

11:45 – 1:30 PM Business/Awards Luncheon  Regency Ballroom
The Oversight Committee ensures the organizational health of the Association. As such, this committee should review and recommend changes to policy and procedures, and investigate mechanisms to promote the achievement of the mission statement of ASTE.

**Video-based teaching modules as a vehicle for promoting effective technology integration in secondary classrooms**  
*John Tillotson, Syracuse University; David Slykhuis, James Madison University*  

Video-based teaching modules that showcase the effective integration of emergent educational technologies can serve as powerful professional development tools for science teacher educators. This session will showcase a video-based module that uses mixed reality demonstrations involving gravity to support students' conceptual understanding.

**Integrating technology and developing digital competencies in science education**  
*Isha DeCoito, York University; Daniella DiLucia, York University*  

Digital competencies are monitored as pre-service teachers explored the integration of digital literacies in a science methods course. Findings include enhanced technological literacy in terms of learning about technology; awareness of the process of knowledge construction; personalized learning pedagogy; and heightened self-efficacy.

**An analysis of ontological and epistemological underpinnings of science methods textbooks and syllabi**  
*Jesse Wilcox, Iowa State University; Joanne Olson, Iowa State University*  

This study investigated methods syllabi and textbooks to elucidate ontological and epistemological underpinnings. Our findings indicate these messages align with preservice teachers’ preconceptions of teaching, yet are incongruent with ontological and epistemological underpinnings of reforms-based science teaching practices.

**Using lesson study to develop the knowledge, skills, and dispositions of science teacher educators**  
*Sharon Dotger, Syracuse University; Mary Bearkland, Syracuse University; Patrick Dawes, Syracuse University; Grace Orado, Syracuse University*  

This study describes how lesson study was used by science teacher educators to investigate the knowledge and practices needed in science teacher education. The presentation will describe our lesson study process, the importance of the public research lesson, our learning about student thinking and the knowledge base for teacher education.
Elementary education students’ descriptions of and attitude towards the interdisciplinary nature of science
Karen Bengtson, College of St. Benedict/St. John’s University
This presentation focuses on elementary education students’ attitude towards and descriptions of interdisciplinary science while taking an integrative, inquiry-based science course. Surveys, semester long journaling and a focused pre/post unit comparison are used to examine understanding and attitudes, and how they change throughout the course.

**Traditional Paper Set**
**Saturday 8:00 - 9:00 AM**
**Thread:** Preservice Science Teacher Preparation

Exploring pre-service teachers' interdisciplinary understandings of science through design technology
Young Ae Kim, The University of Georgia; Dongmei Zhang, The University of Georgia; Deborah Tippins, The University of Georgia; Celestin Ntemngwa, The University of Georgia; Ji Shen, University of Miami
Design technology, emphasized in the Next Generation Science Standards (2013), requires students to draw on knowledge constructed in multiple disciplinary contexts. This study investigates pre-service science teachers' understanding of design technology and interdisciplinary knowledge through model hand and birdhouse design tasks.

**Traditional Paper Set**
**Saturday 8:00 - 9:00 AM**
**Thread:** Preservice Science Teacher Preparation

Learning to teach inquiry-based science instruction via mixed-reality teaching practices in a methods course
Nazan Bautista, Miami University
This study investigated the impact of a mixed-reality teaching environment (TeachLive Lab) on preservice early childhood teachers’ understanding of inquiry-based science and self-efficacy beliefs. It has implications for science teacher educators.

Preservice science and mathematics teachers’ perceptions about using computational modeling as an instructional method
Younkyeong Nam, The College at Brockport - State University of New York; Peter Veronesi, The College at Brockport - State University of New York; Osman Yasar, The College at Brockport - State University of New York
This study presents initial findings come from a research and evaluation study of our first and second year implementations of the Noyce program about participants’ satisfactions and perceptions regarding the use of computational modeling and simulation tools for teaching science and mathematics.

**Traditional Paper Set**
**Saturday 8:00 - 9:00 AM**
**Thread:** Science Teacher Professional Development

Becoming a “Thoughtfully Adaptive” science teacher educator: Critical incidents identified through self-study
Annie Arnone, University of Missouri; Deborah Hanuscin, University of Missouri; Somnath Sinha, University of Missouri
Through collaborative self-study, we examine the transition of a classroom teacher to science teacher educator. We use critical incidents to explore the development of “thoughtfully adaptive” pedagogy framed around student ideas and thinking. Our work has implications for the design of programs to prepare graduate students to be teacher educators.

Newly qualified science teachers: What the research says
Julie Luft, University of Georgia; Ben Campbell, University of Georgia; Shannon Dubois, University of Georgia; Ryan Nixon, University of Georgia; EunJin Bang, Iowa State University
This international review of research is focused on early career science teachers. Empirical, peer-reviewed studies were examined covering thirty years, and compared to international standards in teacher education. Some areas had significant research, while other areas are emerging.

Darwinian evolution as a theory of teacher learning
Andy Cavagnetto, Washington State University
This paper argues for Darwinian evolution as a theoretical tool to inform research and design of professional learning opportunities. Darwinian evolution has been employed across a wide variety of social science disciplines and has potential to simplify our current theoretical positions.

Educate to innovate in science teacher professional development
Regina Toolin, University of Vermont; Beth White, University of Vermont
In this paper we discuss the successes and challenges of the Noyce Scholarship program since 2009 with a specific focus on recruitment and program efficacy: Is the program doing what it said it would do? How important and effective is the coursework, fieldwork and the Noyce mentoring program on teacher professional development?

New technologies and reformed-based science instruction: An examination of the professional development focused on supporting science teaching and learning with technologies.
Todd Campbell, University of Connecticut; Max Longhurst, Utah State University; Shiang-Kwei Wang, New York Institute of Technology; Hui-Yin Hsu, New York Institute of Technology; Dan Coster, Utah State University
As professional development (PD) outcomes, this presentation will reveal how cyber-enabled resources are adopted as classroom tools and the impact of PD on student learning.

