At a Glance

**Wednesday, January 02**
- 4:00pm – 9:00pm Registration/Exhibits and Vendors Setup - Registration/Office - 2nd Floor
- 5:00pm – 9:00pm ASTE Executive Committee and Board of Directors - Savannah Room

**Thursday, January 03**
- 6:30am – 8:00am Breakfast - Ballroom Prefunction Area
- 6:15am – 7:30am Fun Run/Walk
- 7:30am – 4:00pm Registration - Registration/Office - 2nd Floor
- 8:00am – 9:30am Opening Poster Session - Harborside
- 9:45am – 10:45am Concurrent Session #1
- 10:30am – 11:00am Coffee Break
- 11:00am – 12:00pm Keynote: Eric Banilower - Results From the 2018 National Survey of Science and Mathematics Education: Challenges and Opportunities for Science Teacher Educators in Changing Times - Ballroom A, B
- 12:00pm – 1:15pm Lunch On Your Own
- 12:00pm – 1:15pm Grad Student lunch - Scarbrough 4
- 1:15pm – 2:15pm Concurrent Session #2
- 2:15pm – 2:30pm Conversations & Coffee
- 2:30pm – 3:30pm Presidential Town Hall - Ballroom A, B
- 3:45pm – 4:45pm Concurrent Session #3
- 5:00pm – 6:00pm Regional Meetings
- 6:30pm – 8:00pm ASTE Social/JSTE 30th Birthday - Harborside

**Friday, January 04**
- 6:30am – 8:00am Breakfast - Ballroom Prefunction Area
- 7:00am – 4:00pm Registration - Registration/Office - 2nd Floor
- 7:00am – 7:50am Birds of a Feather - Ballroom Prefunction Area
- 8:00am – 9:00am Concurrent Session #4
- 9:15am – 10:15am Concurrent Session #5
- 10:15am – 10:45am Coffee Break - Ballroom Prefunction Area
- 10:45am – 11:45am General Session Panel: Building bridges and a presence in today's climate - Ballroom A, B
- 11:45am – 1:15pm Lunch On Your Own
- 1:15pm – 2:15pm Concurrent Session #6
- 2:30pm – 3:30pm Coffee, Cookies, and Committees
- 3:45pm – 4:45pm Concurrent Session #7
- 5:00pm – 6:00pm Concurrent Session #8
- 6:00pm – 7:00pm JSTE Editor's Reception (by invitation)
- 7:15pm – 8:45pm WISE Dinner (tickets required) - Barracuda Bob's

**Saturday, January 05**
- 6:30am – 8:00am Breakfast - Ballroom Prefunction Area
- 7:00am – 7:50am Forum Meetings
- 8:00am – 9:00am Concurrent Session #9
- 9:15am – 10:15am Concurrent Session #10
- 10:15am – 10:45am Coffee Break - Ballroom Prefunction Area
- 10:45am – 11:45am Concurrent Session #11
- 12:00pm – 2:00pm ASTE Awards and Business Luncheon - Ballroom A, B, C
Welcome to the 2019 Conference from the ASTE President

Dear Colleagues,

On behalf of the ASTE Board of Directors, it is my sincere pleasure to welcome you to Savannah, Georgia as we celebrate our 26th Annual ASTE Conference! The conference is a time to share research, engage in dialogue, and foster collaborations that support the advancement of science teacher education. It is a time to both renew and expand our professional and personal networks.

This is also a time to celebrate the 30th anniversary of ASTE’s flagship journal, *The Journal of Science Teacher Education*. JSTE has come a long way in 30 years!! A big congratulations to the past and current editors for developing a resource we all rely on to learn about new developments in improving classroom teaching and learning, professional development, and teacher recruitment and retention at pre K-16 levels.

The conference theme is “Building Bridges and a Presence within a Climate of Change in Science Teacher Education.” Every year seems to bring new challenges to science teacher education and the work we do; we have a responsibility to continue to move forward. At the conference, I hope we all renew our inspiration, increase our understanding, and find camaraderie!

I would like to highlight our keynote events: Eric Banilower, Vice President of Horizon Research, Inc., and Brian Williams, Director of the Alonzo A. Crim Center for Urban Educational Excellence (CUEE). Dr. Williams will be joined by Meg Evans, Outreach Coordinator for Project AFFRIM, and Tracey Weldon-Stewart, Associate Dean for Diversity and Inclusion at the University of South Carolina, in a dialogue about diversity issues embedded within education.

**I would also strongly encourage you to attend the Town Hall.** We have important issues to discuss as we grow and strengthen the Association, and we need your input. Please take advantage of this opportunity to help shape ASTE. The Board will be facilitating small group discussions about the best organizational structure for ASTE, with a focus on the role of Regions and possible changes to the structure of the Board. No other sessions are planned at this time so everyone can attend and participate. Please come and share in the conversation.

When you’re not conferencing, Savannah is a beautiful city to stroll through. Walk along the river or wander the historic district. There’s something for everyone, from quaint boutiques to Southern mansions. And, of course, Southern cooking!

I would like to acknowledge and thank the 2019 ASTE Conference Co-chairs – Katie Brkich, Nate Carnes, Natalie King, Julie Luft, and Reneé Schwartz. Planning a conference is never easy!

Finally, please attend as many sessions as possible, dialog with colleagues, visit the exhibitors, enjoy the city, and make the wonderful connections that the ASTE conference provides.

Best,

Patricia Morrell
President
Welcome to the 2019 ASTE conference in Savannah!

We are excited for our conference! The theme is ‘Building bridges and a presence within a climate of change in science teacher education.’ This theme captures the critical role that science teacher educators play in society today. As the discourse surrounding us increases in terms of the need for teacher quality, the exclusion and inclusion of individuals, and engagement in critical scholarship, science teacher educators find themselves in unique positions. This theme also acknowledges our changing climate, and suggests that science teacher educators are essential in navigating this change. By building bridges that connect the future with our current state, we hope to better guide the changing climate in education. These bridges are composed of empirical work that embrace the ASTE mission of advancing practice and policy through scholarship, collaboration, and innovation.

We have two exciting plenary sessions this year. The first is a presentation from Eric Banilower of Horizon Research, Inc. We will get the first insights to the results of the 2018 National Survey of Science and Mathematics Education. Then, on Friday, we will have a panel discussion about diversity, inclusion, and implicit bias in education. Panelists are Brian Williams (Director of the Alonzo A Crim Center for Urban Educational Excellence at Georgia State University), Meg Evans (Director of the LGBT Resource Center at University of Georgia), and Alexandra Reyes (Teaching Culturally and Linguistically Diverse Students at Southern University).

Join us at the opening social on Thursday evening. This event is held in the beautiful Harborside room. Come sample southern-style appetizers. Have some fun with the photo booth, and join in the 30th birthday celebration of our journal, the Journal of Science Teacher Education [JSTE]. It will be a nice way to meet friends and colleagues before heading out to dinner. Just steps away, you will find a variety of restaurants and pubs where you can enjoy the evening.

Savannah that is known for its enchanting soul. We hope that you have time to explore the city and embrace Savannah's charm. Here, you will experience true Southern hospitality, regional dishes that will redefine your notion of comfort food, and an environment that is full of legend and legacy. Be sure to try the pralines, shrimp & grits, and southern fried chicken! Check out the squares and see which one is your favorite. Get to know Savannah's beauty and history with a trolley tour. Don't miss the huge ships as they pass by (trust us, you can't miss them!).

Savannah is the perfect setting to contemplate emerging ideas and to consider the extent of your own work as science educators within this time of change. Have a great conference!

Again, welcome to Savannah, and just holler if you need us,

Katie Brkich, Nate Carnes, Natalie King, Julie Luft, & Renée Schwartz
Your ASTE 2019 conference Co-Chairs
Sponsors & Exhibitors

Conference Exhibitors

Conference Sponsors
Conference Program and Thread Coordinators and Reviewers

Scheduling the right presenters for the right rooms at the right times supports an energetic and enriching conference for everyone. The devil is in the details—conference program planning begins months in advance. The Program Coordinator works with the Professional Development Committee, Conference Chairs, Executive Director and Director of Electronic Services to manage the development and review of proposals, helps thread Coordinators and reviewers make recommendations about breakout sessions and coordinates breakouts with other conference activities. Thread coordinators communicate with reviewers during the review process, compile acceptance decisions, and suggest paper sets. Reviewers are the backbone of the process. Their insights and comments are the basis for decision-making and help authors improve their presentations.

Program Coordinator

Meredith L. McAllister

Thread Coordinators

College and University
Amanda Glaze
Leslie Bradbury

Policy and Reform
Catherine Koehler
Anita Martin

Curriculum, Pedagogy, and Assessment
Su Gao
Nate Carnes

History and Nature of Science
Allison Meyer
Brendan Callahan

Equity/Diversity
David Sparks
Felica-Moore Mensah

Educational Technology
Phil Boda
Josh Ellis

Preservice Science Teachers
Demetrice Smith-Mutegi
Tina Cartwright
Paula Magee

Informal Science Education
Angelia (Angie) Reid-Griffin
Jenn Mesa

Science Teacher Professional Development
Bridget Mulvey
Elizabeth Lewis

STEM
Helen Meyer
Christina McDaniel

K-12 Student Learning
Angela Chapman
Melanie Reap

Ethnoscience—Environmental Science Education
Bryan Nichols
Charlene Ellingson
Reviewers

Issam Abi-El-Mona
Valarie Akerson
Adel Althubyani
Lauren Angelone
Amerah Archer
Scott Ashmann
Sumreen Asim
Dana Atwood-Blaine
Saiqa Azam
Yejun Bae
Tara Barnhart
Selina Bartels
Michael Beeth
Craig Berg
Patricia Bills
Alice (Jill) Black
Margaret Blanchard
Alec Bodzin
Sarah Boesdorfer
Julie Bokor
Allison Bookbinder
Frederick Bradley
Lisa Brown
Erica M. Brownstein
Angela Burgess
Andrea Burrows
Brenda Carpenter
Daniel Carpenter
Stacey Carpenter
Sarah Carrier
Carmen Carrion
Tina Cartwright
E. M. Cayton
Robert Ceglie
Gina Childers
Ying-Ting Chiu
Yunhee Choi
Pamela Christol
Heidi Cian
Michael Clough
Angelina Constantine
Kristin Cook
Kent Crippen
Elizabeth Crotty
Danielle Dani
Emily Dare
Jeni Davis
Michael Dias
Helen Dougllass
Dina Drits-Esser
Elizabeth Edmondson
Charlene Ellingson
Patrick Enderle
Gayle Evans
Benjamin Ewing
Kelly Feille
Allan Feldman
Michelle Forsythe
Tonju Freeman
Amity Gann
Anne Gatling
Alex Gerber
Andrew Gilbert
Brent Gilles
Karen Goodnough
Aimee Govett
Letitia Graybill
Katie Green
Zachary Grimes
Carolanne Grogan
Tugce Gul
Rita Hagevik
Sarah Haines
Jonathan Hall
Deborah Hanson
Susanna Hapgood
Brian Hartman
Terri Hebert
Richard Hechter
Deborah Hemler
Ben Herman
Ron Hermann
Robbie Higdon
Rebecca Hite
A. Housal
Sonia Howard
Kylie Hoyle
Robert Humphrey
Amal Ibourk
Martha Inouye
Tobias Irish
Karen Irving
David Jackson
Sophia Jeong
William Jones
Karl Jung
Melissa Jurkiewicz
Katheryn Kennedy
Meredith Kier
Justine Kim
Young-shin Kim
David Kimori
Jeffry King
Rudolph Kraus
Jennifer Kreps Frisch
Kelsy Krise
Jerrid Kruse
Mason Kuhn
Sandra Lampley
Catherine Lange
Corinne Lardy
Katie Laux
Felicia Leammukda
Soon C. Lee
Dawne LePretre
Mila Librea-Caden
Lindsay Lightner
Kelsey Lipsitz
Illana Livstrom
Kimberly Lott
Christine Lotter
Jennifer Maeng
Meghan Marrero
Anita Martin
Lisa Martin-Hansen
Heidi Masters
Jennifer Mayo
Meredith McAllister
Stacy McCormack
Christina McDaniel
Karina Mendez Perez
Helen Meyer
Jamie Mikeska
Rhea Miles
Brant Miller
James Minogue
Tammera Mittelstet
Felicia Moore Mensah
Judith Morrison
Bridget Mulvey
Kim Murie
Jaclyn Murray
Vanashri Nargund-Joshi
Mark Newton
Ryan Nixon
Tara Nkrumah
Kayla Norville
Michelle Nugent
Sarah Nuss
James Nyachwaya
Joanne Olson
Jennifer Oramous
David Osmond
David Owens
K.A. Paraz
Meredith Park Rogers
Carolyn Parker
Jennifer Parrish
John Pecore
Matthew Perkins
Coppola
Erin Peters-Burton
Mario Pickens
Jacob Pleasants
Rose Pringle
Jeffrey Radloff
Joshua Reid
Angelia Reidgriffin
Gillian Roehrig
Nancy Romance
Joshua Rosenberg
John Russell
Alexis Rutt
Laura Schisler
Catherine Scott
Lesley Shapiro
Carrie-Anne Sherwood
Ramya Sivaraj
Bob SS
Andria Stammen
Lauren Stewart
Morgan Stewart
Regina Suriel
Kristina Tank
Cara Tarullo
Stephen Thompson
William Thornburgh
Preethi Titu
R. Toolin
Hector Torress
Tinh Trinh
Ryan Walker
Maria Wallace
Jianlan Wang
Lu Wang
Angela Webb
Molly Weinburgh
Julianne Wenner
Katahdin Cook Whitt
Jeanna Wieselmann
Selene Willis
Rachel Wilson
Francine Wizner
Heather Wygant
Yael Wyner
Sandra Yarema
Ezgi Yesilyurt
Ibrahim H. Yeter
Xinying Yin
Sun Young Kim
Laura Zang

7
Pre-Program & Program Sessions

Wednesday, January 2nd

Wed, January 02
Registration
4:00pm - 9:00pm  Registration office 2nd floor

Wed, January 02
ASTE Executive Board Meeting
5:00pm - 6:00pm  Savannah

Wed, January 02
ASTE Board Meeting
5:00pm - 9:00pm  Savannah

Wed, January 02
Presider Training
6:00pm - 6:30pm  Scarbrough 2

Thursday, January 3rd

Thu, January 03
Fun Run
6:15am - 7:30am  Lobby

Thu, January 03
Breakfast
6:30am - 8:00am  Ballroom Prefunction AB

Thu, January 03
Equity Committee I
7:00am - 7:50am  Scarbrough 1

Thu, January 03
Registration
7:30am - 4:00pm  Registration office 2nd floor
Informal Science Setting Influence on Affective Dimensions of Learning Among Education Undergraduates: An Ethnographic Study

Joanne B Vakil, The Ohio State University  
Lin Ding, The Ohio State University

8:00am - 8:40am  Harborside - Poster

This study of preservice teachers analyzes how informal science settings frame teacher identity and influence affective dimensions of learning. Findings offer critical perspectives in light of the current national shortage of STEM teachers and suggest a reconceptualization of teacher education that explicitly connects formal with informal learning.

How First-Grade English Learners Used Language During Stem Lessons

Karina Mendez Perez, Trinity University  
Ellen Barnett, Trinity University, Rocio Delgado, Trinity University

8:00am - 8:40am  Harborside - Poster

This session/poster will present the findings from an instrumental case study of how English Learners in a first-grade bilingual classroom used language during STEM lessons.

Exploring the Affordances of Emergent Instructional Technology on Students’ Motivation in and Understanding of Secondary Biology Instruction

Paul R Munshower, McMurry University

8:00am - 8:40am  Harborside - Poster

VR creates environments with images, touch feedback, simulated movements and auditory stimuli enabling learning in new ways: visualizing abstract concepts, practicing procedural skills, and interacting with phenomena. This project adds to the body of literature in VR and formal science learning, especially in learning and perceptions of learning.

Creating Next Generation Science Classes From Next Generation Science Standards

Dora Kastel, Teachers College, Columbia University  
John Russell, Math for America

8:00am - 8:40am  Harborside - Poster

This poster will provide an overview of the Five Tools and Process for NGSS, a professional development curriculum created to prepare teachers and leaders for the new approaches to science instruction and assessment called for by the NGSS, and how it was locally implemented by utilizing the work teachers were already doing in their classrooms.

A Conceptual Framework for Studying Science Voice Development

Robert J Palmer, University of Minnesota  
Felicia Leammukda, University of Minnesota Gillian Roehrig, University of Minnesota Barbara Billington, University of Minnesota

8:00am - 8:40am  Harborside - Poster

Science voice development is critical for providing students access to the culture of science. The significance of this led the authors to an extensive review of voice literature. Results of this research include the development of a tentative framework for identifying and studying science voice development in students.
Using Satellites, Weather Balloons, and Antares Rockets to Increase Middle and High School Students’ Stem Attitudes

Jeni R Davis, Salisbury University
Starlin Weaver, Salisbury University Steven Binz, Salisbury University Brian J Raygor, Wicomico County Public Schools Philip Bock, Wicomico County Public Schools Chad Pavlekovich, Wicomico County Public Schools

8:00am - 8:40am Harborside - Poster
This poster will present ThinSat, a STEM program created by Twiggs Space Lab, Virginia Space and others to partner university, middle and high schools, and engineers. Our poster will detail the ThinSat program and provide initial findings of how the middle and high school students respond to engaging in an authentic STEM experience.

Exploring Mathematicians Views of Nature of Mathematics and Stem Education

Jesse L Wilcox, Simpson University
Kean A Roberts, Drake University Jerrid W Kruse, Drake University Jaclyn M Easter, Grand View University

8:00am - 8:40am Harborside - Poster
STEM has grown in popularity despite a relative lack of consensus of what “STEM” means. Yet, understanding STEM requires understanding of the nature of each discipline. Although existing literature exists in nature of STE, the nature of math (NOM) is lacking. This study explored mathematicians’ views on NOM and implications for STEM education.

S+t+m=e?: A Theoretical View of the Nature of Stem

Joshua W Reid, Middle Tennessee State University
Candice M Quinn, Middle Tennessee State University Grant E Gardner, Middle Tennessee State University Jeremy F Strayer, Middle Tennessee State University

8:00am - 8:40am Harborside - Poster
Producing students ready to enter the STEM workforce is a primary goal of science education reform. Attention needs to be placed on whether STEM education is implemented through some form of an integrated or siloed approach. We address this issue by asking whether the STEM workforce is truly integrated and how this should inform STEM education.

Change the Culture or Change the Girl: The Gender Gap in Physics

Stephanie M Stehle, George Mason University

8:00am - 8:40am Harborside - Poster
Women continue to face challenges in the STEM disciplines and workforce, and women in physics have a larger gap to bridge. This presentation will synthesize the recent literature on the gender gap in physics, identify the context of the problem and potential solutions, and provide suggestions for future research.

Teaching Evolution in the Deep South

Carolanne Grogan, Texas Tech
Rebecca Hite, Texas Tech

8:00am - 8:40am Harborside - Poster
Cultural and political barriers preclude effective secondary teaching of evolution in the United States. This is particularly salient in the American South. This case study surveyed 6-12 science teachers in Alabama on perceived challenges in teaching evolution, to ascertain any disconnects between teachers’ perceptions and community expectations.
Using the Lakatosian Conflict Map for Conceptual Change of Pre-Service Elementary Teachers About the Seasons

Hyonyong Lee, Kyungpook National University
Jun-young Oh, Hanyang University

8:00am - 8:40am Harborside - Poster

This study offers teaching strategies and their corresponding instructional sequences based on Lakatosian Methodology, and examines the effects of a Lakatosian Conflict Map using pre-service elementary teachers’ conceptual understandings of the causes of seasons. Most of them consistently protect their hard-core beliefs about seasonal change.