Effects of 3-year sustained professional development on the classroom instruction of elementary school teachers
Nancy Hauck, Dixie State University; Todd Campbell, University of Connecticut
This study examined the extent to which sustained teacher development, designed to meet science education reform, affected the classroom instruction of elementary school teachers in third through sixth grade over a 3-year period.
**Social and teaching presence in technical support sessions: A descriptive analysis**

Jennifer Albert, North Carolina State University; Margaret Blanchard, North Carolina State University; Meredith Kier, Howard University; Sarah Carrier, North Carolina State University; Grant Gardner, Middle Tennessee State University

This study analyzed the nature of technical support with teachers following teacher professional development in videoconferencing and face-to-face sessions. Analyses using the Community of Inquiry framework found the nature of the sessions comparable, implying the need for an experienced teacher and the efficacy of videoconferencing.

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**The nature of technology: Implications for learning, teaching, and teacher education**

Jerrid Kruse, Drake University; Michael Clough, Iowa State University; Joanne Olson, Iowa State University; Benjamin Herman, University of South Florida

This thematic paper set will (1) introduce and provide rationale for a nature of technology (NOT) framework, (2) discuss implications of these ideas for society and teacher education, (3) discuss ways in which the NOT can be addressed in teacher education and (4) present research on the efficacy of those efforts.

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**Learning to teach elementary science in an experiential, informal context: Three cases of developing identity**

Carolyn Wallace, Indiana State University

Lack of time for teaching science in traditional elementary classroom placements has led some teacher educators to find practice teaching time for elementary education students in informal science settings. The purpose of this study was to explore how the science teaching identities of three case study students developed in this context.

**Preservice elementary teachers’ identity development in an environmentally-focused service-learning course**

Rachel Wilson, Appalachian State University; Leslie Bradbury, Appalachian State University

The purpose of this presentation is to explore how a pre-methods service-learning experience with preservice elementary teachers influenced their science learning and science teaching identities. PSETs were involved in service-learning events in an applied science setting as well as interacting with elementary aged students.
Building positive “possible selves” in elementary science: Examining the effects of an elementary science concentration on preservice teacher’s confidence to teach science
Tammy Lee, East Carolina University; Meredith Kier, Howard University, Washington, D.C.; Megan Garner, East Carolina University
We explored the possible selves of 6 preservice elementary teachers enrolled in an elementary science concentration. As students reflect on their past science experiences and their experience in the science concentration, they provide insight to how discipline-specific methods courses may increase their confidence to effectively teach science.

Traditional Paper Set  Saturday 8:00 - 9:00 AM  Live Oak
Thread: Mixed  Presider: David Vallet

Brokering the boundary between formative and summative assessment
Xinying Yin; Gayle Buck, Indiana University
This study presents a collaborative action research between a high school chemistry teacher and a university researcher in exploring how to use formative assessment for students’ learning and prepare students for tests by brokering the boundary between formative and summative assessment.

Use of ‘the Scientific Method’in practitioner journals: Why we should kill it; why it’s not dead yet
Daniel Meyer, Illinois College
‘The Scientific Method’ has a schizophrenic status, being both ubiquitous in its use and regarded as a fallacy by science education reformers. In this paper, we examine its use in practitioner journals to address why this myth persists.

Physics coursetaking, teacher recruitment, and resource allocation: Implications for policy and practice
Angela Kelly, Stony Brook University; Keith Sheppard, Stony Brook University
Secondary physics education in New York State will be explored using statewide databases to highlight patterns in resource allocation, teacher assignments and certification, and physics coursetaking. The data analysis will inform efforts to expand the STEM pipeline and promote physics participation, particularly among underrepresented students.

NTLI Committee  Saturday 9:15 - 10:15 AM  Chula Vista Boardroom
Members of the NTLI review committee will meet to determine the ASTE presentation to be presented at The Society for Information Technology and Teacher Education.

Embedded Workshop  Saturday 9:15 - 11:15 AM  Directors
Using multimedia to instruct Nature of Science (NOS) and Scientific Inquiry (SI)
Mark Bloom, Dallas Baptist University; Catherine Koehler, Southern Connecticut State University, Ian Binns, University of North Carolina-Charlotte
Oftentimes, public conceptions of science are formed by popular media representations via television or films. These representations are often inaccurate and misleading about nature of science (NOS) and scientific inquiry (SI). In this workshop, we will demonstrate how science is portrayed in popular media as a vehicle for NOS/SI instruction.

**Equity committee meeting**  
Saturday 9:15 – 10:15 AM  
Chula Vista

The Equity Committee works to ensure that the Association, in all forms and representations, addresses equity issues, including representation, access, and compliance with ASTE SOPs and By-Laws.

**Traditional Paper Set**  
Saturday 9:15 - 10:15 AM  
Pecos

**Examining the effects of a STEM career video intervention on the interests of rural, minority middle school students**  
*Meredith Kier, Howard University; Margaret Blanchard, North Carolina State University*

This mixed methods study examined the STEM career interests of 85 rural eighth grade students as they explored STEM career videos and fact sheets, and planned a video. Analyses of students’ products and a pre/post STEM-CIS survey using aspects of the Social Cognitive Career Theory indicated shifts in interest based on knowledge of career outcomes.

**Identifying critical aspects of a STEM school**  
*Judith Morrison, Washington State University; Amy Roth-McDuffie, Washington State University; Brian French, Washington State University*

This presentation overviews research conducted at an innovative STEM high school focused on four critical aspects of teaching and learning: problem and inquiry-based learning, motivation, social interactions, and collaboration. The impact of these on student academic success will be discussed.

**The Nature of Engineering (NOE) among middle school students and K-8 teachers: Phase I**  
*Anita Martin, University of Illinois*

Engineering design principles will be taught in K-12 classrooms yet little research is available about the views of teachers and students related to the work/nature of engineering (NOE). This mixed methods study analyzed middle school students and high school teachers’ views on NOE. Results found naive views about NOE by both students and teachers.

**Enhancing science teaching through a transformative and immersive inquiry-based professional development experience for urban teachers**  
*Aidin Amirshokoohi, DeSales University; Mahsa Kazempour, Penn State Berks; Steven Autieri, East Haven High School*
This study focuses on a professional development (PD) for urban science teachers. We explored (1) participants’ prior expectations and post perceptions of the PD, (2) the impact of the experience on their PCK, (3) the extent of the incorporation of PD ideas in teaching practices, and (4) factors supporting or impeding changes in practice.

The role of teacher inquiry as professional development for resource (lead) teachers
Karen Levitt, Duquesne University; Sharon Hess, ASSET, Inc.
Very few opportunities exist for ongoing learning and reflection about effective strategies for professional development for former classroom teachers in a new role as a lead, or resource, teacher. The use of teacher inquiry as professional development for lead teachers is presented as a meaningful strategy for examining impact and change.

On the nature of induction: Understanding the needs and induction experiences of alternatively licensed science teachers in Louisiana
Angela Webb, Louisiana State University
Across the country, alternative certification programs serve to address teacher shortages in key areas, including science. In Louisiana, this is no different. Given this, the purpose of this study is to describe alternatively licensed beginning science teachers’ induction supports and the ways they experience such supports.

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<tr>
<th>Traditional Paper Set</th>
<th>Saturday 9:15 - 10:15 AM</th>
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<tr>
<td>Thread: Curriculum, Pedagogy, and Assessment</td>
<td>Presider: Phillip Boda</td>
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Shared collaborative ownership: Project based learning
Angelia Reid-Griffin, UNCW/Secondary Education; William Sterrett, UNCW/Educational Leadership
Insights on the collaborative efforts of teachers, the building principal, instructional leaders, and university faculty in shaping a powerful, relevant learning experience for middle school students in a way that enhanced collaboration and student engagement.

The affective nature of PCK
Peggy Ward, University of Arkansas; Cathy Wissehr, University of Arkansas; Michael Wavering, University of Arkansas
This presentation will attempt to identify from the literature how the PCK model is a valuable construct toward achieving affective goals in the science classroom such as generating positive student attitudes toward school science, enhancing students’ motivations to engage in science processes, while at the same time, improving learning outcomes.

English as default language of instruction in primary grades: Repercussions in Indian Science Classroom
Vanashri Nargund-Joshi, New Jersey City University
This study represents a case study of two primary school teachers’ science teaching in English language from India. The goal is to understand dynamics between teacher and students in a science classroom
while learning in a foreign language. The reasons for the difference between policy expectations and teachers’ classroom practice are presented.

### Traditional Paper Set  Saturday 9:15 - 10:15 AM

**Blanco**  
Thread: Mixed

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td><strong>Unifying life: Placing urban tree diversity into an evolutionary context</strong></td>
<td>Yael Wyner, City College of New York/City University of New York; Jennifer Doherty, Michigan State; Janice Koch, Hofstra University</td>
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<td>This presentation describes a program that uses the Leafsnap tree identification app to engage urban middle-school students in local plant diversity and the patterns of evolution. We will discuss preliminary findings on how students notice, identify, and group plants according to common ancestry.</td>
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<table>
<thead>
<tr>
<th>Title</th>
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<tbody>
<tr>
<td><strong>Investigating the Interdisciplinary Understanding (IU) of middle school preservice teachers using a prototype energy assessment instrument</strong></td>
<td>Shannon Sung, The University of Georgia; David Jackson, The University of Georgia</td>
</tr>
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<td>We are interested in whether preservice teachers’ IU would increase with sequential acquisition of energy topics introduced in a science methods class. The instrument was implemented as an extra credit assignment before and after instruction. A paired-samples t test was conducted to compare the mean differences of nine participants.</td>
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<tr>
<th>Title</th>
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<tr>
<td><strong>Video analysis project based learning in the high school physics classroom</strong></td>
<td>Samuel Wheeler, North Carolina State University</td>
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<tr>
<td>This pilot study investigates the impact of video analysis technology project based learning on the attitudes and interests in physics of high school students. A PBL inquiry activity on the physics of flight was assigned. Participants were interviewed and given a survey. Results show more interest in physics and learning because of the activity.</td>
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### Traditional Paper Set  Saturday 9:15 - 10:15 AM

**Blanco**  
Thread: Student Learning P-12

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<thead>
<tr>
<th>Title</th>
<th>Authors</th>
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<tr>
<td><strong>The decisions made: The case of an exemplary elementary science teacher</strong></td>
<td>Jeni Davis, University of South Florida</td>
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<td>This case study examined the salient features of student performance that influenced instructional decisions made by an exemplary elementary science teacher. Three key features of student performances that impacted instructional decision-making emerged: (1) completion of the task; (2) content; and (3) correctness of the student’s performance.</td>
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<th>Title</th>
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<tr>
<td><strong>I can dig it! What do elementary students know about the properties of rocks and soils?</strong></td>
<td>Heather Miller, The Ohio State University; Mandy Smith, The Ohio State University; Kathy Trundle, The Ohio State University; Sally Hobson, Hilliard City Schools; Katherine Mollohan, The Ohio State University; Margilee Hilson, Columbus Public Schools; Larry Krissek, The Ohio State University</td>
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This study describes second and third grader’s understandings of the properties and uses of rocks and soils before and after targeted instruction. Twenty-three students in a suburban, Midwestern school participated in this study. Students made gains or maintained knowledge of uses and properties of rocks and soils after targeted instruction.

**Experiential Session**  
**Saturday 9:15 - 10:15 AM**  
**Nueces**  
Thread: Preservice Science Teacher Preparation

**Integrating Engineering Standards, Common Core ELA Standards, Common Core Mathematics Standards, and Elementary Science Performance Standards**  
*Barbara Rascoe, Mercer University; Catherine Lange, Buffalo State College; Mary Katherine Johnson, Mercer University; Rachel Sauls, Mercer University*  
This session will provide methodologies for designing science instruction for elementary teachers that comply with integrating common core, science performance standards, and engineering standards.

**Traditional Paper Set**  
**Saturday 9:15 - 10:15 AM**  
**Pecan**  
Thread: Informal Science Education  
Presider: Shiyu Liu

**Reinventing the role museums play in advancing science education**  
*Bryan Wunar, Museum of Science and Industry; Nicole Kowrach, Museum of Science and Industry*  
The Museum of Science and Industry in Chicago will outline the components of a comprehensive model for using the resources of informal learning institutions to strengthen science learning both in and out of the school setting.