Investigating the Result of Using an Analogy (Tangram) in Increasing Teachers’ Understanding of Nature of Science

Noushin Nouri, University of Texas Rio Grande Valley
Maryam Saberi, University of Shiraz

8:00am - 8:40am Harborside - Poster

Introducing useful materials for teaching nature of science (NOS) can help preservice/inservice teachers to not only learn about different elements of NOS but also use it in their classes. Current presentation introduces an analogy for teaching several elements of NOS and provides data related to implementing it successfully in several settings.

What Do You Mean There’s No Scientific Method

Sandra S. West, Texas State University

8:00am - 8:40am Harborside - Poster

The step-by-step experiment-based method of gaining new scientific information is a pervasive misconception, inconsistent with national standards since 1993.

The Impacts of Laboratory Research Experiences on Student Views of Normative Scientific Practices

Catherine Marie Scott, Coastal Carolina University

8:00am - 8:40am Harborside - Poster

Program structure can play a significant role in establishing normative scientific practices, or what counts as a science, in a given setting. The purpose of this study is to describe the ways in which a summer laboratory research experience impacts high school and undergraduate college students’ views of science and how science is done.

The Influence of Metacognition on the Development of Science Identity in Anatomy Labs

Alexandra Daemicke, Northern Illinois University

8:00am - 8:40am Harborside - Poster

This project seeks to investigate how attention to improving student metacognition in anatomy and physiology courses can benefit their science identity, overall course grade and retention rates of undergraduate students seeking to pursue medical professions.
Recognition of Korean Elementary and Secondary Teachers on Application and Activation of the Korean Steam Programs.

YunHee Choi, Soongmoon middle school
8:00am - 8:40am Harborside - Poster

The purpose of this study is to find out the perception of elementary and middle school teachers in Korea's STEAM program and to prepare a plan for activating convergent talent education program in the field.

A Case Study of Indian Teachers Battle to Teach Science in English

Vanashri Nargund-Joshi, New Jersey City University
8:00am - 8:40am Harborside - Poster

In spite the educational system of many countries has not responded. Studies analyzing the effects of using English language in teaching science at early stages with nonnative English students, are scant. This case study focuses on understanding role of English Language in a science classroom dynamics. Mismatch between policy and practice was found.

Examining Variations in Elementary Teachers’ Content Knowledge for Teaching About Matter and Its Interactions

Jamie N Mikeska, Educational Testing Service
Hui Jin, ETS Debra Brockway, ETS Joe Ciofalo, ETS Suzanne Ritter, Princeton Charter School
8:00am - 8:40am Harborside - Poster

We report on findings from a study that focused on collecting and synthesizing elementary science teachers' content knowledge for teaching (CKT) about matter and its interactions when they engage in two critical teaching practices: (1) elicit and interpret students' ideas and (2) select, critique, and generate instructional strategies.

Preservice Science Teachers' Development of NOS-Related Pck Through Science Methods Courses

Sun Young Kim, Chosun University
8:00am - 8:40am Harborside - Poster

This mixed methodology study explores the preservice science teachers' development of NOS-related pedagogical content knowledge. Science methods courses were developed to enhance the preservice science teachers' understanding of nature of science (NOS), their attitude towards NOS teaching, and NOS-related to pedagogical content knowledge.

A Watershed Pbl Collaboration Across the Nation With Robotics

Susan J Paulsen, Texas Tech University
Stephanie Playton, Texas Tech University
8:00am - 8:40am Harborside - Poster

Across the USA collaboration project between two schools with the use of simple robotics that focus on local watershed issues.
Remodeling: Transforming Models by Design to Facilitate Sophisticated Sensemaking Skills

Jaclyn K Murray, Augusta University
8:45am - 9:30am Harborside - Poster

What data patterns do students identify and represent through ReModeling? ReModeling is the transformation of one model into another, created from data generated by the original model. The purpose of ReModeling is to engage students in designing and developing models and to provide students the opportunity to analyze, interpret, and represent data.

Flores: Family Learning and Outreach for Research and Education in STEM

Amanda M Gunning, Mercy College
Meghan E Marrero, Mercy College
8:45am - 9:30am Harborside - Poster

This research explores how the FLORES model supports family engagement in STEM for low-income communities in the US and Ireland. This is a continuation of research on the model and now examines international implementation and how preservice elementary teachers can play a role in supporting and eventually leading FLORES programs of their own.

A Measurement of Self-Efficacy, School Climate, and Burnout in Louisiana Science Teachers

Leiflyn Gamborg, Louisiana State University
8:45am - 9:30am Harborside - Poster

This research in progress presents the relations of burnout, self-efficacy and perceived school climate in both middle and high school science teachers. This presentation further examines the differences that may occur between traditional and alternatively licensed science teachers in Louisiana.

Engaging as Members of the Professional Teaching Community: How Conference Attendance Impacts the Decision of Preservice Teachers to Pursue a Career Teaching Secondary Science or Mathematics

Kristen Apraiz, University of Florida
Gayle Evans, University of Florida
8:45am - 9:30am Harborside - Poster

Professional conferences offer participants opportunities to network with educators, gain insights about teaching, and learn new teaching strategies. This study focused on 11 preservice teachers to learn about how attendance at a professional conference impacted their decision to pursue a secondary teaching career.

Embedded Assessments as a Learning Tool in Elementary Classrooms

Amal Ibourk, Florida State University
8:45am - 9:30am Harborside - Poster

This study investigates how an upper elementary teacher uses online embedded assessment tools to scaffold the process of science learning and feedback that occurs in an online platform that leverages learning technologies. It also provides evidence that embedded assessments have promise for supporting teachers in providing iterative feedback.
Research Experience for Teachers: Big Data and Computational Thinking

Stephanie B Philipp, University of Louisville
Olfa Nasraoui, University of Louisville Jason Immekus, University of Louisville
Mary Mills, University of Louisville

8:45am - 9:30am Harborside - Poster

This poster will share initial findings from the first year of a Research Experience for Teachers, supporting nine secondary STEM teachers from diverse schools in a six week summer project in Big Data and Data Science. Teachers translated their research into lessons incorporating the practice of mathematical and computational thinking.

How Do Practicing Pk-3rd Grade Teachers Plan Science/engineering Instruction?

Susanna E Hapgood, University of Toledo
Jeanna Heuring, University of Toledo
Grant Wilson, University of Toledo

8:45am - 9:30am Harborside - Poster

In this poster we share baseline data regarding the science and engineering instructional planning practices of 39 practicing preschool and primary grade educators. Among the results we found that most of the teachers reported regularly planning instruction with their colleagues and teaching science at least several times a year.

Lack of Relationship Between Self-Efficacy and Science Teaching Practice

Katherine Carman, Drake University
Jerrid Kruse, Drake University Jesse Wilcox, Simpson College
Neal Patel, Drake University Colin Seebach, Drake University
Joleen Henning, Drake University

8:45am - 9:30am Harborside - Poster

Self-efficacy is often used as a proxy for teaching effectiveness when evaluating programs. We collected self-efficacy data on preservice elementary teachers using the STEBI-B and teaching effectiveness using the LSC-COP. Our analysis found no correlation between self-efficacy and teaching effectiveness.

The Stories of Title I Students Returning as Teachers to High-Needs Schools

Melissa A Jurkiewicz, Mercer University
Vicki Luther, Mercer University
Youngbauer, Mercer University Sybil Keesbury, Mercer University Sharon Augustine, Mercer University
William Lacefield, Mercer University Shannon Navy, Kent State University Susie Morrissey, Mercer University

8:45am - 9:30am Harborside - Poster

This qualitative case study chronicles the stories of three minority preservice teachers who meet five indicators for higher risk of attrition from the teaching profession. We examined why they entered the teaching profession and their thoughts on why they will stay or leave.
Supporting Novice Teachers With an Induction Process: Vcu Noyce
Elizabeth W Edmondson, Virginia Commonwealth University
8:45am - 9:30am Harborside - Poster
The use of a two-year induction model supports our Noyce Scholars in their first years of teaching. The induction model engages the Scholars in two protocols, a problem-solving and success protocol, at each meeting. Novice Teachers attend at high rates and remain in the profession at above average rates.

A Cross College Approach to Encourage the Discussion of the Recruitment, Preparation and Induction of Science Teachers
Julie Luft, University of Georgia
Paula Lemons, University of Georgia Dorothy Y. White, University of Georgia Blake Whitt, University of Georgia Elana B. Worth, University of Georgia Clay McElheny, University of Georgia Julia Przybyla-Kuchek, University of Georgia
8:45am - 9:30am Harborside - Poster
Over a three-year period, faculty from different colleges met to discuss the recruitment, preparation, and induction of science teachers. The faculty formed a learning community, which developed a report that guided their work for the following two years. We will share the process of formatting the learning community and the results of their work.

Promoting Student Interest in Stem and Stem–Related Careers via a Place–Based Environmental Educational Program at a Public Aquarium
Sandra L Yarema, Wayne State University
Jeff L Ram, Wayne State University Amy J Emmert, Belle Isle Aquarium Joan S Chadde, Michigan Technological University Marion J Tate, Wayne State University Emily E Weiss, Belle Isle Aquarium
8:45am - 9:30am Harborside - Poster
The goal of this NSF-funded project is to build capacity for STEM for grade 5 students. Researchers partnered with the staff at a public aquarium to improve teacher and student knowledge of STEM. We propose that teacher professional learning along with student field trips to the aquarium will have a positive effect on the students' STEM knowledge.

Teaching Stem: Investigating Personal Attitudes of Preservice Elementary Teachers
Deborah L Hanson, Hanover College
8:45am - 9:30am Harborside - Poster
This presentation investigates elementary preservice teachers’ attitudes towards teaching STEM and insights generated from a STEM-focused course that focused on integrating engineering into science units for an after school program.

“Talk to the Hand”: Children’s Spontaneous Gesturing While Explaining Magnetism
James Minogue, NC State University Diane Hunter
8:45am - 9:30am Harborside - Poster
This exploratory study catalogues upper elementary children’s use of spontaneous gestures while verbally explaining magnetism.
Innovative Inclusive Professional Development for Postsecondary Science Faculty Developing and Implementing Course-Based Undergraduate Research Experiences

Rommel J Miranda, Towson University
Laura Gough, Towson University Matthew Hemm, Towson University Trudymae Atuobi, Towson University

8:45am – 9:30am Harborside - Poster

This HHMI-funded Inclusive Excellence Program has two overarching goals: 1) reform science laboratory courses to incorporate authentic research experiences via course-based undergraduate research experiences (CUREs), and 2) provide professional development for postsecondary science faculty to promote effective inclusive teaching practices.


Xinying Yin, California State University-San Bernardino

8:45am – 9:30am Harborside - Poster

The study compared Chinese and American secondary science teachers’ understandings and practices of the respective science standards in the two countries. This study intends to inform American and Chinese science educators’ effort to implement the reformed standards and teacher professional development.

An Exploration of Best Practices in Science Teacher Professional Development for NGSS Implementation Among High Performing California School Districts

Heathe A Wygant, Texas Tech University
Rebecca Hite, Texas Tech University

8:45am – 9:30am Harborside - Poster

NGSS implementation continues to be an ongoing challenge for states providing Professional Development (PD) to in-service science teachers. Examination of districts whose students perform well on NGSS-based pilot assessments may provide insight to best practice. Preliminary results of research on district level PD suggests ongoing PD over time.

Supporting Teacher Cognition and Instruction of Science Representations in Elementary Classrooms: A Peek Into the First Year of a Multi-Year Program

Meredith Park Rogers, Indiana University – Bloomington
Joshua Danish, Indiana University – Bloomington Celeste Nicholas, Indiana University – Bloomington Dionne Cross Francis, Indiana University – Bloomington Cindy Hmelo-Silver, Indiana University – Bloomington

8:45am – 9:30am Harborside - Poster

Our project involves working with elementary teachers to support their cognition and instruction about the role of representations in science. We present our PD model and the experiences the first teacher cohort had with designing and enacting units that include various forms of representations in support of constructing explanations in science.
**Mindfulness-Based Science Teacher Education Curriculum Design**

Duygu Umutlu, University of Georgia  
Deborah J. Tippins, University of Georgia

8:45am - 9:30am  Harborside - Poster

Mindfulness—the Pali word sati—means to ‘remember’ consciously, with the focus on the presence of mind (Brown, Ryan, & Creswell, 2007). Mindfulness in classrooms aims to foster deeper awareness, concentration, and insight to both teaching and learning. We will present a mindfulness-based curriculum design framework for science teacher education.

**Investigation of a Blended Professional Development Program for K-12 Science Teachers: Challenges and Opportunities**

Xavier Fazio, Brock University  
Kamini Jaipal-Jamani, Brock University

8:45am - 9:30am  Harborside - Poster

In this presentation we report upon a two-year study of K-12 science teachers (n =206) participating in a blended-learning professional development program. Our study supports professional development programs by offering recommendations in support of the call for more research on teacher professional learning in a blended-learning environment.

**Cross-Sectional Study of Students' Understanding of Theory of Evolution and Epistemology**

Sun Young Kim, Chosun University

8:45am - 9:30am  Harborside - Poster

This study used the cross-sectional study design in order to compare grade level differences of four variables: knowledge, acceptance of evolution, and both domain-specific and context-specific epistemologies. The study results could suggest instruction tips for teaching the theory of evolution in relation to the grade levels at Korea.

**Enhancing Stem Preservice Teacher Preparation Through Internships Providing Informal Teaching Opportunities**

Paige K Evans, University of Houston  
Leah McAlister-Shields, University of Houston  
Mariam Manuel, University of Houston

9:45am - 10:45am  Ballroom D - Session A

In this mixed methods study, the relationship between informal teaching experience and teacher self-efficacy among pre-service teachers in a secondary STEM teacher preparation program was analyzed. Results illuminated a significant difference in teacher self-efficacy between students with and students without informal teaching experience.

Format: Individual Paper Presentation  Presider: Amity Gann
Preservice Science Teacher Preparation - Thu, January 03

**Features of Student Teacher Reflections About Self and Peer Classroom Video That Cultivate Reform-Minded Thinking**

Robert M. Danielowich, Adelphi University
9:45am - 10:45am  Ballroom D - Session B

Student teachers whose reflections deviated from a one-sided, teacher-oriented, and 'best practices’ position, whose perceptions about teaching were at an ‘arm’s distance’ from their peers, and who aligned their general teaching goals with their ‘gauges’ for student success expressed more robust reform-mindedness about secondary science teaching.

*Format: Individual Paper Presentation  Presider: Amity Gann*

Preservice Science Teacher Preparation - Thu, January 03

**Elementary Preservice Teachers’ Approximations to Practice Through Engineering Design-Based Science Teaching**

Brenda Capobianco, Purdue University
Jeffrey Radloff, Purdue University
9:45am - 10:45am  Ballroom D - Session C

This study sought to understand elementary preservice teachers' use of approximations of science teaching practice in an engineering design-based science methods course. Results showed that while teachers utilized multiple core practices, they grappled with helping students explain their design performance using related disciplinary core ideas.

*Format: Individual Paper Presentation  Presider: Amity Gann*

Thu, January 03

**Conference Planning Committee**

9:45am - 10:45am  Ballroom E

Ethnoscience and Environmental Education - Thu, January 03

**Every Story Counts: Using Ethnoastronomy to Create a Better World.**

Richard P Hechter, University of Manitoba
9:45am - 10:45am  Percival - Session A

This presentation shares the story of how preservice science teachers and I used ethnoastronomy, free astronomy software, storytelling, and roots of social reconstructionism to: explore the relationship between science and culture, learn astronomy, evaluate our impact as science teachers in modern times, and help students create a better world.

*Format: Individual Paper Presentation  Presider: Bryan Nichols*

Ethnoscience and Environmental Education - Thu, January 03

**Impacts and Implications of a Faculty Professional Development Workshop in Environmental Education**

Michael E Beeth, University of Wisconsin Oshkosh
Scott Ashmann, University of Wisconsin Green Bay Rebecca L Franzen, University of Wisconsin Stevens Point
9:45am - 10:45am  Percival – Session B

An environmental education workshops for faculty in higher education was conducted. Participants wrote place-based learning activities and implemented those activities in their teacher preparation programs. We will share these activities and document changes in teacher preparation programs through three case studies involving our participants.

*Format: Individual Paper Presentation  Presider: Bryan Nichols*
Ethnoscience and Environmental Education - Thu, January 03

**American Indian Students and Stem Learning**

*Rita Hagievik, The University of North Carolina at Pembroke*  
*Mary Ann Jacobs, The University of North Carolina at Pembroke*

9:45am - 10:45am  Percival - Session C

Traditional Western science is just beginning to understand the importance of Native Science. This study synthesizes previous empirical studies as well as examples from the literature in order to propose ways to connect STEM teaching and learning to American Indian/Alaskan Native students.

**Format:** Individual Paper Presentation  **Presider:** Bryan Nichols

Thu, January 03

**Exploring the Potential of Simulated Classrooms to Support Practice-Based Learning Opportunities for Elementary Science Teachers**

*Jamie N Mikeska, Educational Testing Service*  
*Pamela S. Lottero-Perdue, Towson University*

9:45am - 10:45am  Plimsoll

Conference attendees will consider how an online simulated classroom environment can be used to support elementary science teachers as they learn how to engage in one ambitious teaching practice: facilitating small group discussions focused on scientific argumentation.

**Format:** Workshop

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Curriculum, Pedagogy, and Assessment - Thu, January 03

**Teaching the Science of Drug Addiction: More Than a Traditional Drug Prevention Program**

*Rhea L Miles, East Carolina University*  
*Tonya Little, Northeast Academy for Aerospace and Advanced Technologies*

9:45am - 10:45am  Scarbrough 1 - Session A

A middle school science teacher facilitated student learning about the scientific process by having them design their own experiments using planaria and the stimulants caffeine, sugar, and an energy drink. Students increased their knowledge about drug addiction, biomedical careers, and biomedical research.

**Format:** Individual Paper Presentation  **Presider:** Robert Palmer

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Curriculum, Pedagogy, and Assessment - Thu, January 03

**Results From a Randomized Controlled Trial of an NGSS-Aligned High School Unit That Integrates Evolution and Heredity**

*Louisa A. Stark, University of Utah*  
*Dina Drits-Esser, University of Utah Joseph Hardcastle, American Association for the Advancement of Science*  
*Kristin M. Bass, Rockman et al*  
*Molly Malone, University of Utah Jo Ellen Roseman, American Association for the Advancement of Science*  
*George DeBoer, American Association for the Advancement of Science*

9:45am - 10:45am  Scarbrough 1 - Session B

We report on a new NGSS-aligned 8-week unit for high school biology students that integrates genetics and evolution. Results from a national RCT indicate that students who used the new curriculum showed significantly greater pre/post gain scores for their understanding of evolution than students in the control condition (business-as-usual).

**Format:** Individual Paper Presentation  **Presider:** Robert Palmer
Development of Unit Planning Tools for Stem Integration Using the Assist Approach.

William E. Hansen, University of Iowa
Mark McDermott, University of Iowa
9:45am – 10:45am  Scarbrough 1 - Session c
A synthesis of three years work utilizing an approach known as Argument-based Strategies for STEM-Infused Science Teaching (ASSIST) to help science educators implement the Next Generation Science Standards and create meaningful learning environments for students.

Concept Models as a Planning Tool for Practicing Science Teachers

Ryan S. Nixon, Brigham Young University
Benjamin K. Campbell, Longwood University
9:45am – 10:45am  Scarbrough 2 - Session A
We explored ways biology teachers attend to science concepts while lesson planning and we categorized their initial reactions to using a concept model, a conceptual tool. Results indicate that teachers attend to science content in distinct ways while planning. Concept models appear to support teachers in attending to content in each of these ways.
Format: Individual Paper Presentation  Presider: Heidi Cian

Learning About the NGSS Through Analysis of Science Lessons

Line Saint-Hilaire, Queens College/CUNY
Eleanor Armour-Thomas, Queens College/CUNY
9:45am – 10:45am  Scarbrough 2 - Session B
In this case study, we use video analysis as tool to assess teachers understanding of the three dimensions of the NGSS and how it is related to the integration of ELA and Math.
Format: Individual Paper Presentation  Presider: Heidi Cian

Development of a Socioscientific Argumentation Stem Curriculum at a Historically Black University

Hector N. Torres, Bethune-Cookman University
Raphael D. Isokpehi, Bethune-Cookman University Dana L. Zeidler, University of South Florida
9:45am – 10:45am  Scarbrough 2 - Session C
The overarching goal of this research is to provide a conceptual framework in order to examine the effects of socioscientific argumentation learning and development on student success in a higher education STEM-centered curriculum at a Historically Black Colleges and Universities (HBCUs).
Format: Individual Paper Presentation  Presider: Heidi Cian
Enacting an Integrated Steam Approach in a Reggio-Emilia Preschool
Andrew Gilbert, George Mason University
Lisa Borgerding, Kent State University
9:45am - 10:45am  Scarbrough 4 - Session A
This case study delves into a five-day STEAM camp at a Reggio Emilia inspired pre-school setting. The presentation will highlight arguments for the consideration of STEAM in ECE and provide clear guidance for teachers and teacher educators to carry out similar approaches through the depiction of key pedagogic considerations.

Examining the Written Reflections of Teachers Implementing Lessons Aligned to NGSS
Kimberly Lebak, Stockton University
Stacey Culleny, Stockton University
9:45am - 10:45am  Scarbrough 4 - Session B
This study examines how teachers self-reflect upon their teaching of science lessons based upon NGSS. To focus teacher reflections on the complexities of the NGSS, we utilized the Educators Evaluating the Quality of Instructional Products (EQuIP) Rubric for science as a reflective tool.

Action Research for the Inclusion of Student Voice in the Middle and High School Science Classroom
Katie Laux, University of South Florida
Allan Feldman, University of South Florida
9:45am - 10:45am  Scarbrough 4 - Session C
The purpose of this multiple case study was to explore the impact of a collaborative action research (CAR) group on science teachers’ perspectives on student voice and participation. Preliminary findings indicate teachers were able to incorporate their students’ voices into their classrooms through the process of action research.

Master Teaching Fellows’ Action Research of Implementing New Standards
Hui-Ju Huang, California State University Sacramento
Sarah Ives, California State University Sacramento Jenna Porter, California State University Sacramento
9:45am - 10:45am  Scarbrough 4 - Session D
Science and math teachers participated in the Master Teaching Fellows program that aims to build teachers’ leadership capacity for implementing strong STEM instructions. The research study participant teachers’ action research projects by exploring their reflections on the change of teaching practice and the influence on student learning.
**Racial Consciousness in Elementary Science Teacher Education: Culturally Relevant Pedagogy and Critical Whiteness Studies**

Paula A Magee, Indiana University - Indianapolis

9:45am – 10:45am Scarbrough 4 – Session E

Using culturally relevant pedagogy and critical whiteness studies, an elementary science methods course has been developed. During this session participants will discuss instructional innovations, including the author’s, that include incorporation of critically conscious readings and activities developed to promote anti-racist teaching in schools.

*Format: Small Group Roundtables*

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**Steam in Elementary Education: A Blended Module to Develop Preservice Teachers’ Conceptualizations of Steam Education**

Lauren A Angelone, Xavier University

9:45am – 10:45am Scarbrough 4 – Session F

This project is the development, implementation, and evaluation of a blended STEAM module. Preservice teachers conceptualizations of STEAM education were measured before and after completing the module.

*Format: Small Group Roundtables*

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**The Intersection of Formal and Informal Learning Experiences as Alternative Inclusive Spaces: Exploring Activities and Dialogues**

Helen Douglass, University of Tulsa
Geeta Verma, University of Colorado Denver

9:45am – 10:45am Scarbrough 5 – Session A

Out-of-school STEM learning spaces are fast emerging as alternative and inclusive spaces of learning for all students (including minoritized students). We will provide opportunities to session participants to engage in conversations and activities related to the intersection of formal and out-of-school learning experiences.

*Format: Exploratory Session*

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**Supporting Secondary Students’ Decision-Making During Engineering Design Learning**

Helen Meyer, University of Cincinnati

9:45am – 10:45am Verelst – Session A

I present four teachers thoughts and supports for their students in making decisions while engaged in an engineering design learning project. The study found initially three of the teachers did not consider the role of decision-making, but all increased support materials for their students in their second year of implementation.

*Format: Individual Paper Presentation  Presider: Jeni Davis*
**STEM Integration and Teacher Agency**

**Ilanna C Livstrom, University of Minnesota**
**Elizabeth A Crotty, University of Minnesota Gillian H Roehrig, University of Minnesota**

9:45am – 10:45am  Verelst - Session B

While STEM integration shows promise, it is the responsibility of teachers to make STEM opportunities happen for their students within constricting, siloed educational structures. This comparative case study explored the experiences and enactments of agency of two in-service teacher teams as they collaborated to create, design, and implement STEM.

*Format: Individual Paper Presentation  Presider: Jeni Davis*

**Teacher Leadership to Drive Stem Programming in Emerging Stem Schools**

**Elizabeth A Crotty, University of Minnesota**
**Gillian H. Roehrig, University of Minnesota Elizabeth A. Ring-Whalen, St. Catherine University**
**Ilanna Livstrom, University of Minnesota**

9:45am – 10:45am  Verelst - Session C

This study examined the ways in which three teacher leadership STEM teams, across varied school contexts, integrated STEM. Themes are presented and recommendations are provided for approaches to developing STEM programming through teacher leadership initiatives.

*Format: Individual Paper Presentation  Presider: Jeni Davis*

**History of Science in Science Education: Efforts, Research, and Implications for Science Teacher Education.**

**Zhihong Xu, Texas A&M University**
**Sijin Yan, Texas A&M University Michael P. Clough, Texas A&M University**

9:45am – 10:45am  Vernon - Session A

The history of science (HOS) has been a long-advocated approach for improving science teaching and understanding of the NOS. We conducted an extensive review of relevant literature regarding the HOS in science education. Findings and implications for science teacher education and future research will be presented.

*Format: Individual Paper Presentation  Presider: Bridget Mulvey*

**“I Am Never Not Thinking About the Nature of Science”: A Field Season in the Galapagos With Scientists and the Impact of the Experience on an Elementary Science Educator**

**Brant G. Miller, University of Idaho**
**Joel D. Donna, University of Wisconsin, River Falls**

9:45am – 10:45am  Vernon - Session B

In June of 2018 a team of faculty and students embarked on a field season in the Galapagos to conduct research on land snails. This talk will share stories of ocean rescues, staying ahead of volcanic eruptions, and finding new species, and will discuss how the nature of science unfolds in real time and implications for science teacher preparation.

*Format: Individual Paper Presentation  Presider: Bridget Mulvey*
Developing Preservice Teachers’ Content and Pedagogical Content Knowledge for the History of Science Integrated Science Instruction

Frackson Mumba, University of Virginia
Alexis A. Rutt, University of Virginia

9:45am - 10:45am  Vernon - Session C

We investigated the effects of an online history of science (HOS) methods course on pre-service science teachers’ content and pedagogical content knowledge for and perceptions of HOS-integrated instruction. Results showed that teachers developed knowledge for and positive perceptions of HOS-integrated instruction. Implications are discussed.

Format: Individual Paper Presentation  Presider: Bridget Mulvey
Exploring Ways Elementary Preservice Teachers Conceptualize and Operationalize Engineering Design

Brenda Capobianco, Purdue University
Jeffrey Radloff, Purdue University
1:15pm - 2:15pm Ballroom D - Session B

This study investigated how elementary preservice teachers conceptualized and enacted engineering design-based science instruction in an engineering design-based science methods course. Results showed a shift in conceptions from fragmented to more informed and cohesive, and an overall proficiency in planning for design-based science instruction.

Format: Individual Paper Presentation  Presider: Melissa Jurkiewicz

Mentoring the Mentors: Innovating to Develop Research-Based Online Mentoring Modules to Support Novice Teachers’ Practice

Matthew J Miller, Western Washington University
Josie Melton, Western Washington University
1:15pm - 2:15pm Ballroom D - Session C

This session focuses on the impacts of online modules designed to prepare cooperating teachers to mentor preservice teachers for effective science instruction. The modules utilize animations, cases, and user interactivity. We describe the impacts of the modules on mentors' ability to facilitate and engage in effective mentoring conversations.

Format: Individual Paper Presentation  Presider: Melissa Jurkiewicz

Graduate Student Workshop: Preparing for the Workforce

Jeanna R. Wieselmann, University of Minnesota
Randy Bell, Oregon State University Kent Crippen, University of Florida Julie Luft, University of Georgia William McComas, University of Arkansas Gillian Roehrig, University of Minnesota Kathy Trundle, North Carolina State University
1:15pm - 2:15pm Ballroom E

In this session, graduate students will participate in roundtable discussions related to navigating the transition from graduate school to the workforce. Participants will select from a variety of roundtable topics, ranging from developing an effective CV to preparing for the campus visit. Established faculty members will lead the roundtables and offer their advice to participating graduate students.

Format: Workshop

Manuscript Reviewing 101: Honing Your Skills to Be an Effective Reviewer

Wayne Melville, Andrea Burrous, Rommel Miranda, Ron Hermann
1:15pm - 2:15pm Ballroom F

Are you wanting to become an Editorial Review Board member for one of ASTE's journals, but are not sure what it all entails? Or maybe you are looking for a professional development opportunity to polish your own skills as a reviewer? If your answer is 'yes' to either of these questions then this session is for you! Please join us for a workshop highlighting the in's and out's of providing a quality review for each of our ASTE journals. Editors from the Journal of Science teacher Education (JSTE), Innovations in Science Teacher Education (Innovations), and Contemporary Issues in Technology and Teacher Education (CITE) will be on hand to share critical features for reviewing a manuscript for each of the journals they represent.
Science Instructors’ Perceptions on Attending to Student Thinking

Cara Tarullo, University of Wyoming
Ana Houseal, University of Wyoming

1:15pm - 2:15pm Percival - Session A

Instructor attention to student thinking shapes how students frame learning. A phenomenological lens is used to see the viewpoint of university science instructors’ dealings with student thinking. Interviews imply the instructors want to pay attention to student thinking that encourages sense-making but often send altered epistemological messages.

Format: Individual Paper Presentation  Presider: Felicia Leammukda

Examining Changes in Content Knowledge, Curricular Role Identity, and Science Teaching Self-Efficacy in Preservice Elementary Teachers Enrolled in a Physical Science Content Course Focused on Curriculum

Stacy McCormack-Hootman, University of Indianapolis
Meredith Park Rogers, Indiana University

1:15pm - 2:15pm Percival - Session B

This study examines changes of three constructs in preservice elementary teachers enrolled in a science content course focused on curriculum: content knowledge, curricular role identity, and self-efficacy. Results show including curriculum tasks in a content course increases levels of curricular role identity and science teaching self-efficacy.

Format: Individual Paper Presentation  Presider: Felicia Leammukda

Supportive Stem Professional Development: Innovative and Effective Practices for Teacher and Student Growth

Karen L Rizzo, Pennsylvania State University-Behrend

1:15pm - 2:15pm Percival - Session C

In a review of the literature on STEM professional development (PD), desired teacher/student outcomes are found when applying five critical elements of PD. This presentation describes these characteristics and their collective impact on teacher instruction and student outcomes in STEM classrooms. Key considerations for planning STEM PD are shared.

Format: Individual Paper Presentation

What Does Communication Look Like in Science?: Grades 6-8 Teachers' Conceptions of Science Text

Melissa P Mendenhall, Alpine School District
Leigh K Smith, Brigham Young University Kendra M Hall-Kenyon, Brigham Young University

1:15pm - 2:15pm Scarborough 1 - Session A

This study explored the conceptions of 6th grade elementary and 7th and 8th grade middle school science teachers about science text, an important prerequisite to understanding how information is communicated in science. Results suggest most teachers do not have a clear understanding of the discipline-specific types of text used in science.

Format: Individual Paper Presentation  Presider: Jamie Mikeska
The Availability and Quality of Existing Curriculum Materials Supporting Chemistry Teachers' NGSS-Aligned Engineering Instruction

Sarah B. Boesdorfer, Illinois State University
Anna Maria Arias, Kennesaw State University Bayleigh Mull, Illinois State University Kyle A. Lieberum, Illinois State University

1:15pm - 2:15pm  Scarbrough 1 - Session B

With the importance of curriculum materials for teacher learning and implementation of standards, this presentation will explore the engineering infused curriculum materials freely available to secondary chemistry teachers. Implications for the enactment of NGSS along with needs for curriculum development and teacher education will be discussed.

Format: Individual Paper Presentation  Presider: Jamie Mikeska

High School Teachers’ Considerations, Benefits and Challenges in Classroom Pilot Testing 3d Curriculum Materials

Dina Drits-Esser, University of Utah
Kristin M. Bass, Rockman et al Louisa A. Stark, University of Utah

1:15pm - 2:15pm  Scarbrough 1 - Session C

High school teachers choose to participate in NGSS-aligned curriculum testing for specific reasons. Using interview and survey data, this study explores the reasons behind teachers' decisions to participate in classroom testing of a new evolution unit, and the benefits and challenges of participation.

Format: Individual Paper Presentation  Presider: Jamie Mikeska

The Value-Added Effects of a Short-Term Follow-Up Pd on Secondary Science Teachers’ Practice-Based Instruction in Rural Schools

Soon C. Lee, Wichita State University

1:15pm - 2:15pm  Scarbrough 2 – Session A

This study demonstrated value-added effects of a short-term follow-up PD on secondary science teachers' knowledge and self-efficacy in practice-based instruction. The follow-up PD model used in this study can be adopted widely in k-12 schools as a sustainable and efficient way to support teachers' reformed instruction in the subsequent years.

Format: Individual Paper Presentation  Presider: Susanna Hapgood

Converging Science and Math Curricula With Learners Through Culturally Responsive Engineering Designs

Meredith W Kier, William & Mary
Deena Khalil, Howard University Adrian W Bruce, Howard University Paige Teamey, Independent Consultant

1:15pm - 2:15pm  Scarbrough 2 - Session B

This study details the iterations of a design-based research model for supporting mathematics and science teachers to incorporate culturally responsive engineering design challenges within their lessons that are aligned to curricular standards and that centralized their learners' lived experiences.

Format: Individual Paper Presentation  Presider: Susanna Hapgood
A Professional Development Initiative to Help English Learners and Economically Disadvantaged Adolescents Succeed on High-Stakes Science Tests: Findings Comparing a Treatment and Control Campus

Margaret Huerta, University of Nevada, Las Vegas
Julie K. Jackson, Texas State University
Tiberio Garza, University of Nevada, Las Vegas

1:15pm - 2:15pm  Scarbrough 2 - Session C

A two-year professional development initiative designed to help at-risk high-school students successfully pass high-stakes assessments will be presented. The professional development initiative was beneficial to students within the Intervention Campus and showed promising effects when compared to a matched Comparison Campus.

Format: Individual Paper Presentation  Presider: Susanna Hapgood

Exploring the Effects of a Historical Narrative Approach to Teach Nature of Science Within a Flipped Classroom on Student Motivation

Allison Witucki, Western Michigan University
David W. Rudge, Western Michigan University

1:15pm - 2:15pm  Scarbrough 3 - Session A

This mixed methods study examines how the use of historical narratives to teach NOS, in the context of a flipped classroom format, affects student motivation to learn in a nonmajor’s biology course. This research may inform teachers on how contextualized examples and the format of the flipped class can influence student motivation to learn.

Format: Individual Paper Presentation  Presider: Kimberly Myers

Implementing Stem in the International School.

Michael W. Schulteis, Concordia University Irvine

1:15pm - 2:15pm  Scarbrough 3 - Session B

This presentation will describe how STEM education is taught in the International School K-12 setting. Contrasts and comparisons between methods for teaching NGSS science curriculum in the international setting and the US will be made. The expatriate living experience in teaching science will also be addressed.

Format: Individual Paper Presentation  Presider: Kimberly Myers

Research Into the Education of Science Teacher Educators

Felicia M Mensah, Teachers College, Columbia University
Dora Kastel, Teachers College, Columbia University
Kristen Larson, Teachers College, Columbia University
Kelly Parkes, Teachers College, Columbia University
Ruth Aguirre, Teachers College, Columbia University
Mary Hafeli, Teachers College, Columbia University
Nicole Johnson, Teachers College, Columbia University

1:15pm - 2:15pm  Scarbrough 3 - Session C

Exploratory in nature, this study looks at five alums from a science teacher education program and their preparation as doctoral candidates and teacher educators. Their comments serve as recommendations to current doctoral students and teacher education faculty to offer opportunities for educating science teacher educators.

Format: Individual Paper Presentation  Presider: Kimberly Myers
The Use of Beads and Beadwork (Cultural Artifacts) for Place-Based Learning of Science Concepts: Teachers Un/awareness

Sina Fakoyede, University of Witwatersrand, South Africa
Femi Otulaja, University of Witwatersrand

1:15pm - 2:15pm  Scarbrough 4 - Session A

This paper accessed teachers’ un/awareness of the use of cultural artifacts (beads and beadworks) as place-based learning tools in a life sciences classroom particularly when classroom pedagogical practice appears to shift from teacher-centered to learners centered. The learners became enabled as hotspots from which they can learn from each other.

Format: Small Group Roundtables


Katheryn B Kennedy, Walden University

1:15pm - 2:15pm  Scarbrough 4 - Session B

Inservice elementary teachers are tasked with increasing levels of content and pedagogy in response to the Next Generation Science Standards. Teacher perceptions of supports and barriers to professional learning were explored in a reflective practice interview study. Identified strategies function as both helpful and as obstacle for learning.

Format: Small Group Roundtables

Engineering Design Training Efficacy in the Context of Earth & Space Science Professional Development

Deb Hemler, Fairmont State University
Sean Harwell, Fairmont State University

1:15pm - 2:15pm  Scarbrough 4 - Session C

The efficacy of a two-year professional development cohort designed to engage teachers in the three dimensions of NGSS in the context of earth & space science with a focus on engineering design is explored. By the end of the PD, participants made positive gains on all aspects of the Teaching Engineering Self-Efficacy Scale (TESS) instrument.

Format: Small Group Roundtables

Understanding Personal Pck of a High School Teacher in the Context of Teaching Electricity in a Multicultural and Multigrade Classroom

Saiqa Dr. Azam, Memorial University of Newfoundland
Karen Dr. Goodnough, Memorial University of Newfoundland

1:15pm - 2:15pm  Scarbrough 4 - Session D

This research explored the personal PCK of a high school teacher, Susan, by using a narrative inquiry approach to study her experiences of teaching electricity. Narrative data was collected and analyzed using topic-specific PCK as a framework. A coherent story of Susan’s teaching was developed using narrative analysis technique to portray her pPCK.