**A conceptual model of the Science Olympiad experience**  
*Lucy Kulbago, Kent State University; Aziz Alamri, Kent State University; Rajlakshmi Ghosh, Kent State University; Bridget Mulvey, Kent State University*  
This qualitative study examined the perceived benefits of the Science Olympiad program for 28 participants including middle and high school students and supporting adults. Participants were interviewed while attending a competition in Ohio. Transcripts were coded and inductively analyzed to begin to conceptualize the Science Olympiad experience.

**Science as a puzzle: One view of how video games present science**  
*Logan Leslie, University of Georgia*  
I examine how Portal 2 makes contributions to player understandings of what science is through analysis of both the game and fan made works. In addition to providing specific examples of how Portal 2 presents ways to interpret science, I address how such messages imbedded in popular media can be overlooked or misunderstood by science educators.
Themed Paper Set  Saturday 9:15 - 10:15 AM  Mesquite
Thread: Equity and Diversity

Interrogating the hybrid language of science in ELL classrooms
Molly Weinburgh, Texas Christian University; Cecilia Silva, Texas Christian University; Kathy Smith, Tarleton State University
We examine the hybrid language of science (Lemke, 2004) as manifested with ELLs over seven years of summer school that authentically integrated science, language arts, and mathematics. Data from journals, video, and student products will be used to show change in natural language, visual representation, and manual/technical activity.

Traditional Paper Set  Saturday 10:30 - 11:30 AM  Pecos
Thread: Equity and Diversity  Presider: Felicia Moore Mensah

Responding to the STEM equity dilemma: An innovative public/private partnership
Carolyn Parker, The Johns Hopkins University School of Education; Claudia Morrell, National Association for Partnerships in Equity
A nationally recognized non-profit organization, a regional community college, and a large urbanized school district have partnered to deliver a high-quality professional development focused on supporting classroom practices intended to enhance equity in STEM classrooms.

Incorporating indigenous knowledge and STEM in Reservation classrooms
Marcie Galbreath, University of Idaho; Anne Kern, University of Idaho
This case study addresses how Indigenous Knowledge (IK) could be incorporated in science, technology, engineering and mathematics (STEM) in classrooms on American reservations. Using an interview method and subsequent questionnaires, discussions and observations we report findings on the incorporation of IK and STEM in classrooms on two neighboring schools.

Relationship-based pedagogy as culturally responsive science instruction for indigenous students
Sara Tolbert, University of Arizona
Findings will be shared from a qualitative study of science teachers’ and indigenous students’ views on what it means to be a culturally responsive teacher. Results indicate that developing positive teacher-student relationships must be a key component of education reforms designed to improve science-learning experiences for indigenous students.

Themed Paper Set  Saturday 10:30 - 11:30 AM  Medina
Thread: Preservice Science Teacher Preparation

Exploring effective clinical/field experience options for pre-service elementary science teachers
Paula Magee, Indiana University - Indianapolis; Aimee Govett, East Tennessee State University; Debra Hemler, Fairmont State University
The session will describe 3 types of elementary science pre-service teacher field experiences that support content knowledge, pedagogical expertise and appreciation for student difference and diversity. Discussion with participants will follow the presentation.

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<th>Traditional Paper Set</th>
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<td>Thread: Student Learning P-12</td>
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<td>Presider: Philip Boda</td>
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**Science camps for students with visual impairments**
*Margilee Hilson, Columbus City Schools; Sally Hobson, Hilliard City Schools; Tiffany Wild, The Ohio State University*

This study focused on the development of scientific understandings of students with visual impairments as a result of participation in weeklong summer camps. Observational and pre/post interview data indicate an increase in scientific understandings following field-based instruction supported by classroom-based preparatory and summary lessons.

**The relationship between written and oral arguments**
*Hui-Hui Wang, University of Minnesota/Center for Youth Development and STEM Education Center; Ying-Chih Chen, University of Minnesota/STEM Education Center; Jia-Ling Lin, University of Minnesota/STEM Education Center*

This study is to explore the relationship between oral argument and written argument in the eight-grade science unit of heat and energy. We suggested there is a positive relationship between oral and written arguments, especially in using scientific language, questions and claim, and multimodal representation.

**Immersive argument-based inquiry practice in science classroom: Dissertation research on science writing heuristic approach**
*Jee Kyung Suh, University of Iowa; Ying-Chih Chen, University of Minnesota; Brian Hand, University of Iowa*

This study is a review of twenty one dissertation studies that formed part of an ongoing research program focused on examining the benefits and nature of Science Writing Heuristic (SWH) approach in science classroom. This review study discusses theoretical and practical issues regarding learning science through immersive ABI approach.

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<th>Traditional Paper Set</th>
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<tr>
<td>Thread: Preservice Science Teacher Preparation</td>
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<td>Presider: Barbara Billington</td>
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**Evaluating a graduate-level science teacher education program**
*Elizabeth Lewis, University of Nebraska-Lincoln; Robbie McCarty; Aaron Musson, University of Nebraska-Lincoln*

Highly-quality science teaching needs research on teacher education programs. We examined changes in a 14-month, certification program for practicing scientists. Changes that were made in the coursework sequence that resulted in less stress for teacher candidates and a more meaningful and reflective process in the final research project.
Science teacher performance assessments: A comparison of program-embedded assessments and the EdTPA  
*Frederick Freking, University of Southern California*

This presentation will share a science teacher education programs development of a series of assessments that are used by candidates to reflect on their development and the program to determine readiness for the science classroom. Candidate performance on the programmatic assessments is then compared to results on the Science EdTPA.

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<tr>
<td>Thread: Science Teacher Professional Development</td>
<td>Presider: Rich Lamb</td>
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**Effects of a science content academy on science self-efficacy of elementary teachers**  
*Suzanne Nesmith, Baylor University; Madelon McCall, Baylor University; John Park, Baylor University*

The effect of a 40-hour science content workshop on short and long-term science teacher efficacy was researched. Twenty elementary teachers from one school participated in the summer workshop. Possible reasons for the dramatic differences in the STEBI subtests at year’s end will be discussed.