Format: Small Group Roundtables
**Preservice Science Teacher Preparation - Thu, January 03**

**Stem Methods I and II**

*Stephanie Fanselow, University of Northern Colorado*

1:15pm - 2:15pm  Scarbrough 5 - Session A

This sequence of 2 STEM Methods courses was designed to prepare both secondary science and math teacher candidates to teach all areas of science and math with a focus on integrated STEM (including engineering design principles, technology utilization, and computer science instruction). Both courses include co-requisite field experiences.

*Format: Syllabus Sharing*

**Preservice Science Teacher Preparation - Thu, January 03**

**Preparing Quality Stem Teachers for Urban High-Need Classrooms; the Enable Stem Project**

*Justina Ogodo, The Ohio State University*

*Karen Irving, The Ohio State University Patti Brosnan, The Ohio State University Lin Ding, The Ohio State University*

1:15pm - 2:15pm  Scarbrough 5 - Session B

This study focuses on the ENABLE STEM program that trains preservice teachers to be highly-qualified STEM teacher leaders in urban high-need schools. The teacher candidates are recruited, trained, and equipped to defy the odds that often impede teacher retention and successful careers in urban high-need schools.

*Format: Syllabus Sharing*

**Preservice Science Teacher Preparation - Thu, January 03**

**Using Children’s Literature to Advance Preservice Teachers’ Implementation of Scientific Inquiry and Engineering Design**

*Michelle Forsythe, Texas State University*

*Julie Jackson, Texas State University*

1:15pm - 2:15pm  Scarbrough 5 - Session C

This presentation features in-class activities and assignments designed to leverage elementary teacher candidates’ prior interest in children’s literature to advance the ways in which they design lessons that promote students’ scientific inquiry and engineering design.

*Format: Syllabus Sharing*

**Curriculum, Pedagogy, and Assessment - Thu, January 03**

**A Course to Foster Teacher Agency in Alleviating Stem Opportunity and Achievement Gaps: A Syllabus Share**

*Rebekka Darner, Illinois State University*

*Kara E. Baldwin, Illinois State University*

1:15pm - 2:15pm  Scarbrough 5 - Session D

Opportunity and achievement gaps that begin in K-12 grades result in systematic under-representation by women and some ethnic minorities in science disciplines. This presentation details a course in which future STEM teachers develop understanding of the sources of gaps and their perceived roles in reducing opportunity and achievement gaps.

*Format: Syllabus Sharing*
Investigating the Affect of Augmented Reality Applications in an Elementary Science Methods Class

Leonard Annetta, East Carolina University
Marina Shapiro-Eney, California State University-Bakersfield
Alliy Funsch, East Carolina University

1:15pm - 2:15pm  Sloane - Session A

18 preservice elementary science methods students at a Mid-Atlantic University engaged with two different augmented reality apps as a way of integrating technology. Findings suggest augmented reality is an exciting way to immerse preservice teachers using technology and integrating the Bring Your Own Device initiative into their future classrooms.

Format: Individual Paper Presentation  Presider: Amal Ibourk

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Consideration of NSTA E-Learning Center Scipacks for Preparing Middle Level Teacher Candidates

Nate Carnes, University of South Carolina
Flavio Mendez, National Science Teachers Association
Christine Lotter, University of South Carolina

1:15pm - 2:15pm  Sloane - Session B

Presenters will provide a brief overview about how NSTA SciPacks are aligned with ETS Middle Level Science Study at-a-Glance topics, highlighting the SciPacks useful for preparing for a high stakes test.

Format: Individual Paper Presentation  Presider: Amal Ibourk

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Maximizing Observation, Analysis, Feedback and Reflection During Clinical Experiences Using an App-Based Tool That Facilitates a Team Approach

Craig Berg, The University of Wisconsin-Milwaukee
Raymond Scolavino, The University of Wisconsin-Milwaukee
Scott Ashmann, UW-Green Bay

1:15pm - 2:15pm  Sloane - Session C

The focus is a web-based app that maximizes classroom observation of both qualitative & quantitative factors, that provides instant and detailed analysis of critical components of teaching, and allows for rich feedback and data-based reflection, while facilitating a team-based approach to observation & feedback in the context of a recent study.

Format: Individual Paper Presentation  Presider: Amal Ibourk

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Preservice Secondary Science Teachers’ Experiences With Engaging Students in the NGSS Science and Engineering Practices

Stacey L Carpenter, University of California, Santa Barbara

1:15pm - 2:15pm  Verelst - Session A

This qualitative case study examined 12 preservice science teachers’ experiences with engaging students in the NGSS science and engineering practices during their student teaching field placements, as well as the supports and constraints afforded to them through their field placements and university coursework.

Format: Individual Paper Presentation  Presider: David Jackson
Preservice and First Year Teachers’ Successes and Challenges in Enacting Inquiry-Based Practices

Amy N Tankersley, University of Nebraska-Lincoln
Elizabeth B Lewis, University of Nebraska-Lincoln Aaron Musson, University of Nebraska-Lincoln

1:15pm - 2:15pm Verelst - Session B

In this study we describe the use of inquiry practices by preservice and first year teachers. Through classroom observations, interviews, and collection of demographic data we found that preservice science use of inquiry is influenced by teaching experience, teacher education program and student teaching placement.

Format: Individual Paper Presentation  Presider: David Jackson

Supporting Preservice Elementary Teachers’ Sense-Making of the Astps Through Eportfolios

Courtney Lynch, The Pennsylvania State University
LeeAnna Hooper, The Pennsylvania State University

1:15pm - 2:15pm Verelst - Session C

In this qualitative study, we aim to better understand PSTs’ pre-existing views about science teaching and learning and the role that reflection and ePortfolios may play in helping them identify ambitious science practices and analyze their teaching experiences for these practices.

Format: Individual Paper Presentation  Presider: David Jackson

Peer Coaching – Supporting the Development of Nature of Science Knowledge and Classroom Practice

Cary W. Sell, The University of Georgia

1:15pm - 2:15pm Vernon - Session A

This study uses peer coaching in a professional development as a support system for developing knowledge of NOS. Mixed methods research with cross case analysis of five secondary science teachers in a 15-week professional development to develop knowledge of NOS and the skills to teach NOS indicated an increase in NOS knowledge and NOS teaching.


Preparing Science Teachers to Overcome Common Obstacles and Teach the Nature of Science

Michael P. Clough, Texas A&M University
Benjamin C. Herman, University of Missouri, Columbia Joanne K. Olson, Texas A&M University

1:15pm - 2:15pm Vernon - Session B

Accurately and effectively teaching the NOS requires more than understanding NOS content and effective NOS pedagogy. This presentation, drawing from several empirical studies, addresses the additional need to provide teachers with strategies for navigating and overcoming common obstacles that interfere with efforts to accurately teach the NOS.

We studied responses to various types of NOS questions. Results indicate that students address NOS most completely with scaffolded and specific NOS questions and only slightly less with non-scaffolded specific NOS questions. A large decrease was observed for general NOS questions and students rarely address NOS with general reflective questions.

Middle School Life Science Teacher’s Understanding of Conceptual Models and Use of Technology for Designing Tinkercad-Based 3D Digital Conceptual Models

Regina L. Suriel, Valdosta State University
Kyle W Culpepper, Valdosta State University

3:45pm - 4:45pm Percival - Session C

This case study of 18, seventh-grade life science teachers participating in professional development workshop highlight teachers’ understanding of science-based conceptual models (CM) and design of 3D digital models utilizing Tinkercad. Study findings and samples of teachers’ 3D digital models will be shared.

Format: Individual Paper Presentation  Presider: Josh Ellis

Successful Grant Writing: Part 2

Mary M Atwater, University of Georgia
Melody Russell, Auburn University Malcolm B. Butler, University of Central Florida Rhea Miles, East Carolina State University

3:45pm - 4:45pm Plimsoll

ASTE members who are doctoral students near the completion of their studies, assistant/associate professors, and informal science educators at museums, nature centers, or aquariums will desire to participate in this two-hour beginning and intermediate level grant-writing workshop. The workshop will focus on writing and submitting proposals to NSF.

Format: Workshop

Stem for All: How Teachers Can Create Classrooms That Address the Negative Impacts of Heterosexism and Heteronormativity on Gay Men in Stem Classrooms

David P Steele, UGA

3:45pm - 4:45pm Scarbrough 1 - Session A

Gay men continue to experience discriminatory and oppressive practices that are inclusive of both implicit and explicit issues of heterosexism and heteronormativity that is present at all levels of society. Using a narrative inquiry approach, this qualitative study examined how gay students experienced and navigated these in their STEM classrooms.

Format: Individual Paper Presentation  Presider: Frederick Bradley

Inclusive Science Instruction for Students With Autism and Intellectual Disabilities: Evidence-Based Strategies

Karen Lee Rizzo, Pennsylvania State University-Behrend
Jonte C Taylor, Pennsylvania State University Jiwon Hwang, University of California-Bakersfield

3:45pm - 4:45pm Scarbrough 1 - Session B

In this presentation, we will focus on findings from our analysis of single-case research examining the effectiveness of science instruction for students with intellectual disabilities (ID) and autism spectrum disorder (ASD). From the studies reviewed, ten instructional practices emerged with supportive evidence for teaching students with ID/ASD.

Format: Individual Paper Presentation  Presider: Frederick Bradley
Equity and Diversity - Thu, January 03

**School Factors That Help Elementary Schools Defy the Odds in Science Achievement for All Students**

**Tonjua B Freeman, University of Central Florida**
**Regina L Suriel, Valdosta State University**

3:45pm - 4:45pm  Scarbrough 1 - Session C

This case study about four elementary schools in two states offers suggestions for successful elementary science approaches for students often underrepresented in science and science-related careers.

*Format: Individual Paper Presentation  Presider: Frederick Bradley*

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**Science Teacher Professional Development - Thu, January 03**

**Bench to Bedside: The Effectiveness of a Professional Development Program Focused on Biomedical Sciences and Action Research**

**Houda D Pruitt, University of Florida**
**Julie R Bokor, University of Florida Margarita Hernandez, The Pennsylvania State University Mary Jo Koroly, University of Florida**

3:45pm - 4:45pm  Scarbrough 2 - Session A

A professional development program aimed to increase teacher awareness of scientific processes, skills and careers by examining the continuum of basic to clinical research. Evaluation shows significant gains in teacher confidence to explain advanced biosciences topics, and development of action research skills for intervention assessment.

*Format: Individual Paper Presentation  Presider: Dana Atwood-Blaine*

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**Science Teacher Professional Development - Thu, January 03**

**Teachers’ Content Knowledge, Beliefs, and Practice After a Project-Based Professional Development Program With Ultrasound Scanning**

**Christine R Lotter, University of South Carolina**
**Nathan Carnes, University of South Carolina Jeff Marshall, Clemson University**

3:45pm - 4:45pm  Scarbrough 2 - Session B

This research study investigated 20 middle and high school teachers’ content knowledge, use of project-based learning curriculum, and reform-based beliefs after engaging in a 115 hour professional development program that was developed collaboratively with medical school and education faculty.

*Format: Individual Paper Presentation  Presider: Dana Atwood-Blaine*

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**Science Teacher Professional Development - Thu, January 03**

**Data Explorations in Ecology: Supporting Science Teachers’ Focus on Data in Secondary Classrooms**

**Tobias Irish, University of Hawai‘i at Hilo**
**Alan Berkowitz, Cary Institute of Ecosystem Studies Cornelia Harris, Cary Institute of Ecosystem Studies Carol Brewer, Prairie Ecotone Research Group, LLC**

3:45pm - 4:45pm  Scarbrough 2 - Session C

DEEP was a professional development effort designed to support secondary science teachers in implementing instruction focused on data literacy. The associated research worked to understand the extent to which the teachers focused on data literacy practices in their teaching and identify factors that supported or constrained their efforts.

*Format: Individual Paper Presentation  Presider: Dana Atwood-Blaine*
Culturally Relevant Science: A Multiple Case-Study on the Beliefs, Experiences and Practices of Pre-Service Teachers in Racially and Ethnically Diverse Classrooms

Suzanna Roman, Georgia State University
Renee' Suzanne Schwartz, Georgia State University
3:45pm - 4:45pm  Scarbrough 3 - Session A

This multiple case study explored the beliefs, experiences and practices of seven pre-service science teachers that were part of two national fellowships focused on teacher preparation for 'high-needs' school districts. The study investigated their use of culturally relevant practices in racially and ethnically diverse science classrooms.

Format: Individual Paper Presentation  Presider: Patricia Bills

Improving the Teaching of Pre-Service Secondary Science Teachers for English Learners: Evidence From a Multi-Site Intervention Study

Edward G Lyon, Sonoma State University
3:45pm - 4:45pm  Scarbrough 3 - Session B

This presentation reports on an intervention study at six teacher preparation programs across multiple states. Secondary science method courses were restructured to improve teaching for English Learners. Observations reveal two practices with the strongest implementation evidence: “Increasing student interaction” and “Facilitating student talk.”

Format: Individual Paper Presentation  Presider: Patricia Bills

Preparing Preservice Teachers to Teach Science to English Learners: A Review of Literature

Alexis Rutt, University of Virginia
Frackson Mumba, University of Virginia Amanda Kibler, University of Virginia
3:45pm - 4:45pm  Scarbrough 3 - Session C

We reviewed the extant research on preparing preservice teachers (PSTs) to teach science to English Learners. Results showed that integrated language and science methods courses, cohesive program components, and opportunities to experience and engage in targeted practices were important components for teacher training. Implications are discussed.

Format: Individual Paper Presentation  Presider: Patricia Bills

Science Teacher Leadership: An Active Exploration of Perspectives

Jennifer S Mayo, University of Portland/Portland Public Schools
3:45pm - 4:45pm  Scarbrough 4 - Session

Definitions of teacher leadership (TL) describe products of TL; that is what TLs do, not how TLs describe themselves. Through our experience with science teacher leaders (STLs), participants will explore understandings of STL via perspective taking and describing STL through a variety of methods, including use of visuals & arts-based strategies.

Format: Exploratory Session
Changing Stereotypes: Lab Coats and Science Self-Concept

Megan Ennes, NC State University
M. Gail Jones, NC State University Tammy Lee, East Carolina University Sarah Carrier, NC State University Lauren Madden, The College of New Jersey Emily Cayton, Campbell University Katherine Chesnutt, NC State University Pamela Huff, NC State University

3:45pm - 4:45pm Sloane - Session A

There is a call to increase the number of youth choosing to major in STEM fields in order to meet future demands. Science self-concept has been seen to influence an individual's STEM career aspirations. This study examined the influence of lab coats on the science self-concept of fifth grade students. We will discuss the results and implications.


Elementary Students’ Images of Scientists and Engineers Before and After a Semester-Length Experience With a Stem Professional

Emily Dux, Iowa State University
Jacob Pleasants, Iowa State University Aubree Dawson, Iowa State University Joanne K Olson, Texas A&M University

3:45pm - 4:45pm Sloane - Session B

This study compares elementary students' images of scientists and engineers in the context of a teacher education and professional development project aimed at supporting science and engineering instruction in grades 3–5. We explore how their images of the two disciplines differ, and how they changed over the course of the project.


Improving Upper Elementary Students’ Nature of Engineering Views With an Engineering Design Experience

Ezgi Yesilyurt, University of Nevada, Las Vegas
Hasan Deniz, University of Nevada, Las Vegas Erdogan Kaya, University of Nevada, Las Vegas

3:45pm - 4:45pm Sloane - Session C

This study examined the influence of the intervention involving explicit, reflective nature of engineering (NOE) instruction and soda can crusher design experience on elementary students' NOE views. An open-ended NOE questionnaire and interviews were used. The results showed that elementary students improved their NOE views after the intervention.


Lesley J Shapiro, Keene State College
Michael J. Dean, Northeastern University

3:45pm - 4:45pm Verelst - Session A

The NGSS represent a significant change in for science education in the United States in terms of both content and pedagogy. This study examined the receptivity of in-service science teachers to the curricular shifts necessitated by the adoption of the NGSS. The results offer insights for supporting in-service teachers through the transition.

Format: Individual Paper Presentation  Presider: Illana Livstrom
Engaging Students in Reasoning About Socioscientific Issues: Are Stem Teachers Prepared?

David C. Owens, Georgia Southern University
Benjamin C. Herman, University of Missouri
Robert T. Oertli, University of Missouri
Troy D. Sadler, University of North Carolina at Greensboro

3:45pm - 4:45pm  Verelst - Session B

Teachers often report being ill-equipped to address non-scientific factors that are requisite to the resolution of socioscientific issues (SSI). The purpose of this study was to better understand how secondary mathematics and science teachers exhibit socioscientific reasoning when engaging in a regionally relevant environmental SSI.

Format: Individual Paper Presentation  Presider: Illana Livstrom

Exploring Inclusive Education Through the Eyes of Science Teacher Educators

Christine Tippett, University of Ottawa
Karen Goodnough, Memorial University of Newfoundland
Saiqa Azam, Memorial University of Newfoundland
Tood Milford, University of Victoria

3:45pm - 4:45pm  Vernon - Session A

Research on science teacher educators and their work in relation to inclusion is limited. In this exploratory session, participants will have the opportunity to share their perspectives as it relates to inclusion in initial teacher education and engage in individual and collaborative reflection about their work.

Format: Exploratory Session

ASTE Social/JSTE 30th Birthday

6:30pm - 8:00pm  Harborside

Friday, January 4th

Breakfast

6:30am - 8:00am  Ballroom Prefunction AB

Birds of a Feather: Meet With Colleagues That Share a Common Interest on a Variety of Topics

7:00am - 7:50am  Ballroom Prefunction AB

During breakfast, we invite you to meet new people with whom you have common interests. At breakfast tables, you will notice some signs with different topics – or blank signs to write in your own topic of interest. Sit down with “Birds of a Feather” to make new ASTE friends and potential collaborators!

Registration

7:00am - 4:00pm  Registration office 2nd floor
3MT Competition

Jeanna Wieselmann,
8:00am - 9:00am  Ballroom D - Session
The ASTE Graduate Student Forum is pleased to offer its second annual Three-Minute Thesis (3MT) competition at ASTE 2019. The 3MT competition has been held at universities worldwide and celebrates exciting research conducted by doctoral students. Ph.D. and Ed.D. students will concisely describe their dissertation work in three minutes and in one PowerPoint slide for a panel of judges. The winner will receive free registration to ASTE 2020. The GSF leadership team invites everyone at ASTE 2019 to witness this exciting event and help encourage graduate student involvement with ASTE.

Preservice Science Teacher Preparation - Fri, January 04

Improving Preservice Teacher Self-Efficacy Through Environmental Education

Chelsea J McClure, Towson University
Sarah A Haines, Towson University
8:00am - 9:00am  Ballroom E - Session A
We conducted a pilot study on preservice teachers that examined how nonformal field experiences affect teaching self efficacy, content knowledge, and attitudes towards teaching science. PSTs taught programming at the National Aquarium to middle level students from Baltimore City Schools. Results will be presented from pre/post surveys, interviews, and student work artifacts.
Format: Individual Paper Presentation  Presider: Sandra Lampley

Preservice Science Teacher Preparation - Fri, January 04

Elementary Preservice Teachers Learning Science: Another Look at Self-Efficacy Beliefs

Rose M. Pringle, University of Florida
Erin Mistry, University of Florida
8:00am - 9:00am  Ballroom E - Session B
In this research, we measure self-efficacy beliefs in real time while elementary preservice teachers were engaged in a science content course grounded in effective pedagogy. Findings indicate that personal interests in specific science content had a strong influence on their learning and dictated how they interacted with course activities.
Format: Individual Paper Presentation  Presider: Sandra Lampley

Preservice Science Teacher Preparation - Fri, January 04

Development of Preservice Elementary Teachers’ Science Teacher Identity and Self-Efficacy

Deepika Menon, Towson University
Saiqa Azam, Memorial University of Neufoundland, Canada
8:00am - 9:00am  Ballroom E - Session C
This mixed-methods study investigates how and what factors are associated with preservice elementary teachers’ formation of science teacher identity over the years and how their identities are shaped within the context of a science methods course. The results of the study and implications for preservice teacher education will be discussed.
Format: Individual Paper Presentation  Presider: Sandra Lampley
The World in Which We Live: Blending Place-Based Education and NGSS for Greater Student Engagement

Martha Inouye, University of Wyoming
Ana Houseal, University of Wyoming

8:00am - 9:00am  Ballroom F - Session A

Place-based education can serve as a means for reaching the goals of NGSS, and NGSS can be an avenue through which place-based education can be accessed. Come consider how blending these two can support teachers' classroom instruction and student engagement.

Format: Small Group Roundtables

K-12 Teachers' Implementation of Computing and Computational Thinking

Judith Morrison, Washington State University
Jonah Firestone, Washington State University Danielle Malone, Washington State University

8:00am - 9:00am  Ballroom F - Session B

This study explored concerns and challenges expressed by teachers about incorporating computing into their teaching and their plans to incorporate computing in their classrooms. This exploration is the first step to understanding the experiences teachers need to support their implementation of interdisciplinary computing and computational thinking.

Format: Small Group Roundtables

Supporting Teachers as Designers Through Professional Development

Julie R Bokor, University of Florida

8:00am - 9:00am  Ballroom F - Session C

This case study of a teacher-scientist professional development program aimed to understand the activity structures and design supports that foster science teachers' ability to design learning experiences for their classroom context. Findings suggest curriculum design knowledge is a necessary knowledge type that provides the foundation for design.

Format: Small Group Roundtables

Guided Online Group Discussion Enhances Student Critical Thinking Skills

Anu Gokhale, Illinois State University

8:00am - 9:00am  Percival - Session A

The presentation will focus on the effectiveness of a pedagogical approach suitable for online learning: instructor-guided online group discussion to enhance the problem-solving ability of students. In addition to statistical tools, the study used clustering algorithms and data analytics to gain greater insights.

Format: Individual Paper Presentation  Presider: Ron Hermann
Statistical Reliability of an English Language Nature of Solutions and Solubility-Diagnostic Instrument

Mandy McCormick Smith, The Ohio State University  
Jonathan M Breiner, University of Cincinnati
8:00am – 9:00am  Percival - Session B

Nature of Solutions and Solubility–Diagnostic Instrument developed by Adadan and Savasci (2012) was designed to assess student understanding of solution chemistry. This session presents findings from five psychometric tests evaluating reliability and the discriminatory power of the latest English version of the instrument, the NSS-DI (Eng V.3).

Format: Individual Paper Presentation  Presider: Ron Hermann

Developing and Implementing an Instrument for Measuring Creative Engineering Problems Solving Propensity

Younkyeong Nam, Pusan National University  
Ju-Won Kang, Pusan National University DongYoung Lee, Pusan National University
8:00am – 9:00am  Percival - Session C

This study presents the process of developing a valid and reliable instrument for measuring students’ creative engineering problem solving propensity (CEPSP) in STEM research context. By using the instrument, we also measure the impact of a STEM research program on gifted high school students CEPSP in South Korea.

Format: Individual Paper Presentation  Presider: Ron Hermann

Addressing Language/literacy Development for English Learners in Secondary Science Method Courses

Edward G Lyon, Sonoma State University  
Joyce Hill, University of California, Santa Cruz Suzanne Garcia, Tam High School
8:00am – 10:00am  Plimsoll

Participants will engage with tools and instructional tasks to modify secondary science method courses in support of preparing pre-service teachers to teach science to ELs and overcome likely challenges faced. The workshop will be guided by the SSTELLA Framework that integrates NGSS-aligned science learning with language/literacy development.

Format: Workshop

Urm Students' Perceptions of Th!nk!ng Through Active Learning in a Large-Lecture Classroom

Michelle L Nugent, North Carolina State University  
Miriam G Ferzli, North Carolina State University Margaret R Blanchard, North Carolina State University
8:00am – 9:00am  Scarbrough 1 - Session A

Incorporation of active learning strategies in college classrooms has been shown to increase exam and test scores for underrepresented students. This study examines the benefits of critical and creative thinking through active learning from the student perspective to identify keys aspects of classroom activities that students find beneficial.

Format: Individual Paper Presentation  Presider: Carolyn Parker
Navigating Choices and Identities: Exploring Mother-Daughter Stem-Related Discourses

Ramya Sivaraj, University of Minnesota
8:00am – 9:00am  Scarbrough 1 – Session B

Through qualitative case studies, mother-daughter STEM-related discourses were explored in order to examine their navigation of choices and identities. Applying critical discourse analysis as an analytical framework, findings include three central themes: recognition of STEM norms; access to STEM experiences; and resilience with respect to agency.

Format: Individual Paper Presentation  Presider: Carolyn Parker

From Interdisciplinarity to Intersectionality: Culturally Relevant Computational Thinking Courses

Rouhollah Aghasaleh, Georgia State University
Patrick J Enderle, Georgia State University
8:00am – 9:00am  Scarbrough 3 – Session A

Graduate assistants who attend these courses work on a research project that extends existing research in the field by proposing a model to teach computational competencies. This course sequence provides preservice teachers opportunities to develop culturally relevant experiences for urban Latinx adolescents in computational thinking.

Format: Syllabus Sharing

Teaching Science Methods Online

Danielle Dani, Ohio University
8:00am – 9:00am  Scarbrough 3 – Session B

This syllabus presentation describes an experiential approach to promote virtual science teacher education. The course is offered as part of a graduate level endorsement program. A syllabus, sample activities, course projects, and samples of student work will be shared.

Format: Syllabus Sharing

Implementing the Teaching for Transformative Experiences in Science Model in Introductory Biology for Pre-Service Teachers

Rachel A. Sparks, Illinois State University
Rebekka Darner, Illinois State University
8:00am – 9:00am  Scarbrough 3 – Session C

Elementary educators are students’ first science teachers yet receive little science education. This presentation describes an introductory biology course designed to improve evolutionary understanding and science teaching skills in pre-service elementary teachers. Data on the efficacy of this course and instructional materials will be shared.

Format: Syllabus Sharing
From Science to STEM: Introduction to Stem, Engineering Design Process, and Creative Thinking Strategies Course Syllabus Part One of the Stem Certification Process

Elizabeth J.R. Stretch, University of Minnesota
Justine N Kim, University of Minnesota

8:00am - 9:00am  Scarbrough 3 – Session D

One step towards a unified STEM approach is creating coursework for educators, practitioners, and policy makers to have a foundational understanding of STEM pedagogy. This proposed course will explore issues that surround and define integration of STEM that allows participants to leave with efficacy towards STEM integration models and practices.

Format: Syllabus Sharing

Instructional Rounds in Preservice Teacher Education

Deborah L Hanuscin, Western Washington University

8:00am - 9:00a  Scarbrough 4 – Session A

The use of instructional rounds in an elementary science methods course affords examining dimensions of contrast across multiple classrooms. This experience supports preservice teachers in identifying problems of practice and implications for their own instruction, and overcomes many of the challenges inherent in current field experience models.

Format: Small Group Roundtables

Utilizing Personalized Learning to Improve Pedagogy in a Preservice Elementary Science Course

Brendan E Callahan, Kennesaw State University
Anissa Lokey-Vega, Kennesaw State University

8:00am - 9:00am  Scarbrough 4 – Session B

Personalized learning values learner differences and allows the educator and learner to co-plan a unique educational experience. We will discuss the transformation of a successful physical science course for preservice elementary teachers into a course that is personalized. We will focus on the process of the transformation of the class.

Format: Small Group Roundtables

Highly-Structured Integrated Stem Professional Development: Challenges and Insights Gained From a Cross-Case Analysis

Kristin L Cook, Bellarmine University
Sarah B Bush, University of Central Florida Margaret Mohr-Schroeder, University of Kentucky Christopher Rakes, University of Maryland, Baltimore County Robert Ronau, National Science Foundation Jon Saderholm, Berea College

8:00am - 9:00am  Scarbrough 4 – Session C

In this session, we report on a cross-case analysis of the implementation of a professional development framework through three federally-funded, multi-year integrated STEM PD programs. In addition to key findings, we summarize challenges revealed and insights gained.

Format: Small Group Roundtable
Fri, January 04

**Understandings of Scientific Inquiry; Learning to Score and Administer Valid and Reliable Instruments (Views About Scientific Inquiry and Young Children Views About Science)**

Judith S. Lederman, Illinois Institution of Technology
Selina L. Bartels, Valparaiso University
Norman G. Lederman, Illinois Institute of Technology
Dawnee LePrette, Illinois Institute of Technology

8:00am - 10:00am  Scarbrough 5 - Session

During this workshop participants will learn how to deliver and validly score instruments (VASI and YCVS) that assess students' understandings of Scientific Inquiry. This interactive workshop will provide opportunities to learn about previous studies about SI from around the world and to collaborate with colleagues to develop further research.

**Format:** Workshop

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Science Teacher Professional Development  -  Fri, January 04

**Highlighting Integral Components of NGSS-Aligned Instruction Through a 3d Learning Experience**

Fred Stein, The Exploratorium, Institute for Inquiry
Kelsey Lipsitz, The Exploratorium, Institute for Inquiry
Lynn Rankin, The Exploratorium, Institute for Inquiry
Barry Kluger-Bell, Inquiry Science Education Consultant
Rachel Jordan, The Exploratorium, Institute for Inquiry

8:00am - 9:00am  Sloane - Session A

Participants will have the unique opportunity to engage in a 3D learning activity from the learner's perspective. This activity demonstrates the potential of sensemaking experiences that highlight integral components of the NGSS – modeling, discourse, and equity – in helping shift instruction from learning about to figuring out phenomena.

**Format:** Exploratory Session

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STEM Education  -  Fri, January 04

**Preservice Teachers’ Conceptions of Stem Before, During and After the Planning and Delivery of a Lesson**

Selina L Bartels, Valparaiso University
Katie Rupe, Illinois Institute of Technology
Judith Lederman

8:00am - 9:00am  Verelst - Session A

This study looked at what are preservice elementary teachers' understandings of STEM and planning for STEM lessons after explicit modeling and practice in elementary science and math methods courses? The findings for this study show that preservice teachers' understandings of STEM and the ability to lesson plan did increase from this model.

**Format:** Individual Paper Presentation  Presider: Yunhee Choi

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STEM Education  -  Fri, January 04

**Disciplinary Practice Understanding Among Pre-Service Stem Teachers**

Kara E Baldwin, Illinois State University
Rebekka Darner, Illinois State University

8:00am - 9:00am  Verelst - Session B

National standards describe and integrate scientific and mathematics practices into STEM learning. However, less is known about how disciplinary practices are understood by preservice teachers. This presentation presents preliminary research exploring preservice teacher understanding of disciplinary practices through research experiences.

**Format:** Individual Paper Presentation  Presider: Yunhee Choi
Creativity in Science: A Course Designed to Change Perceptions of Science and Increase Retention of Diverse Students in Stem Majors

Susan M Gomez Zwiep, CSU Long Beach
Lisa Martin Hansen, CSU Long Beach YoungJin Song, CSU Long Beach

This exploratory study focuses on STEM majors participating in an introduction to scientific thinking and creativity course. Course documents were qualitatively analyzed to identify themes in students’ perceived use of creativity in scientific investigations, as well as their own ability to use creative ways of thinking.


Teacher and School Support for Students’ Science Career Development Through Nature of Science and Inquiry

Bridget K. Mulvey, Kent State University
Katherine R. Eagleton, Kent State University Mila Rosa Librea-Carden, Kent State University Jeff Papa, Kent State University

This study examined 9 teachers' ideas/plans about NOS and science careers associated with an online PD. Details on NOS/career activities to broaden perspectives of science/science careers will be presented. Findings include teachers' increased awareness of their students' career-related needs and evidence-based changes to their practice.

Format: Individual Paper Presentation  Presider: Jonathan Hall

What Do K-12 Students Need to Noe? a Delphi Study Into the Nature of Engineering

Brian D Hartman, Walla Walla University
Randy L Bell, Oregon State University

The goal of this research is to elucidate aspects of the nature of engineering that are appropriate to teach at the K-12 level. Experts in K-12 engineering education were invited to participate in a classic, three-round Delphi study. The participants identified seven aspects of the nature of engineering important to K-12 education.

Format: Individual Paper Presentation  Presider: Jonathan Hall

Elementary Teachers’ Portrayals of the Nature of Engineering When Supported by a Stem Professional in the Classroom

Jacob Pleasants, Iowa State University
Joanne K Olson, Texas A&M University Kristina M Tank, Iowa State University Michael P Clough, Texas A&M University

The present study examines how participants in a professional development project portrayed the nature of the engineering discipline during instruction. We will discuss the ways in which participants accurately communicated the engineering discipline, and also highlight the areas that were less accurately portrayed.

Format: Individual Paper Presentation  Presider: Jonathan Hall
Personification as a Reflective Tool to Examine Pre-Service Teachers Attitudes Towards and Conceptions of Biology

Zachary T Grimes, Middle Tennessee State University
Joshua W Reid, Middle Tennessee State University Cindi Smith-Walters, Middle Tennessee State University

9:15am - 10:15am  Ballroom D - Session A

Science education reform efforts have primarily explored the cognitive learning domain in science teacher preparation. Through the use of a reflective prompt, we explored the attitudes toward biology in a biology content course for preservice elementary teachers.

Format: Individual Paper Presentation  Presider: Gayle Evans

Lesson Study as an Instructional Strategy in a Science Methods Course: Participants’ Perspectives

Sandra A Lampley, University of Alabama in Huntsville

9:15am - 10:15am  Ballroom D - Session B

Learn how lesson study was used as an instructional strategy in an elementary science methods course. This presentation will focus on teacher candidates' perceptions of lesson study as a component of the course and discuss the conflict that participants had about the collaboration process with their peers.

Format: Individual Paper Presentation  Presider: Gayle Evans

Themes in Prospective Middle School Teachers’ Personal and Professional Views About Evolution and Its Teaching

José M Pavez, University of Georgia
Sandhya Krishnan, University of Georgia David F Jackson, University of Georgia

9:15am - 10:15am  Ballroom D - Session C

We describe a unit in a middle grades science methods course on the teaching and learning of evolution in light of the prevalence of creationist beliefs in the U.S., and analyze the student responses to a writing prompt challenging them to confront their own personal beliefs and their relationship to their professional intentions in this area.

Format: Individual Paper Presentation  Presider: Gayle Evans

Supporting Preservice Teachers in Designing NGSS-Aligned Unit Plans Using the Five Tools and Processes

Julie Contino, American Museum of Natural History
David Randle, American Museum of Natural History

9:15am - 10:15am  Ballroom E - Session A

In response to the new vision for science teaching and learning called for by the NGSS faculty in the AMNH MAT Program adapted a curriculum designed for inservice teachers in order to support preservice teachers in planning units consistent with NGSS goals. This session will have attendees explore ideas about preparing preservice teachers for NGSS.

Format: Exploratory Session
Fostering Stem Interest in Middle School Female Students of Color Through Stem Integration at a Developing Stem School

Felicia D. T. Leammukda, University of Minnesota
Bonnie B. Boyd, University of Minnesota Gillian H. Roehrig, University of Minnesota

9:15am - 10:15am Ballroom F – Session A

Females of color are underrepresented in STEM fields. This single embedded case study examines how STEM integration at a developing STEM middle school fostered STEM interest in girls of color. Based on the findings of this study, authors highlight particular characteristics of STEM integration that cultivate STEM interest among girls of color.

Format: Individual Paper Presentation

Creating Cultural Competence or Deficit-Based Views: A Study Examining Middle School Students’ Experience With Culturally Framed Engineering

Khomson Keratithamkul, University of Minnesota
Justine Kim, University of Minnesota Gillian Roehrig, University of Minnesota

9:15am - 10:15am Ballroom F – Session B

Engineering educators and curriculum developers have drawn from theoretical perspectives that ground engineering problems in real world contexts. In this study, students developed deficit-based views of the people and places when problems were framed in certain cultural context. Also, implications for existing engineering curricula are examined.

Format: Individual Paper Presentation

Examining Preservice Teachers’ Use of the UDL Framework to Ensure Access to Three-Dimensional Science

Jennifer Mesa, University of West Florida

9:15am - 10:15am Ballroom F – Session C

This study examined preservice teachers' use of the Universal Design for Learning (UDL) principles and guidelines in planning three-dimensional science instruction for students with disabilities in an elementary science methods course. Patterns in preservice teachers' use of UDL were analyzed to identify recommendations for integrating UDL.

Format: Individual Paper Presentation

Exploring Pre-Service Science Teachers’ Views Toward Culturally Relevant Pedagogy, Science as a Civil Right and Urban Schools

Seema Rivera, Clarkson University
Preethi Titu, University of Minnesota

9:15am - 10:15am Ballroom F – Session D

Knowing pre-service teachers views toward culturally relevant pedagogy, science as a civil right and urban schools in education have significant classroom impacts, this study investigated the views of pre-service science teachers toward the three aspects.

Format: Individual Paper Presentation
Creating School Advocates for Experiential Learning in the Outdoors
Ryan M Walker, Mississippi State University
John L Pecore, University of West Florida Michael Dias, Kennesaw State University Shana N Lee, Mississippi State University

9:15am - 10:15am Percival - Session A
The Great Smoky Mountains Institute at Tremont launched an intensive 1-year professional development to support teachers in the use of experiential learning pedagogy, outdoor spaces, and authentic science experiences. Researchers discuss both the challenges and successes of the program while making suggestions for continued improvement.

Format: Individual Paper Presentation  Presider: Michael Beeth

Changing Teachers’ Perceptions of Experiential Learning in Outdoor Spaces
Shana Lee, Mississippi State University
Dr. Ryan Walker, Mississippi State University Jennie MgGuigan, Great Smoky Mountain Institute at Tremont Tiffany Beachy, Great Smoky Mountain Institute at Tremont

9:15am - 10:15am Percival - Session B
The Great Smoky Mountains Institute at Tremont delivered an intensive 1-year professional development for in-service teachers. Program goals targeted increased use of experiential learning pedagogy, outdoor spaces, and authentic science processes. Embedded assessments revealed unforeseen challenges and successes of the professional development.

Format: Individual Paper Presentation  Presider: Michael Beeth

Promoting Perspective-Taking in an Undergraduate Environmental Science Course
Mark H Newton, California State University, Chico
Dana L Zeidler, University of South Florida

9:15am - 10:15am Percival - Session C
This qualitative study provides empirical evidence to support using specific strategies to promote perspective-taking in a SSI-embedded Environmental Science undergraduate course. Pre-service teachers examined wolf management in Northern California through multiple perspectives.