**Middle school science teachers’ efficacy and implementation of inquiry: Impact of an inquiry professional development program**  
*Christine Lotter, University of South Carolina; Stephen Thompson, University of South Carolina; Whitney Smiley, University of South Carolina; Tammiee Dickenson, University of South Carolina*

This study investigated the impact of a year-long inquiry professional development program on middle school teachers’ self-efficacy and outcome expectancy for teaching science as inquiry as well as the quality of their implemented inquiry practice. The presentation will address implications for inquiry professional development.

**Professional empowerment in action: Meeting teachers where they are**  
*Amy Moreland, UT Austin - UTeach Institute; Mary Hobbs, UT Austin - Center for STEM Education*

The researchers used the construct of professional empowerment as the theoretical frame to explore pre-kindergarten teachers’ professional growth over time to investigate the following question: How did the teacher-researchers change in terms of professional empowerment over the course of the three-year project?

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<th>Experiential Session</th>
<th>Saturday 10:30 - 11:30 AM</th>
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**Engaging college students in the practices of science with team-based learning**  
*Sandra Westmoreland, Texas Woman's University; Scott Miller, Sam Houston University; Jennifer Mount, Texas State University*

In this presentation the authors will introduce the team-based learning (TBL) model of teaching and learning and will discuss how it can be implemented in college science and science teaching methods.
classes. We will demonstrate how to form teams, how to assess individual and team readiness, and how to create team application exercises.

**Literacy-rich STEM**

*Kevin Carr, Pacific University*

How should 21st century teachers be STEM-prepared in light of CCSS and NGSS? Work in many school communities demands an explicit focus on the development of STEM academic literacy. This paper describes how teaching candidates, mentors, and science teacher educators are working to define, create and implement literacy-rich STEM (ELSTEM) activities.

**Understanding factors underlying science course selection by African American students at an inner city high school: An exploratory study**

*Diane Johnson, North Carolina State University; Margaret Blanchard, North Carolina State University*

This mixed methods, exploratory study examined the self-efficacy and motivation of 62 urban high school students in advanced and regular science courses. There were few differences in students’ self-efficacy and motivation, and parental support was most influential in academic choices. Most insights were gained through student interviews.

**Measuring student learning through the integration of science, engineering and literature**

*Kristina Tank, University of Minnesota; Tamara Moore, University of Minnesota; Bhaskar Upadhyay, University of Minnesota*

With increasing attention on STEM, it is important to examine various instructional models to better understand what is meant by STEM integration. Building on language and science integration research, this study explores how literacy could be used to facilitate an integrated approach to teaching science, and engineering in elementary classrooms.

**The effects of participation in undergraduate science education research on teachers’ practice**

*Sarah Boesdorfer, University of Northern Iowa; Laura Asprey, University of Northern Iowa*

Some inservice teachers had the opportunity to participate in formal science education research projects as undergraduates. The results of a study of teachers exploring the effects of that experience on their teaching practice will be presented. A major finding including research skills that translated to skills used during their teaching practice

**Fostering resiliency as a necessary skill for science teachers: A case study approach**

*Rita Hagevik, The University of North Carolina at Pembroke; Irina Falls, The University of North Carolina at Pembroke*
This qualitative study examined the resilience building process in secondary preservice science teachers and its link to perceived teacher success. A resilience framework was established that included using mobile devices. A cross-case analysis showed that resilience was fostered and that the mobile device was able to provide support.

The growing awareness inventory: Building capacity for culturally responsive STEM with a structured observation protocol

*Julie Brown, University of Florida; Kent Crippen, University of Florida*

We share case study results of secondary science and math preservice teachers who completed a structured observation protocol designed to support the use of culturally responsive pedagogy in their field experiences and subsequent lesson planning. Implications for preparing culturally responsive STEM teachers and redesign of the protocol are shared.

| Luncheon | 11:45 AM – 1:30 PM | Regency Ballroom West |

Annual business meeting, ASTE Award presentations, passing of the gavel, and 2015 ASTE Portland Conference preview.
### ASTE Awards

#### Outstanding Science Educator of the Year (Award I)

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Institution</th>
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<tbody>
<tr>
<td>1973</td>
<td>Gerald Krockover</td>
<td><em>Purdue Univ.</em></td>
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<td>1974</td>
<td>No Award Given</td>
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<td>1975</td>
<td>Vincent Lunetta</td>
<td><em>Univ. of Iowa</em></td>
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<td>1976</td>
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<td>1978</td>
<td>Harold Jaus</td>
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<td>1979</td>
<td>Roger W. Bybee</td>
<td><em>BSCS</em></td>
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<td>Anton Lawson</td>
<td><em>Arizona State Univ.</em></td>
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<td>1982</td>
<td>James A. Shymansky</td>
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<td>James Dudley Herron</td>
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<td>Lawrence F. Lowery</td>
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<td>Barry Fraser</td>
<td><em>Curtain Univ. of Technology, Australia</em></td>
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<td>Cheryl Mason</td>
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<td>1999</td>
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<td><em>St. Cloud State Univ.</em></td>
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<td>2003</td>
<td>Ronald Bonnstetter</td>
<td><em>Univ. of Nebraska</em> (10+ yrs.)</td>
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<td>2005</td>
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<td>Penny J. Gilmer</td>
<td><em>Florida State Univ.</em> (10+ yrs.)</td>
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<td><em>Univ. of Missouri-St. Louis</em> (10+ yrs.)</td>
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<td>Kathryn Scantlebury</td>
<td><em>Univ. of Delaware</em> (10+ yrs.)</td>
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<td>2009</td>
<td>Deborah Tippins</td>
<td><em>Univ. of Georgia</em> (10+ yrs.)</td>
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<td>2010</td>
<td>John W. Tillotson</td>
<td><em>Syracuse Univ.</em> (10+ yrs.)</td>
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<td>2011</td>
<td>G. Nathan Carnes</td>
<td><em>Univ. of South Carolina</em> (10+ yrs.)</td>
</tr>
<tr>
<td>2012</td>
<td>Kathy Cabe Trundle</td>
<td><em>Ohio State Univ.</em> (10+ yrs.)</td>
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<td>2013</td>
<td>Julie A. Luft</td>
<td><em>Arizona State Univ.</em> (10+ yrs.)</td>
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<td>2014</td>
<td>Catherine Milne</td>
<td><em>New York University</em> (10+ yrs.)</td>
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<td>2015</td>
<td>Randy L. Bell</td>
<td><em>Univ. of Virginia</em> (10+ yrs.)</td>
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<tr>
<td>2016</td>
<td>Julie Gess-Newsome</td>
<td><em>Northern Arizona State Univ.</em> (10+ yrs.)</td>
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<tr>
<td>2017</td>
<td>Rebecca Schneider</td>
<td><em>University of Toledo</em> (10+ yrs.)</td>
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<tr>
<td>2018</td>
<td>Lynn Bryan</td>
<td><em>Purdue University</em> (10+ yrs);</td>
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<tr>
<td>2019</td>
<td>Carla Johnson</td>
<td><em>University of Cincinnati</em> (&lt;10 yrs)</td>
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<tr>
<td>2020</td>
<td>Alec Bodzin</td>
<td><em>Lehigh University</em> (10+ yrs);</td>
</tr>
<tr>
<td>2021</td>
<td>Deborah Hanuscin</td>
<td><em>University of Missouri</em> (&lt;10 yrs)</td>
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## Outstanding Mentor (Award II)