Format: Individual Paper Presentation  Presider: Michael Beeth - Fri, January 04

Committee of Regional Units

9:15am - 10:15am Savannah

Preservice Science Teacher Preparation - Fri, January 04
A Comparison of Two Liberal Arts Teacher Education Science Methods Course: How Much Time Should Be Allocated the Teaching of Science as Inquiry?
Lori A. Smolleck, Bucknell University
Jennie M. Carr, Bridgewater College

9:15am - 10:15am Scarbrough 1 - Session A
This research investigated the importance of the teaching of science as inquiry within two institutions. The researchers investigated the knowledge participants had prior to and after the science methods course. The critical incidents that assisted participants in developing a deeper understanding of teaching science as inquiry were also analyzed.

Format: Individual Paper Presentation  Presider: Melanie Kinskey
“I Will Fight. I Will Advocate. I Will Tell Others”: The Impacts of the Deliberate Attention to Caring About Elementary Science in a Methods Course

Julianne A Wenner, Boise State University
9:15am - 10:15am  Scarbrough 1 - Session B

Often in schools an elementary teacher has to want to teach science for it to happen with quality. This study explored the impacts of the explicit attention to caring about elementary science in an elementary methods course. Findings indicate that students learned about the value of elementary science and felt able to advocate for it in the future.

Format: Individual Paper Presentation  Presider: Melanie Kinskey

Examining the Impact of Increasing Reflexivity on Preservice Elementary Teachers’ Conceptions of Science as Socially and Culturally Embedded

Jeffrey Radloff, Purdue University
David Eichinger, Purdue University
9:15am - 10:15am  Scarbrough 1 - Session C

The purpose of this study was to understand the impact of increasing reflexivity in an introductory biology content course on preservice elementary science teachers’ conceptions of science as socially and culturally embedded. Results revealed increases in students’ positionality and accessibility to science.

Format: Individual Paper Presentation  Presider: Melanie Kinskey

Becoming a Teacher: Reflective Practice as a Way of Exploring Secondary Science Teachers’ Beliefs and Practices

Preethi Titu, University of Minnesota
Gillian H Roehrig, University of Minnesota Joshua A Ellis, Michigan Technological University
9:15am - 10:15am  Scarbrough 2 - Session A

Knowing that teacher’s beliefs and practices toward teaching vary widely in education and have significant classroom impacts, this study investigated the beliefs and practices of inservice secondary science teachers toward teaching as a classroom teacher.

Format: Individual Paper Presentation  Presider: Jennifer Albert

Science Teachers’ Perceptions of Their Increasing Use of Professional Noticing During Instruction

Lauren N Stewart, San Diego State University
Meredith Houle Vaughn, San Diego State University Donna L Ross, San Diego State University
9:15am - 10:15am  Scarbrough 2 - Session B

This study examines five secondary science teachers' perceptions on the growth of their professional noticing skills over time and how their teaching practices are influenced by noticing. We found that teachers perceive that noticing influences teacher moves, helps to elicit student thinking, and to no longer focus on correct/incorrect answers.

Format: Individual Paper Presentation  Presider: Jennifer Albert
The Effects of Extended Action Research-Based Professional Development on the Teaching of Climate Science

Allan Feldman, University of South Florida
Molly Nation, Florida Gulf Coast University Katie Laux, University of South Florida

9:15am - 10:15am Scarbrough 2 - Session C

This presentation reports on the use of extended action research-based professional development for climate change education. Results indicated teachers changed their practice to incorporate discussion and argumentation, decreased their concern about the political aspects of climate change, and increased the place-based nature of their teaching.

Format: Individual Paper Presentation  Presider: Jennifer Albert

NSTA Sponsored Session: NSTA/CAEP Science Teacher Preparation Standards: Report Compiler / Reviewer

Michael Dias, Kennesaw State University
Deb Hemler, William Jones

9:15am - 10:15am Scarbrough 4 - Session

The purpose of this presentation is to provide support for science teacher educators who lead candidate and program assessment efforts at their respective institutions. Participants will gain deeper understanding of the NSTA-CAEP 2012 Standards for Science Teacher Preparation through analysis of sample program data reports. Suggestions on how to prepare a report for submission are included with helpful advice for developing an assessment system and presenting teacher-candidate data. The workshop provides in-depth examination of issues in science teacher education, in that the NSTA/SSTP assessments support science teacher candidates' enactment of content, pedagogical, and professional knowledge and skills.

Supporting High School Students’ Science Learning: Immersion to Argument-Based Inquiry and Increasing Knowledge, Skills, and Positive Disposition

Yejun Bae, University of Iowa

9:15am - 10:15am Sloane - Session A

In the session, the presenter will describe (1) how the summer UB science program increased students' argumentative competences through supporting students' immersion to practice of science and engineering, and (2) how the summer UB students increased, and changed their dispositions. The assessment examples will be provided.

Format: Individual Paper Presentation  Presider: Jacob Pleasants

Students’ Competencies to Be a Creative Problem Solvers With Computational Thinking

Young Shin Park, Chosun University

9:15am - 10:15am Sloane - Session B

The purpose of this study was to define computational thinking (CT) practice in science education. 9 components of CT from computer science was modified as follows for the context of science teaching: data collection, data analysis, data representation, decombining, abstraction, algorithm and procedure, automation, simulation, and generalization.

Format: Individual Paper Presentation  Presider: Jacob Pleasants
Early Childhood Engineering Design Challenges: Effects of Cognition and Interest

Kathy I Malone, Nazarbayev University
Karen E. Irving, The Ohio State University
Vinta Tirani, The Ohio State University
Rachel Kajfez, The Ohio State University
Hochieh Lin, The Ohio State University
Trudy Giasi, Southeast Missouri State University
Brian Edmiston, The Ohio State University

9:15am - 10:15am Sloane - Session C

This mixed methods study demonstrates how dramatic inquiry, dance, visual arts and PE can be incorporated into STEM units that focus on the engineering design process in pK-3 classrooms. There was an increase in student understanding of engineering, and in their understanding of technology.

Format: Individual Paper Presentation  Presider: Jacob Pleasants

Not a Crapsheet: Winning Strategies for Collaborative Science Teacher Education, Research, and Practice in “Failing Schools”

Merrie Koester, University of SC Center for Science Education
Jennifer Albert, Citadel STEM Center for Excellence
Meta Van Sickle, College of Charleston

9:15am - 10:15am Verelst - Session A

We will EXPLORE ways science teacher educators can artfully create winning combinations of science education strategies (load the dice) to improve the long term expected payback percentages (improved teaching and learning outcomes) in “failing schools”. Too often, the dice are loaded against teachers and their students in these Edu-Casinos.

Format: Exploratory Session

The Roles of the Twitter Hashtag #NGSSCHAT in the Context of Science Education Reform Efforts

Joshua M Rosenberg, University of Tennessee, Knoxville
Joshua W Reid, Middle Tennessee State University
Matthew J Koehler, Michigan State University
Christian Fischer, University of California – Irvine
Thomas J. McKenna, Boston University

9:15am - 10:15am Vernon - Session A

The purpose of this project is to carry out the first investigation of the #NGSSchat Twitter hashtag. Results, focusing upon who is participating, patterns of interaction via social network analysis, and topics discussed, provide an opportunity to discuss how innovative uses of social me can be applied to other science teacher education contexts.

Format: Individual Paper Presentation  Presider: Lauren Angelone

Cybersecurity and Technology: How Do They Fit Into a Science Classroom?

Andrea C Burrows, University of Wyoming
Mike Borowczak, University of Wyoming

9:15am - 10:15am Vernon - Session B

This study bridges discipline silos between science courses and cybersecurity/computer science by indicating how they complement each other. Eight K12 teachers and 26 secondary K12 students participated in a week-long GenCyber camp with Micro:bit technology. External camp evaluations show successes and how cybersecurity fits into STEM classrooms.

Format: Individual Paper Presentation  Presider: Lauren Angelone
Educational Technology - Fri, January 04

**Applying the Teacher Educator Technology Competencies to Science Education**

**David A Slykhuis**, University of Northern Colorado  
**Teresa S. Foulger**, Arizona State University  
**Kevin J Graziano**, Nevada State College  
**Denise A Schmidt-Crawford**, Iowa State University

9:15am - 10:15am  Vernon - Session C

The Teacher Educator Technology Competencies published in 2017 lay out the knowledge, skills, and attitudes every teacher educator needs related to technology to best prepare teacher candidates. This session will explore the creation of the competencies and their applications and implications for science educators.

*Format: Individual Paper Presentation  Presider: Lauren Angelone - Fri, January 04*

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**Coffee and Conversations**

10:15am - 10:45am  Ballroom Prefunction

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Fri, January 04

**General Session: Re-Examining Bridges in Today’s Climate of Diversity**

10:45am - 11:45am  Ballroom AB

We welcome a panel of experts on diversity and social justice. The discussion will focus on their perspectives of current issues related to diversity, implicit bias, and inclusivity in science education and teacher preparation.

**PANELISTS:**

**Meg Evans** With over a decade of student affairs experience, Meg Evans (pronouns: they/them/their, she/her/hers) is passionate about creating just and equitable spaces in higher education for all students. Meg serves as the Director of the LGBT Resource Center at University of Georgia (UGA) and has worked within student affairs divisions at Carnegie Mellon University, Guilford College, and Warren Wilson College. Meg is pursuing her doctoral degree in UGA's College of Education where their research focuses on student activism, practitioner advocacy, and the impacts of whiteness on higher education. Meg identifies as queer, gender non-conforming, and white. They hold a BA in Outdoor Leadership from Warren Wilson College and a MS in Community Leadership from Duquesne University. When not engaging in justice work, Meg can be found cheering for all the Chicago sports teams with their sweet nine-month old son, Ezekiel Waveland.

**Alexandra (Alex) Reyes** is an assistant professor of Teaching Culturally and Linguistically Diverse Students (TCLD) in the College of Education at Georgia Southern University. She holds a PhD in Education from the University of North Carolina at Chapel Hill with an emphasis on Culture, Curriculum, and Change. Dr. Reyes earned a master's in Bilingual and Multicultural Education from Northern Arizona University, and a bachelor's in Spanish from Southern Connecticut State University. She draws on her diverse experiences working in P-12 education, non-profit organizations, and higher education to direct her research interests. Her scholarship focuses on the intersections of language, culture, and identity, and how they inform learning experiences for bilingual and Latinx communities in informal and formal education settings. Additionally, Dr. Reyes is interested in arts-integrated pedagogy and research.

**Brian Williams** has over 20 years of experience working in schools and other educational communities around the world. His work is situated at the intersections of science education, urban education, and education for social justice. More specifically, he is interested in the ways in which equity issues related to race, ethnicity, culture, and class influence science teaching and learning and access to science literacy. Dr. Williams currently serves as director of the Alonzo A Crim Center for Urban Educational Excellence and a clinical professor in the Department of Early Childhood and Elementary Education in the College of Education & Human Development at Georgia State University (GSU) in Atlanta, Georgia. Prior to this, Williams coordinated the Math/Science Equity Program (MSEP) at the University of North Carolina at Charlotte examining the link between parental involvement and the tracking of African American students in science. Williams holds degrees from Emory University (Ph.D., 2003), Georgia Institute of Technology (M.S., 1996), and Norfolk State University (B.S., 1994).
Fri, January 04

**Lunch on Your Own**
11:45am - 1:15pm  Local Restaurants and other Eateries

Fri, January 04

**CKT Matter Group: By Invitation**
11:45am - 1:15pm  Savannah

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**Preservice Science Teacher Preparation** - Fri, January 04

**Focusing on the Formative Assessment Skills of PCK: How Does Science Compare With Other Licensure Areas in State-Mandated Performance Assessments**

Julie S. Kalnin, University of Portland  
Patricia D Morrell, University of Queensland  
Richard Christen, University of Portland  
Peter Thacker, University of Portland

1:15pm - 2:15pm  Ballroom D - Session A

Formative assessment is a strong contributor to effective teaching. We examined how two candidate performance assessments—before and after state-mandated adoption of edTPA—shaped the purposeful implementation of formative assessment, and the impact content area (science, mathematics, social science, and language arts) had on those practices.

*Format: Individual Paper Presentation  Presider: Stacey Carpenter*

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**Preservice Teachers Learning Formative Assessment Through Formative Assessment**

Stephanie Hathcock, Oklahoma State University  
Toni Ivey, Oklahoma State University  
Drew Gossen, drew.gossen@okstate.edu

1:15pm - 2:15pm  Ballroom D - Session B

This exploratory study examined introducing and showcasing formative assessment by formatively assessing elementary preservice teachers and reflecting on the experience. We were seeking to determine (1) content gains, (2) how they viewed the process of being formatively assessed, and (3) their perceptions of the experience.

*Format: Individual Paper Presentation  Presider: Stacey Carpenter*

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**Improving Teaching Engineering Self-Efficacy Through Engineering Mini-Units**

Matthew P Perkins Coppola, Purdue University Fort Wayne

1:15pm - 2:15pm  Ballroom D - Session C

Teachers need to experience multiple mastery experiences in order to improve self-efficacy and outcome expectancy. Engineering Mini-Units are an approach integrated into a science methods course for preservice elementary teachers. First as participants in an engineering design lesson, then as planners and teachers of their own, gains were observed.

*Format: Individual Paper Presentation  Presider: Stacey Carpenter*
Creating Confidence in Science Teachers to Lead Field Experiences

Sarah M Nuss, Chesapeake Bay National Estuarine Research Reserve in VA
Lisa A Lawrence, Virginia Institute of Marine Science

1:15pm - 2:15pm  Ballroom E - Session A

There is an overwhelming consensus that both increased learning and a sense of stewardship emerge from first-hand experiences in the environment. Educators from VIMS will showcase a program for pre-service teachers on how to incorporate scientific investigations into the classroom, promoting teacher confidence in utilizing the outdoors.

Format: Exploratory Session

A Benchmark Statement Hinders Students’ Understanding of the Flow of Oxygen and Carbon Dioxide in Ecosystems

William A. Said, University System of Georgia (Retired)
Lisa M Martin-Hansen, California State University, Long Beach, California

1:15pm - 2:15pm  Ballroom F - Session A

The study examines whether a benchmark statement in “Atlas of Science Literacy, Project 2061” concerning the principles of the flow of matter and energy in ecosystems supports the widely held misconception that plants take in CO₂, use the carbon to make sugar, and release O₂. The benchmark statement has a negative impact on students’ learning.

Format: Individual Paper Presentation  Presider: Young Shin-Park

Using Student Drawings to Assess Comprehension of Science Texts

Katherine L Wright, Boise State University
Julianne Wenner, Boise State University Sara Hagenah, Boise State University Keith Thiede, Boise State University

1:15pm - 2:15pm  Ballroom F - Session B

Visually organizing information can lead to deeper comprehension of scientific texts. This study empirically identified elements of drawings that predict student comprehension with the goal to support teachers in the assessment and instruction of drawings. Findings indicate that there are particular elements that are correlated with comprehension.

Format: Individual Paper Presentation  Presider: Young Shin-Park

A Framework for Assessing the Authenticity of Secondary Student Involvement in the Practices of Science: Implications for Science Teacher Education

Stephen R Burgin, University of Arkansas
William F McComas, University of Arkansas

1:15pm - 2:15pm  Ballroom F - Session C

We present a framework for classifying the level of authenticity of the scientific practices engaged in by science learners. In addition to the similarities between those practices and the work of professional scientists, this framework takes into account the meaningfulness of that activity to the learner and the significance of that work.

Format: Individual Paper Presentation  Presider: Young Shin-Park
Public School Teachers’ Understanding of Legal Issues Related to Evolution and Approaches to Teaching Evolution

Ronald S Hermann, Towson University
Ian C Binns, University of North Carolina Charlotte Lee Meadows, University of Alabama Birmingham Joseph W Shane, Shippensburg University

1:15pm - 2:15pm Percival - Session A
We describe a nation-wide study of 111 public school teachers who completed a survey of their approaches to teaching evolution, views of evolution and creation, perceived pressure to teach alternatives, and knowledge of legal cases. Initial findings from the survey will be reported and suggestions for science teacher educators will be discussed.

Format: Individual Paper Presentation  Presider: Mandy McCormick Smith

Students’ Application of Nature of Science Understanding to Evolution, Creationism, and Intelligent Design

Kathryn Green, North Carolina State University
Ian Binns, University of North Carolina-Charlotte Mark Bloom, Dallas Baptist University

1:15pm - 2:15pm Percival - Session B
This research examines how college students apply their Nature of Science understanding to evolution when asked to be a school board member deciding whether Creationism or Intelligent Design belongs in the public school science classroom. Results from pre-service teachers and non-education majors are compared.

Format: Individual Paper Presentation  Presider: Mandy McCormick Smith


James M. Nyachwaya, North Dakota State University
Nicholas Garza, Oakland University

1:15pm - 2:15pm Percival - Session C
This study explored general chemistry students’ conceptual understanding of free energy, entropy and enthalpy in the context of the biological phenomenon of cellular respiration. The study also looked at the extent to which students integrated the context into their responses as well as how different process skills played out during discussions.

Format: Individual Paper Presentation  Presider: Mandy McCormick Smith

Be an Early Career Star: Balancing Service, Teaching, and Research

Alec M Bodzin, Lehigh University
Deborah L Hanuscin, Western Washington University Ronald S Hermann, Towson University M. Gail Jones, NC State University Felicia M Mensah, Teachers College, Columbia University Erin E Peters-Burton, George Mason University Rose M Pringle, University of Florida Rebecca M Schneider, University of Toledo

1:15pm - 2:15pm Plimsoll
Early career science teacher educators--the future STARS of our field-- are encouraged to join this workshop to learn practical advice and tips for success from ASTE Outstanding Science Teacher Educators.

Format: Workshop
Exploring New Teacher Beliefs: Identity, Homelife, and Culture in the Classroom

Frederick B Bradley, University of South Florida
Allan Feldman, University of South Florida
1:15pm - 2:15pm  Scarbrough 1 - Session A
This study examined new science teachers’ experiences during an action research orientated journal club, exploring beliefs regarding the roles identity, home life, and culture play in teaching and learning. Preliminary findings suggest the development of diverse perspectives about identity and culture, which will be considered in future work.
Format: Individual Paper Presentation  Presider: David Steele

Growing as They Give: Teacher Development Through Cultural Community Wealth Contributions Within an Informal Stem Summer Program

Sonia M Howard, Georgia State University
Natalie S King, Georgia State University
1:15pm - 2:15pm  Scarbrough 1 - Session B
This study explored the contributions of teachers participating in a culturally relevant STEM summer program and their overall experiences. Findings and implications will be shared related to developing informal culturally relevant STEM programs and leveraging culturally relevant teachers to the mutual benefit of both programs and teachers.
Format: Individual Paper Presentation  Presider: David Steele

Teacher Transformation in Science-Focused Elementary Classrooms

Carolyn Parker, American University
1:15pm - 2:15pm  Scarbrough 1 - Session C
In this study, I examine how teachers in seven high-poverty urban elementary schools leveraged a National Science Foundation funded partnership to position themselves as agents of change working in resistance to the dominant elementary-school science milieu, working to bring meaningful science learning to their students.
Format: Individual Paper Presentation  Presider: David Steele

Exploring Engineering Self-Efficacy and Practice: Supporting Science Teachers Through Professional Development

Emily A Dare, Florida International University
Joshua A Ellis, Florida International University  John L Irwin, Michigan Technological University
1:15pm - 2:15pm  Scarbrough 2 - Session A
As states adopt NGSS and other engineering-inclusive standards, knowing how engineering-focused professional development impacts teacher self-efficacy and practice becomes increasingly important. This study explores how one professional development supported science teachers as they learned about and integrated engineering into their classrooms.
Format: Individual Paper Presentation  Presider: Julie Bokor
The EiE–Ohio – Building 21st Century Learners project is a collaboration between ZZZ City Schools and the Colleges of Education, Arts & Sciences, and Engineering to bring STEM integrated engineering units to high needs elementary schools. Our presentation will describe the project and the research findings for the three years of implementation.

**Format:** Individual Paper Presentation  Presider: Julie Bokor

The impact of a PD effort that places an engineering graduate student with a student teacher and cooperating teacher pair. We studied teachers’ strategies, time for science, and science teaching effectiveness using a treatment/control design.

**Format:** Individual Paper Presentation  Presider: Julie Bokor

This particular partnership was initiated by the 82 teachers and administrators at a middle school who wished to have some guidance and added expertise in applying to become a STEM Designation School. In the fall 2017, professors within a college of education met with the school administrators and some of the lead teachers to discuss how to begin.

**Format:** Small Group Roundtables

This presentation describes the development of an instrument that can be used to assess background characteristics of students–their knowledge, values, and personal experience–as it relates to a specific instructional topic. This presentation will discuss the theoretical development of the tool and its potential uses.

**Format:** Small Group Roundtables
Personal Meaning Mapping Assessment for Interdisciplinary Emerging Pathogens Professional Development

Kathryn A Stofer, University of Florida
Julie Bokor, University of Florida
Mary Jo Koroly, University of Florida
Madison Jones, University of Florida
Caitlin Price, University of Florida
Stephanie Guimaraes, University of Florida

1:15pm - 2:15pm Scarbrough 4 - Session C

We present the results of pre-post qualitative personal meaning mapping assessment of high school teachers who participated in university-based two-week professional development on the interdisciplinary topic of emerging pathogens. After the workshop, teachers reported more ideas and a different emphasis on ideas evidenced by theme distribution.

Format: Small Group Roundtables

Stem Experiences on the Mindset of Adolescents

Angelia Reid-Griffin, UNCW
Jessica Croson, Pender County Schools

1:15pm - 2:15pm Scarbrough 4 - Session D

The study investigates how mentoring and parental/community engagement opportunities can influence student participation in after school STEM activities at the high school and in the community. Through a collaborative effort within the College of Education, the teacher and faculty member joined together to explore the interactions of students and its influence on their career aspirations in STEM.

Format: Small Group Roundtable

NGSS- Shifting Mindset and Practice: Distinguishing Between Unit Design and Unit Execution

Ana Houseal, University of Wyoming
Martha Inouye, University of Wyoming

1:15pm - 2:15pm Scarbrough 4 - Session E

To create a 3-Dimensional NGSS-aligned unit with a coherent storyline requires foresight, planning, and in-depth knowledge of the content and phenomenon. This planning, however, does not follow the same flow as the unit execution. Come engage in a discussion that exposes these differences and provides tools to help create and execute 3D units.

Format: Small Group Roundtables

Listening to the Experts: Developing Explanations and Assessment for All Students

Michele J. Koomen, Gustavus Adolphus College
Tiffany Wild, The Ohio State University
Kevin Fleming, George Washington University
Jonte Taylor, Penn State University

1:15pm - 2:15pm Scarbrough 5 - Session A

This themed paper-set will use the K-12 experiences of students with disabilities to align this session with pedagogies advanced by the Frameworks and the NGSS.

Format: Themed Paper or Poster Set
Meet the New JSTE Co-Editors
1:15pm - 2:15pm  Sloane
This session will introduce the new JSTE Co-Editors and then focus on assisting authors in getting their manuscripts accepted for publication in JSTE. We will provide detailed information on the critical issues that all authors should address when submitting their work to the journal for publication. In particular, the major reasons why manuscripts are rejected will be discussed as well as concrete suggestions/solutions to help authors avoid the common pitfalls that result in negative editorial decisions. In addition the session will provide a detailed discussion of what reviewers look for when reviewing manuscripts. The session is meant to be interactive throughout with plenty of time allotted for all individuals to ask questions and voice any concerns they may have.

The Effects of Inadequate Funding on Science Instruction
Emily Cayton, Campbell University
M. Gail Jones, North Carolina State University
1:15pm - 2:15pm  Verelst - Session A
While there is a push for science educators to incorporate hands-on activities and inquiry-based instruction into their classrooms, not all teachers have the resources available to implement these activities. This study examined teachers' access to funding and how science instruction changes when there is inadequate funding for science materials.


Collaborative Inquiry and the Shared Workspace of Professional Learning Communities
Daniel Carpenter, University of Findlay
Brenda Carpenter, National Science Foundation
1:15pm - 2:15pm  Verelst - Session B
An exploration of an educator collaborative inquiry in the shared workspace of professional learning communities reveals that the educator collaborative inquiry enables the leaders to focus on increasing student achievement scores.


Why Does Linking Science and Literacy Across Grades K-5 Consistently Result in Higher Achievement Outcomes: An Explanatory Framework to Support Policy Change in Elementary Science
Nancy Romance, Florida Atlantic University
Michael Vitale, East Carolina University
1:15pm - 2:15pm  Verelst - Session C
Presented will be the conceptual framework explaining why in-depth NGSS-science learning is magnified when linked with literacy development across grades K-5. Coupling the framework with multi-year research evidence demonstrating consistently higher student achievement in both subjects provide a compelling rationale for policy change.

Designing Instructional Strategies for Teaching Nature of Science: Using Hispanic Preservice Elementary Teachers’ Autobiographies to Make Learning Culturally Relevant

Patricia Ramirez-Biondolillo, University of Texas Rio Grande Valley
Noushin Nouri, University of Texas Rio Grande Valley

1:15pm - 2:15pm  Vernon - Session A

Hispanics are among the most underrepresented groups in STEM fields. Our research is focused on finding the disparities between Hispanic preservice elementary teachers' (HPETS') and cultural barriers that impede opportunities for learning science. This study examines experiences in learning and teaching nature of science.


Students’ Scientific Explanations and Associated Nos Views Within a Place-Based Socioscientific Issue Context

Benjamin C Herman, University of Missouri
Robert T Oertli, University of Missouri  David C Owens, Georgia Southern University  Laura A Zangori, University of Missouri

1:15pm - 2:15pm  Vernon - Session B

This investigation explored how place-based SSI instruction focused on wolf reintroduction in Yellowstone influenced sixty secondary students' trophic cascade explanations; and how those explanations associated with the students' NOS views.


Teaching Secondary Students’ Aspects of Nos Using Multiple Ssi Contexts

Dawnne M LePretre, Illinois Institute of Technology
Norman G. Lederman, Illinois Institute of Technology  Judith S. Lederman, Illinois Institute of Technology

1:15pm - 2:15pm  Vernon - Session C

This study investigated changes in 9th & 10th graders' understanding on NOS aspects across four sessions as small teams discussed different SSI. Noted gains from naïve to mixed were found on tentativeness, creativity, and observation/inference; interpreted to be statistically significant at an alpha of <0.05 using the VNOS D+ survey.


Coffee, Cookies and Committees

2:30pm - 3:30pm  Ballroom Prefunction

Membership/participation Committee - Percival
Conference Program Committee - Scarbrough 1
Publications Committee - Scarbrough 3
Elections Committee - Scarbrough 4
Awards Committee - Sloane
Professional Development - Verelst
Communications Committee - Vernon
Preparing New Teachers for Problem-Based Learning: Use and Perspectives of a Pbl Module in Science Methods Courses

Peter Rillero, Arizona State University
Ying-Chih Chen, Arizona State University

3:45 pm - 4:45 pm  Ballroom D - Session A

The free, online module “Design a Problem-Based Learning Experience” was developed for preservice and inservice teachers. We describe how the module is used in preserve teacher science methods courses, experiences before and after the module use, and teacher candidate perceptions about the module.

Format: Individual Paper Presentation  Presider: Judith Morrison

Developing Schoolyard Pedagogy in Preservice Elementary Teachers: A Look at Three Institutions

Kelly Feille, University of Oklahoma
Stephanie Hathcock, Oklahoma State University Beth Klein, SUNY Cortland

3:45 pm - 4:45 pm  Ballroom D - Session B

The purpose of this research and presentation is to introduce the development of schoolyard pedagogy of preservice elementary teachers, methods of schoolyard pedagogy development, and collaborative efforts across three institutions to identify best practices for science methods instruction regarding schoolyard pedagogy.

Format: Individual Paper Presentation  Presider: Judith Morrison

Impact of a Service Learning Course on Pre-Credential Program Elementary Teachers’ Perceptions of Teaching Stem to Diverse Populations

Corinne Lardy, California State University, Sacramento
Jenna Porter, California State University, Sacramento Julie Fogarty, California State University, Sacramento

3:45 pm - 4:45 pm  Ballroom D - Session C

A service learning course was designed and implemented to give undergraduate students an experience teaching STEM activities to local diverse students in afterschool programs at two elementary schools. The undergraduates’ experiences and developing perspectives were examined through written reflections and observations throughout the semester.

Format: Individual Paper Presentation  Presider: Judith Morrison

Using Incongruity to Teach Genetics

Francine Wizner, Kingston City Schools

3:45 pm - 4:45 pm  Ballroom E - Session A

This is an examination of how genetics is taught through humor. Research focused on a secondary teacher's comparisons of disparate concepts to genetics topics and her students' perceptions of how the comparisons affected their learning. Students recognized comparisons made and were able to correctly answer content questions related to them.

Format: Traditional Paper Set
Keeping the Stem on the Apple: Recruiting Teachers From the Sciences

Philip C Short, Austin Peay State University
Benita G. Bruster, Austin Peay State University
Lisa Sullivan, Austin Peay State University
Karen Meisch, Austin Peay State University

3:45pm - 4:45pm  Ballroom F - Session A

In an attempt to recruit more qualified candidates to teaching, STEM majors were provided pedagogical training and opportunities to experience science teaching at several age levels. Perceptions of science education, personal teaching self-efficacy, and interest in science teaching careers were measured before and after completion of the program.

Format: Individual Paper Presentation  Presider: Christina McDaniel

A Practice-Based Approach to Elementary Science Preservice Teacher Preparation

Stephen L Thompson, University of South Carolina

3:45pm - 4:45pm  Ballroom F - Session B

Changes in the science teaching self-efficacy beliefs of 64 elementary preservice teachers will be connected to a “practice-based” elementary science methods course model, i.e., it occurs in authentic classroom settings with students, centers on examining student work, and involves crafting responsive instruction.

Format: Individual Paper Presentation  Presider: Christina McDaniel

A Study of the Longitudinal Development of Stem Teacher Education Programs

Keith Sheppard, Stony Brook University
Margaret Schroeder, University of Kentucky

3:45pm - 4:45pm  Ballroom F - Session C

This case study research investigated the longitudinal development of a group of five Science and Mathematics teacher preparation programs as they progressed through various NSF Robert Noyce awards over the last 15 years. We were interested in seeing to what extent had the Noyce awards changed the STEM teacher practices at the institutions.

Format: Individual Paper Presentation  Presider: Christina McDaniel

Standardized Spectacle: Teacher Educators’ Views of the Impact of a High-Stakes Science Assessment Initiated Through State Policy on Teacher Certification

Marcelle A. Siegel, University of Missouri
Dante Cisterna, Shannon M. Burcks, University of Missouri
Christopher D. Murakami, Chatham University
Suleyman Cite, University of Missouri
Nilay Muslu, Mugla Sitki Kocman University

3:45pm - 4:45pm  Percival - Session A

Preparing teachers to understand and resist pressures from high-stakes testing is a timely and critical undertaking for teacher education. This study examines the impact of a certification test through the eyes of teacher educators. We will discuss the policy context, study findings, and practical considerations for supporting science teachers.

Format: Individual Paper Presentation  Presider: Nancy Romance
Favored or Forgotten: The Implementation of Science and Engineering Practices Within K-5 Life Science

Michelle Forsythe, Texas State University  
3:45pm - 4:45pm  Percival - Session B

This presentation examines how Science and Engineering Practices are represented within the NGSS K-5 performance expectations as well as curricular resources and assessments align with these performance expectations. Findings suggest that a culture of favored and forgotten practices might be taking root within K-5 Life Science.

Effectiveness of a Practice-Based Science Methods Course for Promoting Preservice Teacher Learning

Danielle Dani, Ohio University  
3:45pm - 4:45pm  Percival - Session C

This presentation reports on the effectiveness of a practice-based science methods course that provides teacher candidates opportunities to rehearse, enact, and reflect on content-specific and standards-aligned high leverage practices in authentic settings.

Visibility in Stem: Use of Archive Data to Explore the Nature of Science and the Scientific Concepts in Charles Drew’s Scientific Contributions

Catherine Quinlan, Howard University School of Education  
3:45pm - 5:45pm  Plimsoll

The absence of the scientific contributions of African American scientists in any meaningful way that connects with the scientific concepts being studied, underplays the significance and relevance of the contributions of people of African origins to science. This workshop explores the science in Charles Drew’s work - the “Father of Blood Bank” - as it relates to the Next Generation Science Standards.

Challenges in Preparing Teachers for Diversity in Today’s Science Classrooms: Considering Wicked Problems

Sophia (Sun Kyung) Jeong, University of Georgia  
Stacey Britton, University of West Georgia  
Sun Young Jeong, Medical College of Wisconsin  
Logan Leslie, University of West Georgia  
David Steele, Oak Ridge Associated Universities  
Deborah J. Tippins, University of Georgia

3:45pm - 4:45pm  Scarbrough 1 - Session A

The purpose of this themed paper set is to examine issues of diversity in today's science classroom. As an eclectic group of scholars, we are using the analytical lens of impressionist tales to foster a conversation about what we see as challenges in preparing prospective teachers for diverse science classrooms of today.
**Elementary Teachers' Learning of NGSS-Related Physical Science**

*Jerrid Kruse, Drake University*

*Jesse Wilcox, Drake University Lucas Menke, Drake University Mitch Schank, Drake University Mitch Klocke, Drake University Jordan Holub, Drake University*

3:45pm - 4:45pm Scarbrough 2 – Session A

We will discuss the results of a year-long professional development program for elementary teachers, focusing on a 10-week unit on physical science. The goal of the unit was to improve participants' physical science knowledge aligned to the NGSS performance expectations through classroom investigations designed to elicit and correct misconceptions.

**Concept Mapping Changes in Elementary Teachers’ Content Knowledge About Energy**

*Hasan Deniz, University of Nevada Las Vegas*

*Mary Kay Orgill, University of Nevada Las Vegas Kristoffer R Carroll, Southern Nevada Regional Professional Development Program (SNRPDP) Erdogan Kaya, University of Nevada Las Vegas Ezgi Yesilyurt, University of Nevada Las Vegas*

3:45pm - 4:45pm Scarbrough 2 – Session B

The purpose of this study is to examine changes in 55 elementary teachers’ knowledge about energy through concept mapping (CM) during a 5-day professional development program. We found that elementary teachers improved their knowledge about energy as measured by their CM scores. We also found CM as powerful but time consuming assessment method.

**Assessing In-Service Elementary Teachers’ Conceptions of Forces: Best Practices That Promote Increased Conceptual Understanding.**

*Kimberly H Lott, Utah State University*

*Max Longhurst, Utah State University Brenda Bennett, Utah State University*

3:45pm - 4:45pm Scarbrough 2 – Session C

This paper discusses elementary teachers' conceptions before and after a science content course on forces in the context of an Elementary STEM Endorsement project. We found increases in conceptual understanding for many fundamental topics, but some misconceptions still persisted despite targeted professional learning.

**Scientist-Led Stem Clubs: Changing Perceptions of Science and Scientists for Latina Elementary Students**

*Rebecca L Hite, Texas Tech University*

*Brianna Crosier, Texas Tech University Jill White, Texas Tech University Jerry Dwyer, Texas Tech University*

3:45pm - 4:45pm Scarbrough 4 – Session A

STEM clubs provide rich opportunities for science learning, yet non-cognitive affordances of such clubs, is underexplored. Elementary Latinx students' affect was examined after participation in a year-long afterschool STEM club led by female scientists. Results suggest modest gains in fostering a more inclusive view of science and scientists.
Youth Views of Science and Engineering in a Program for Preparing Teachers to Use Educational Technology in STEM

Steve Adams, California State University, Long Beach
Paul Burns, California State University, Long Beach Lisa Martin-Hansen, California State University, Long Beach

3:45pm - 4:45pm  Scarbrough 4 - Session B

Youth at a community organization experienced STEM workshops that were the product of a course supporting K-12 teachers’ use of technology in STEM subjects. A mixed – methods evaluation was conducted of perceptions of 36 youth regarding science and engineering with several perceived benefits to youth from this model.

Format: Individual Paper Presentation  Presider: Gina Childers

Teen and Adult Stem Identification in Informal Stem Programming

Laura S. Rodriguez, University of Connecticut
Anita Mozillo, University of Connecticut John C Volin, University of Connecticut Todd Campbell, University of Connecticut

3:45pm - 4:45pm  Scarbrough 4 - Session C

Empirical determination of STEM identity can support equity in informal science programs by illuminating access and effectiveness. This presentation will introduce a newly developed empirical survey used to describe STEM identities in teens and adults in an intergenerational project incorporating geospatial technologies in conservation science.

Format: Individual Paper Presentation  Presider: Gina Childers

Exploring Engineering and Computational Thinking in Integrated Stem

Kristina M Tank, Iowa State University
Elizabeth Gajdzik, Purdue University Ibrahim Yeter, Purdue University Tamara J. Moore, Purdue University Monica E Cardella, Purdue University

3:45pm - 4:45pm  Scarbrough 5 - Session A

With increasing attention on STEM+C integration, this exploratory session will provide an opportunity to experience two models of STEM+C integration before engaging in a group discussion around these models within the larger context of integrated STEM instruction and the integration of engineering and computational thinking (CT) into science.

Format: Exploratory Session

Creating, Sustaining, and Iteratively Improving a “Third Space” for Science Methods Courses Based at a Professional Development Middle School

David F Jackson, University of Georgia
Meganne Skinner, Hilsman Middle School Shaughnessy McCann, Hilsman Middle School Kayla Flanagan, University of Georgia

3:45pm - 4:45pm  Sloane - Session A

Three different perspectives (university professor, multiple middle school teachers, doctoral student TA) on the first two years of a collaborative effort to create and improve two science methods courses for prospective middle school science teachers in the context of a “third space” environment at an urban Professional Development School.

Format: Themed Paper or Poster Set
Navigating Integrated Stem in Small Group Activities: A Gender-Focused Case Study

Jeanna R. Wieselmann, University of Minnesota
Emily A. Dare, Florida International University
Elizabeth A. Ring-Whalen, St. Catherine University
Gillian H. Roehrig, University of Minnesota

3:45pm - 4:45pm  Verelst - Session A

To better understand how gender may relate to participation in small group STEM activities, this study explored the experiences of four students (two girls and two boys) as they participated in small group portions of an integrated STEM unit. Additionally, it explored differences in student engagement between science and engineering lessons.

Format: Individual Paper Presentation  Presider: Joshua Reid

Who Likes STEM More? Exploring Gender Differences in Attitudes Towards STEM

Abeera P. Rehmat, Purdue University
Marissa C. Owens, University of Nevada, Las Vegas

3:45pm - 4:45pm  Verelst - Session B

This study explored gender attitude differences towards STEM in a problem-based learning environment. The quantitative results revealed that over time both genders showed a shift in their attitudes towards STEM. However, there was a significant difference found in means between males and females on the post STEM attitude survey.