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<td>1997</td>
<td>John Penick</td>
<td>Univ. of Iowa</td>
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<tr>
<td>1998</td>
<td>Hans Anderson</td>
<td>Indiana Univ.</td>
</tr>
<tr>
<td>1999</td>
<td>Norman Lederman</td>
<td>Oregon State Univ.</td>
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<tr>
<td>2001</td>
<td>Robert E. Yager</td>
<td>Univ. of Iowa</td>
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<td>2002</td>
<td>Walter S. Smith</td>
<td>Ball State Univ.</td>
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<td>2003</td>
<td>Larry Enochs</td>
<td>Oregon State Univ.</td>
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<tr>
<td>2004</td>
<td>Catherine Yeotis</td>
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<tr>
<td>2005</td>
<td>Sandra Abell</td>
<td>Univ. of Missouri-Columbia</td>
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<tr>
<td>2006</td>
<td>Tom Koballa</td>
<td>Univ. of Georgia</td>
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<tr>
<td>2007</td>
<td>Kenneth Tobin</td>
<td>Graduate Center of the City Univ. of New York</td>
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<tr>
<td>2008</td>
<td>Dana Zeidler</td>
<td>Univ. of South Florida</td>
</tr>
<tr>
<td>2009</td>
<td>Lloyd Barrow</td>
<td>University of Missouri</td>
</tr>
<tr>
<td>2010</td>
<td>Kathryn Scantlebury</td>
<td>Univ. of Delaware</td>
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<tr>
<td>2011</td>
<td>Gerry Saunders</td>
<td>Unity College</td>
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<td>Alec Bodzin</td>
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<td>2013</td>
<td>Julie Luft</td>
<td>University of Georgia</td>
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## Emeritus Awards/ Outstanding Longtime Service to ASTE (Award III)

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<tr>
<td>N. Eldred Bingham</td>
<td>Univ. of Florida</td>
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<tr>
<td>Milton O. Pella</td>
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<tr>
<td>Pinchas Tamir</td>
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<td>Fletcher Watson</td>
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<td>Marvin Druger</td>
<td>Syracuse Univ.</td>
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<td>R. Will Burnett</td>
<td>Univ. of Illinois</td>
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<tr>
<td>Fred Fox</td>
<td>Oregon State Univ.</td>
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<tr>
<td>Nasrine Adibe</td>
<td>Dowling College</td>
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<tr>
<td>Gerald Craig</td>
<td>Teachers College, Columbia Univ.</td>
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<td>Herbert Smith</td>
<td>Colorado State Univ.</td>
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<tr>
<td>Roger Olstad</td>
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<tr>
<td>Alfred DeVito</td>
<td>Purdue Univ.</td>
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<tr>
<td>Hans Anderson</td>
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<td>Paul Dehart Hurst</td>
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<td>Robert W. Howe</td>
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<td>Ronald K. Atwood</td>
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<td>Willard Jacobson</td>
<td>Teachers College, Columbia Univ.</td>
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<td>Donald W. McCurdy</td>
<td>Univ. of Nebraska-Lincoln</td>
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<td>Ralph Lefler</td>
<td>Purdue Univ.</td>
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<td>Harold Tannenbaum</td>
<td>Hunter College</td>
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<td>Steven Winter</td>
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<td>William C. Ritz</td>
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<td>Edward Victor</td>
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<td>Stanley Helgeson</td>
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<td>Floyd E. Mattheis</td>
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<td>Kenneth J. Appleton</td>
<td>Central Queensland Univ.</td>
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<td>William E. Baird</td>
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<td>Michael Cohen</td>
<td>Indiana Univ.-Purdue Univ.</td>
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<td>Vincent Lunetta</td>
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<td>Dorothy Gabel</td>
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<td>Addison Lee</td>
<td>Univ. of Texas</td>
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<tr>
<td>Dana Zeidler</td>
<td>Univ. of South Florida</td>
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## Innovations in Teaching Science Teachers (Award IV)

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<thead>
<tr>
<th>Year</th>
<th>Title</th>
<th>Authors</th>
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</thead>
<tbody>
<tr>
<td>1990</td>
<td>A Reflective Approach to Science Methods Courses for Preservice Elementary Teachers</td>
<td>Dorothy Rosenthal (California State Univ.- Long Beach)</td>
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<tr>
<td>1991</td>
<td>Enhancing Science and Mathematics Teaching</td>
<td>Kenneth Tobin, Nancy Davis, Kenneth Shaw, and Elizabeth Jakubowski (Florida State Univ.)</td>
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<tr>
<td>1992</td>
<td>The Learning Cycle as a Model for the Design of Science Teacher Preservice and Inservice Education</td>
<td>Peter Rubba (Pennsylvania State Univ.)</td>
</tr>
<tr>
<td>1993</td>
<td>Reconstructing Science Teacher Education Within Communities of Learners</td>
<td>Deborah Tippins (Univ. of Georgia), Sharon Nichols and Kenneth Tobin (Florida State Univ.)</td>
</tr>
<tr>
<td>Year</td>
<td>Title</td>
<td>Authors</td>
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<td>------</td>
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<tr>
<td>1994</td>
<td>No Award Given</td>
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<td>1995</td>
<td>Science for Early Adolescence Teachers (Science FEAT): A Program for Research and Learning</td>
<td>Samuel Spiegel, Angelo Collins, and Penny J. Gilmer (Florida State Univ.)</td>
</tr>
<tr>
<td>1996</td>
<td>An Innovative Model for Collaboration Reform in Elementary School Science Teaching</td>
<td>M. Gail Shroyer, Emmett Wright, and Linda Ramey-Gassert (Kansas State Univ.)</td>
</tr>
<tr>
<td>1997</td>
<td>Reconceptualizing the Elementary Science Methods Course Using Reflective Orientation</td>
<td>Sandra Abell and Lynn Bryan (Purdue Univ.)</td>
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<td>1998</td>
<td>What Science Education Standards Say: Implications for Teacher Education</td>
<td>Penny Hammrich (Temple Univ.)</td>
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<td>1999</td>
<td>No Award Given</td>
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<tr>
<td>2000</td>
<td>Professional Development Programs for Elementary Science Teachers: An Analysis of Teacher Self-Efficacy Beliefs and the Professional Development Model</td>
<td>Tracy J. Posnanski (Univ. of Wisconsin- Milwaukee)</td>
</tr>
<tr>
<td>2001</td>
<td>Empowering Teachers as Researchers and Inquirers</td>
<td>Anne M. (Amy) Cox-Petersen (California State Univ.- Fullerton)</td>
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<tr>
<td>2002</td>
<td>Being There and Not Being “There:” The Experience of Teaching an Elementary Science Education Course on the Internet</td>
<td>Janice Koch and Michael Barriere (Hofstra Univ.)</td>
</tr>
<tr>
<td>2003</td>
<td>Using a Card-Sorting Task to Elicit and Clarify Science Teaching Orientations</td>
<td>Patricia Friedrichsen (Univ. of Missouri- Columbia) and Thomas Dana (Pennsylvania Univ.)</td>
</tr>
<tr>
<td>2004</td>
<td>An Inquiry-Based Laboratory Lesson to Construct an Understanding of Earth’s Seasons</td>
<td>Paul Ashcraft and Susan Courson (Clarion Univ.)</td>
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<td>2005</td>
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<td>2007</td>
<td>Using Historical Non-Fiction and Literature Circles to Develop Elementary Teachers’ Nature of Science Understanding</td>
<td>Sharon E. Nichols (Univ. of Alabama) and William Straits (California State Univ.- Long Beach)</td>
</tr>
<tr>
<td>2008</td>
<td>More Than a Conversation: Using Cogenerative Dialogues in the Professional Development of High School Chemistry Teachers</td>
<td>Sonya N. Martin (Drexel Univ.) Kathyrn Scantlebury (Univ. of Delaware)</td>
</tr>
<tr>
<td>2009</td>
<td>Expanding the Ways in Which Urban Students Participate in Science Education: Rituals, Transactions, and Fundamental Interactions</td>
<td>Christopher Emdin (Columbia Univ.)</td>
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<tr>
<td>2010</td>
<td>Flexibly adaptive professional development in support of teaching science with geospatial technology.</td>
<td>Nancy M. Trautman (Cornell Laboratory of Ornithology) &amp; James G. Makinster (Hobart and William Smith Colleges)</td>
</tr>
<tr>
<td>2011</td>
<td>Learning to Teach Science Through Collaboration: Coteaching and Cogenerative Dialogue in Elementary Science Methods Courses</td>
<td>Christina Siry (Univ. of Luxembourg), Nicole Lowell, and Elizabeth Zawatski (Manhattanville College)</td>
</tr>
<tr>
<td>2012</td>
<td>What about those left behind? A template for developing quality science lessons for English language learners.</td>
<td>Susan Gomez-Zwief &amp; Bill Straits. (California State University of Long Beach)</td>
</tr>
<tr>
<td>2013</td>
<td>Descriptive Inquiry in The Throes of Learning to Teach: Can Prospective Teachers Learn to Teach and Study their Teaching Closely?</td>
<td>Michele Koomen and Jamie Mitchell (Gustavus Aldophus College)</td>
</tr>
<tr>
<td>2014</td>
<td>Connecting to our community: Utilizing photovoice as a pedagogical tool to connect college students to science.</td>
<td>Kristin Cook, Bellarmine University and Cassie Quigley, Clemson University</td>
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**Implications of Research for Educational Practice (Award V)**

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<thead>
<tr>
<th>Year</th>
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<tbody>
<tr>
<td>1981</td>
<td>Wait-time and Learning in Science</td>
<td>Kevin Tobin (Western Australia Institute of Technology) and William Capie (Univ. of Georgia)</td>
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<td>1982</td>
<td>No Award Given</td>
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<tr>
<td>1983</td>
<td>The Disadvantaged Majority: Science Education for Women</td>
<td>Jane Butler Kahle (Purdue Univ.)</td>
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79
1984  Training Science Teachers to Use Better Teaching Strategies- Russell H. Yeany and Michael J. Padilla (Univ. of Georgia)
1985  Using Research to Improve Science Teaching Practice- Kenneth Tobin (Western Australian Institute of Technology)
1986  Active Technology for Higher Cognitive Level Learning in Science- Kenneth Tobin, William Capie, and Antonio Bettencourt (Univ. of Georgia)
1987  Training Teachers to Teach Effectively in the Laboratory- Pinchas Tamir (Hebrew Univ.)
1988  What Can Be Learned From Investigations of Exemplary Teaching Practice- Kenneth Tobin (Florida State Univ.)
1989  Visual/Spatial Thinking: An Essential Element of Elementary Science- Alan J. McCormack (San Diego State Univ.)
1990  Helping Students Learn How to Learn: A View from a Teacher-Researcher- Joe Novak (Cornell Univ.)
1992  Teacher Development in Microcomputer Usage in K-12 Science- James D. Ellis (BSCS)
1993  Understanding and Assessing Hands-On Science- Lawrence Flick (Washington State Univ.)
1994  Teaching Evolution: Designing Successful Instruction- Lawrence Scharmann (Kansas State Univ.)
1995  Using Visits to Interactive Science and Technology Centers, Museums, Aquaria and Zoos to Promote Learning in Science- Leonie Rennie and Terrence McClafferty (Curtin Univ. of Technology)
1996  General Biology: Creating a Positive Learning Environment for Elementary Education Majors- Larry Scharmann and Ann Stanheim-Smith (Kansas State Univ.)
1997  Empowering Science Teachers: A Model for Professional Development- Ann Howe (Univ. of North Carolina- Raleigh) and Harriet Stubbs (North Carolina State Univ.)
1998  No Award Given
1999  A Dynamical Systems Based Model of Conceptual Change- Andrew Hurford (Haskell Indian Nations Univ.)
2000  Teachers and Technology: A Case Study From an Implementation Project- Myra Halpin (North Carolina School of Science and Mathematics) and Ann Howe (North Carolina State Univ.)
2001  Visual/Spatial Thinking: A Forgotten Fundamental for School Science Programs- Alan J. McCormack and Cheryl L. Mason (San Diego State Univ.)
2002  What Knowledge is of Most Worth for Lateral Entry Secondary Science Teachers?- William R. Veal (Univ. of North Carolina- Chapel Hill)
2003  Teacher Student Co-Construction in Middle School Life Science- Maria Nunez-Oviedo (Univ. of Massachusetts- Amherst), Mary Ann Rea-Ramirez (Hampshire College), John Clement and Mary Jane Else (Univ. of Massachusetts- Amherst)
2005  Culturalized Science Instruction: Exploring Its Influence upon Black and White Students’ Achievement- Eileen Parsons (North Carolina State Univ.)
2006  No Award Given
2007  Narrative of Community: Visualizing Culturally Relevant Science Pedagogy Through the Identities of Black Middle School Teachers- M. Jenice Goldston and Sharon E. Nichols (Univ. of Alabama)
2008  A Case Study of Fifth Grade Teachers’ Changes in Methodology During a Two-Year Timeframe- Anita Martin and Brian Hand (Univ. of Iowa)
2009  Pathways to success in science: A phenomenological study examining the life experiences of African-American women in higher education, Claudette L. Giscombe
2010  Exploring Multiple Outcomes: Using cogenerative dialogues and coteaching in a middle school science classroom, Nicole K. Grimes, The Graduate Center, The City University of New York
2011  Synergistic Teaching of Science to English Language Learners: Comparative Analysis of the Strategies  
Daniel J. Bergman, Wichita State University  

2012  A mixed methods study of mid-career science teachers: The growth of professional empowerment.  
Amy Moreland and Mary Hobbs (University of Texas at Austin).  

2013  Teachers’ NOS Practices Two to Five Years after Having Completed an Intensive Science Education  
Program, Benjamin Herman, University of South Florida, Michael Clough, and Joanne Olson, both of  
Iowa State University  

2014  Educational turbulence: The influence of macro and micro policy on science education reform. Carla  
Johnson, Purdue University
AETS/ASTE Presidents

1941-1945  Anna M. Gemmill  1983-1984  Ron W. Cleminson
1947-1948  Ellis Haworth  1985-1986  Marvin Druger
1951-1952  Robert Cooper  1989-1990  Floyd Mattheis
1952-1953  Rose Lammel  1990-1991  Gwendolyn Henderson
1959-1960  Herbert Schwartz  1998-1999  Lawrence Flick
1964-1965  Herbert Smith  2002-2003  John Penick
1967-1968  Sylvan Mickelson  2005-2006  Patricia Simmons
1974-1975  David P. Butts  2012-2013  John Tillotson
1977-1978  David H. Ost
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<td>Daniel</td>
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<td>Devarati</td>
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<td>Kimberly</td>
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<td>Margaret</td>
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<td>Phillip</td>
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<td>Sarah</td>
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2015 ASTE – Portland, Oregon

January 7-10, 2015

For the 2015 International Conference, ASTE will be returning to the Marriott Waterfront in downtown Portland! Portland is a city with many nicknames and awards, including City of Roses, Capital of Karaoke, City of Bridges, Food Network’s Delicious Destination of the Year, Best City in the World for Street Food, and CNBC’s Best City for Happy Hour. Portland is the spawning grounds of famous authors (Chuck Palahniuk, Beverly Cleary), bands (The Decemberists, The Kingsmen), TV and Movie sets (Grimm, Extraordinary Measures). The City has more breweries than any other city in the world while being known for its artisanal coffee culture. It is home to the Trail Blazers, Portland Timbers, Winterhawks, and Rose City Rollers! It has both the largest wilderness park within a city limit as well as the world’s smallest park, and even an extinct volcano. It’s where you’ll find Powell’s City of Books and Nordstrom’s Rack. In short, Portland has something for everyone. And what could be more fun than being part of a conference in a city whose unofficial slogan is “Keep Portland Weird!” Mark your calendars to spend January 7-10 with your ASTE colleagues in the great Pacific Northwest!

For more information, contact the co-chairs Tisha Morrell (morrell@up.edu), Judy Morrison (jmorriso@tricity.wsu.edu), Kevin Carr (kcarr@pacificu.edu)
ROOM LOCATIONS

Hill Country Level (3rd Floor)
   Nueces, Frio, Blanco, Llano, Pecos, Directors, Pecan, Mesquite, Live Oak

Ballroom Level (2nd Floor)
   ASTE Registration & Office (Guadalupe), Medina, Rio Grande Ballroom, Regency Ballroom

Lobby Level (Behind the Bar)
   Chula Vista, Chula Vista Boardroom

Across Losoya Street
   Bowie A

Losoya Street

Hyatt Regency