Format: Individual Paper Presentation  Presider: Joshua Reid

Strengthening Preservice Science Teachers’ Understanding of Nature of Science: The Role of an Embedded Research Experience in Teacher Preparation

Julie Angle Angle, Oklahoma State University

3:45pm - 4:45pm  Verelst - Session C

This session shares the development of a science methods course that provides secondary preservice science teachers with a mentored research apprenticeship as a lens to strengthen their understanding of nature of science. The course outline, rationale for course assignments, and student products are presented.

Format: Individual Paper Presentation  Presider: Joshua Reid

Ins and Outs of Digestion for Middle School Students via 5-E Model

Mohammed A. Qazi, Tuskegee University
Shaik Jeelani, Tuskegee University
Ruth Liddell, Alabama State University
Shirley Scarbrough, Alabama State University
Carol Banks, Tuskegee University

3:45pm - 4:45pm  Vernon - Session A

This module emphasizes hands-on, inquiry-based activities designed to create a model of the human digestive system using readily available household materials and determine the correct placement of various organs. Students use the model to compare mechanical and chemical digestion.

Format: Exploratory Session
Why We Can’t Say Goodnight Moon: Preservice Elementary Teachers’ Fragile Moon Understandings

Stephanie Hathcock, Oklahoma State University
Drew Gossen, Oklahoma State University Toni Ivey, Oklahoma State University
5:00pm - 6:00pm  Ballroom D - Session A

This pilot study examined elementary preservice teachers' understanding of moon phases. We were seeking to determine content gains, nuances in conceptual ideas, and transfer to novel situations. Findings indicate the fragility of PSTs moon phase understanding, particularly when faced with novel situations.

Format: Individual Paper Presentation  Presider: Corinne Lardy

The Role of Narrative Science Writing and Illustration in Pre-Service Teachers' Conceptual Understanding of Abstract Concepts in Biology

Kerry M Owens Cresawn, James Madison University
5:00pm - 6:00pm  Ballroom D - Session B

This presentation describes a novel approach to promoting conceptual understanding of cell biology concepts for pre-service K-12 teachers. By writing and illustrating a narrative cell-based science story, students experience metacognition, and develop meaningful content knowledge and skills for communicating these abstract concepts.

Format: Individual Paper Presentation  Presider: Corinne Lardy

Preservice Teachers’ Beliefs About Anthropogenic Climate Change Dissenter Messages

Jennifer C. Parrish, University of Northern Colorado
Andrew P.K. Bentley, University of Northern Colorado
5:00pm - 6:00pm  Ballroom D - Session C

This study examined which anti-anthropogenic climate change messages preservice teachers are likely to accept, whether their agreement with dissenter messages is similar to the publics’, and why they agree or disagree with particular messages.

Format: Individual Paper Presentation  Presider: Corinne Lardy

Examining the Impact of Collaboration and Shared Leadership Practices in Professional Learning Communities

Kimberly B. Myers, Texas Tech University/Ph.D. Student
5:00pm - 6:00pm  Percival - Session A

There is a growing concern regarding the retainment and development of effective teachers in STEM education to improve instructional practices. Reform efforts have focused on collaboration and Professional Learning Communities in the school system. Research outcomes have implications on teaching and learning practices in the classroom.

Format: Individual Paper Presentation  Presider: Allan Feldman
Reconstruction of Teacher Leadership Trajectory Through Outreach Activities

Tugce Gul, Columbus State University
Kadir Demir, Georgia State University  Brett Criswell, University of Kentucky
5:00pm - 6:00pm  Percival - Session B
The purpose of this study was to examine science teacher leaders’ perceptions of their leadership trajectory as they facilitated PD activities for K-12 teachers in their school districts. The data obtained from interviews and archival data from the leadership program that the participants participated, and analyzed using multiple coding methods.

Format: Individual Paper Presentation  Presider: Allan Feldman

Understanding the Notion of Teacher Professional Vision: A Literature Review

Hye-Gyoung Yoon, Chuncheon National University of Education
Jisun Park, Ewha Womans University  Youngjin Song, California State University Long Beach  Mijung Kim, University of Alberta
Yong Jae Joung, Gongju National University of Education
5:00pm - 6:00pm  Percival - Session C
This study presents the results of literature review on ‘professional vision.’ 21 articles in various scholarly journals were analyzed to understand a) the characteristics of professional vision, b) research methods, and c) research findings on teachers’ professional vision. Implications for science teacher education will be discussed.

Format: Individual Paper Presentation  Presider: Allan Feldman

Contextualizing Science Phenomena Within Agriculture for Critical Thinking

Debra M. Spielmaker, Utah State University
Max L. Longhurst, Utah State University
5:00pm - 6:00pm  Scarbrough 1 - Session A
In this session participants will engage in agricultural-based phenomena and explore storyline episode investigations as a means for critical thinking for a more sustainable agricultural system. Classroom-ready resources will be shared, and instructional approaches will be modeled to highlight phenomena and three-dimensional learning.

Format: Exploratory Session

Home-Grown Primary Science: Developing District-Wide K-2 Science Teachers and Curriculum Aligned to NGSS Using the Assist Approach

Dana Atwood-Blaine, University of Northern Iowa
Mason Kuhn, University of Northern Iowa
5:00pm - 6:00pm  Scarbrough 2 - Session A
How university faculty partnered with 104 primary school teachers over the course of 18 months to develop a district-wide science curriculum aligned with NGSS and following the ASSIST Approach instructional model. A story of mutual professional development and growth over time. Examples of lessons, units, and assessments will be shared.

Early Childhood Teacher Identities: Findings From a Science Professional Learning Partnership

Jacqueline Horgan, American Museum of Natural History
Jenny Inger, American Museum of Natural History
Veena Vasudevan, American Museum of Natural History

5:00pm - 6:00pm  Scarbrough 2 - Session B

We present a study that aims to understand how professional learning with science museum educators shifts prekindergarten teachers' identities as teachers of science. The professional learning model provides opportunities for teachers to do, discuss, see, and teach science in ways that foster developing early childhood science teacher identities.


The Effects of a Science and Literacy Professional Development Initiative in Two High Hispanic Elementary Schools: Implications for Research, Teaching, and Policy.

Julie K. Jackson, Texas State University
Margarita Huerta, University of Nevada Las Vegas
Tiberio Garza, University of Nevada Las Vegas

5:00pm - 6:00pm  Scarbrough 2 - Session C

Elements of a professional development initiative aimed at helping Hispanic ELs and economically disadvantaged students with science achievement as measured on high-stakes tests will be presented. Findings contribute to the effects of interventions on high-stakes tests for all learners and advances knowledge about effective professional development interventions and replication efforts.

Format: Traditional Paper Set  Presider: Karen Irving

The Role of Mindset and Risk in Elementary Science Teacher Preparation

Tina J Cartwright, Marshall University

5:00pm - 6:00pm  Scarbrough 3 - Session A

In this roundtable, participants will discuss the role of developing a growth mindset and supporting risk-taking in elementary science teachers. Participants will engage in a discussion about Carol Dweck's mindset and implicit theories of intelligences along with the role of perceived risk with teaching science in the elementary classroom.

Format: Small Group Roundtables

An Introduction to Making in Two Science Methods Courses

Shelly R. Rodriguez, The University of Texas, Austin
Steven S. Fletcher, St. Edwards University
Jason R. Harron, The University of Texas, Austin

5:00pm - 6:00pm  Scarbrough 3 - Session B

Making allows for personal expression and provides a way to learn, apply, and display knowledge by building meaningful products. This project introduced preservice STEM teachers in two contexts to making, had them explore technologies, and captured their reflections. This is relevant to those interested in the role of making in teacher education.

Format: Small Group Roundtables
Developing School-University Partnerships to Prepare Culturally Responsive Science Teachers

Kelsy Krise, University of Toledo
Amerah Archer, University of Toledo/Toledo Public Schools
Rebecca Schneider, University of Toledo
Lisa Hooker, Toledo Public Schools

5:00pm - 6:00pm  Scarbrough 3 - Session C

Preparing science teachers to be culturally responsive requires well-designed teacher education. This presentation describes work to strengthen a school-university partnership and curricular components of a field-based program. Through collaboration, a program was designed to focus on promoting ambitious science teaching practices in urban schools.

Format: Small Group Roundtables

Purposeful Placements for Clinical Experiences

Stephanie A Fanselow, University of Northern Colorado

5:00pm - 6:00pm  Scarbrough 3 - Session D

What are best practices for placing teacher candidates with mentor teachers? What are the challenges to implementing best practices for placements? How can we overcome these challenges to help our teacher candidates get the most out of their clinical experiences? Come share your own experiences and challenges.

Format: Small Group Roundtables

Elementary Teacher Candidates’ Ideas About Alignment Between Practices in Science and Mathematics

Julie M. Kittleson, University of Georgia

5:00pm - 6:00pm  Scarbrough 3 - Session E

Current recommendations for science education emphasize that instruction should focus not just on what we know, but also on how we know. The idea of science practices supports this goal. I consider parallels between science practices and mathematics practices and how understanding these practices may support instruction in the elementary grades.

Format: Small Group Roundtables

When I Got Ambitious: Shifting an Elementary Science Methods Course Toward Ambitious Teaching

Patricia Bills, Oakland University

5:00pm - 6:00pm  Scarbrough 3 - Session F

This roundtable session explores the question, “what does ambitious science teacher education look like?” The researcher/teacher educator describes the redesign of an elementary science methods course toward the principles of ambitious science teaching. Initial changes in preservice teacher skills, and future research will be discussed.

Format: Small Group Roundtables
Science Teacher Candidates’ Experiential Learning From Edtpa and Critical Incident Reflection Protocols

Michael Dias, Kennesaw State University
Laurie Brantley-Dias, Kennesaw State University
Anton Puvirajah, Western University, Ontario Canada
Kim Cortes, Kennesaw State University

5:00pm – 6:00pm  Scarbrough 3 – Session G

We offer a Multidimensional Reflection Model and recent research and practice efforts to expand our preservice teachers’ reflective practice beyond the scope of edTPA via a Critical Incident Reflection (CIR) protocol. The CIR affords teacher candidates agency for choosing events of teaching practice that they deem salient for reflective analysis.

Format: Small Group Roundtables

Meet the CITE Editors

5:00pm – 6:00pm  Scarbrough 4 – Session

Bridging Science Fiction and Science Fact: Science Fiction Conventions as Informal Learning Environments

Kania Greer, Georgia Southern University
Donna Governor, University of North Georgia
Gina Childers, University of North Georgia
Vaughan James, University of Florida

5:00pm – 6:00pm  Sloane – Session A

Science fiction conventions allow attendees to engage with science experts who enjoy the connection between science and science fiction. The majority of attendees (66%) shared that personal interest influenced how they used the information while 33% stated that they share the information with others, including family, friends, and colleagues.

Format: Individual Paper Presentation  Presider: Margaret Blanchard

Science Gets Personal: Engaging the Public Through Science Festivals

Gina M Childers, University of North Georgia
Macey Jarrard, University of North Georgia
Tony Sacchitello, University of North Georgia
Donna Governor, University of North Georgia
Lesley Simanton-Coogan, University of North Georgia

5:00pm – 6:00pm  Sloane – Session B

Science festivals are informal learning experiences intended to engage the public in science by providing an opportunity for scientists and the public to connect and interact. A majority of science festival attendees (53%) reported personal factors (such as prior experience) were their primary motivation in attending events at the science festival.

Format: Individual Paper Presentation  Presider: Margaret Blanchard
Elementary Teachers Access Children’s Museum to Support Stem Learning

Tammy J Mittelstet, University of Nebraska
Krista L Adams, University of Nebraska Soo Won Shim, Purdue University

5:00pm - 6:00pm  Sloane - Session C

A research pilot study exploring the bridge of informal and formal learning environments at a Midwestern Children’s Museum. How communicating with formal educators could improve structures to contextualize STEM learning in the museum. Resulting in acceptance of accessibility and participation at the museum by formal educational entities.

Format: Individual Paper Presentation  Presider: Margaret Blanchard

Disentangling the Meaning of Stem: Implications for Science Education and Science Teacher Education

Valarie L Akerson, Indiana University
Angela Burgess, Indiana University Alex Gerber, Indiana University Meize Guo, Indiana University Taukir A Khan, Indiana University Steven Newman, Indiana University

5:00pm - 6:00pm  Verelst - Session A

STEM is an appealing acronym, and garners attention from researchers, professional developers, and funding agencies. To be good stewards of STEM education, and to help teachers in their endeavors to “teach STEM,” what is important for teachers to know? This session discusses ideas related to natures of the individual STEM disciplines.

Format: Individual Paper Presentation  Presider: Helen Meyer

Increasing Elementary Student Stem Attitudes by Providing Educators With a Choice as to What Stem Materials to Purchase

Catherine Pozarski Connolly, University of Nevada, Reno
Camille Stegman, University of Nevada, Reno David T Crowther, University of Nevada, Reno

5:00pm - 6:00pm  Verelst - Session B

A discussion of the results of funding k-5 teachers with their choice of STEM materials and the effects on student interest at the k-2 and 3-5 levels. Results suggest giving teachers a choice in which STEM materials to purchase to meet the needs of their students and classrooms can increase STEM interest at the elementary level.

Format: Individual Paper Presentation  Presider: Helen Meyer

I Didn’t Know What Real Science Was or What It Could Be: Citizen Science and Interest in Stem Education and Careers

Mary N. Hedenstrom, University of Minnesota
Michele H. Koomen, Gustavus Adolphus

5:00pm - 6:00pm  Verelst - Session C

STEM careers offer rewarding, in-demand opportunities for youth. This qualitative study reports positive self-efficacy in STEM courses and careers for youth who participated in an informal citizen science project. Authors emphasize the role of teacher mentors and authentic engagement in science to change students’ perceptions of science.

Format: Individual Paper Presentation  Presider: Helen Meyer
The Relationship of Teaching Beliefs to Paraprofessional Preservice Teachers’ Self-Efficacy for Teaching Elementary Science

Lindsay K Lightner, Washington State University
Judith A Morrison, Washington State University

5:00pm - 6:00pm  Vernon - Session A

The current study seeks to understand the teaching beliefs of paraprofessional preservice elementary teachers and determine whether their teaching beliefs as elicited in interviews interact with their science teaching self-efficacy and funds of knowledge for teaching science, with a focus on factors affecting their views of student learning.

Format: Individual Paper Presentation  Presider: Kelly Feille

Learning Theory in the Science Classroom: A Two-Year Study of Pre-Service Teachers’ Use of Learning Theory in the Science Classroom

Jennifer F Oramous, University of Arkansas
Stephen R Burgin, University of Arkansas

5:00pm - 6:00pm  Vernon - Session B

The results from a two-year study with preservice secondary science teachers (PST) and their use of learning theory (LT) in the classroom will be shared. Using observations and student artifacts, we explored the use and types of LT used in our PSTs during their spring internship. Suggestions for improvement in PST use of LT will be included.

Format: Individual Paper Presentation  Presider: Kelly Feille

JSTE Editorial Meeting and Reception: By Invitation Only

6:00pm - 7:00pm  River Lounge

Wise Dinner

7:00pm - 9:00pm  Barracuda Bob’s

Saturday, January 5th

Breakfast

6:30am - 8:00am  Ballroom Prefunction AB

Forum Meetings

7:00am - 7:50am
Seniors as Resources for Science Education Forum – Percival
Inclusive Science Education Forum – Scarbrough 1
Policy and Gov. Relations Forum – Scarbrough 2
Women in Science Education Forum – Scarbrough 3
Scientist/science Educators Collaboration Forum – Scarbrough 4
Small Colleges and Programs Forum – Scarbrough 5
Environmental Education Forum – Sloane
Technology Forum – Verelst
Environmental Topics in Physics by Inquiry Course: Integration Challenges Encountered by Physics Teachers

David Kimori, Minnesota State University, Mankato
8:00am - 9:00am Percival - Session A

This study looked at what challenges Physics teachers faced while integrating environmental topics in their classrooms. Findings of this study indicate that teachers acknowledge the importance of teaching environmental issues in their classrooms but continue to struggle with barriers to successful integration of environmental topics in physics.

Format: Individual Paper Presentation  Presider: Michael Dias

An Investigation of Teacher and Student Perspectives on Connecting Ecology Learning With Environmental Issues

Yael Wyner, City College of New York, City University of New York
Erica Blatt, Rowan University
8:00am - 9:00am Percival - Session B

This study uses sociocultural learning theory to understand how middle and high school science students and pre and in-service science teachers connect daily life activities to environmental issues and ecology.

Format: Individual Paper Presentation  Presider: Michael Dias

Watershed Stories: How an Elementary School Is Re-Energizing Their Environmental Education Focus With Arcgis Storymaps

Jennifer Kreps Frisch, University of Minnesota Duluth
Jonee Kulman Brigham, University of Minnesota
8:00am - 9:00am Percival - Session C

In an elementary school that slowly lost sight of its strong environmental education focus after changes in staff and curricula, teachers and researchers are working together to reinvigorate outdoor learning and teaching using inquiry, phenology, and ArcGIS StoryMaps to frame and share interdisciplinary investigations across grade levels.

Format: Individual Paper Presentation  Presider: Michael Dias


Mason Kuhn, University of Northern Iowa
Mark McDermott, University of Iowa
8:00am - 9:00am Scarbrough 1 - Session A

The purpose of this presentation is to describe an activity used in an elementary science methods course that positioned pre-service teachers in ways that enable them to participate collectively and individually as productive agents of their own actions to better understand why argumentation is an effective learning tool.

Format: Individual Paper Presentation  Presider: Philip Short
Explicit Instruction and Scaffolding of the Claim, Evidence, Reasoning Framework Within a Physical Science Course for Educators

Heidi L. Masters, University of Wisconsin - La Crosse
Jennifer L. Docktor, University of Wisconsin - La Crosse

8:00am - 9:00am  Scarbrough 1 - Session B

In this study we found that explicit instruction and scaffolding of the Claim, Evidence, and Reasoning (CER) framework does influence prospective teachers' abilities to formulate scientific explanations. Prospective teachers did experience more difficulty when constructing scientific explanations for the concepts force and motion and sound.

Format: Individual Paper Presentation  Presider: Philip Short

Student Teaching Triads: An Examination of Successful Partnerships.

Rudolf V. Kraus, Rhode Island College
Lesley J. Shapiro, Keene State College

8:00am - 9:00am  Scarbrough 1 - Session C

Clinical practice experiences, particularly student teaching, present profound opportunities for growth and development for preservice teachers. This study examined several highly successful student teaching triads in secondary science education to identify factors and dynamics that contribute to success.

Format: Individual Paper Presentation  Presider: Philip Short

Teachers as Curriculum Designers: Understanding Stem Pedagogical Design Capacity

Charlene L Ellingson, University of Minnesota

8:00am - 9:00am  Scarbrough 2 - Session A

The purpose of this study is to understand how two protocol interventions support teacher design teams' understanding of STEM curriculum. Understanding Stem curriculum is framed around Pedagogical Design Capacity (PDC). PDC refers to a teacher's ability to recognize and draw upon personal and curricular resources for curriculum use.

Format: Individual Paper Presentation  Presider: Preethi Titu

Stem Touchstones for Teacher Professional Learning: Meeting the Challenge of Stem Teaching in High Need Schools

Regina E. Toolin, University of Vermont
Simon Jorgenson, University of Vermont Stephanie Ratmeyer, University of Vermont

8:00am - 9:00am  Scarbrough 2 - Session B

The VSTEM Leadership Institute is a K-12 professional learning program that seeks to engage teachers in authentic scientific inquiry and research-based teaching practices. This study seeks to examine the overall development and philosophy of VSTEM with a specific focus on VSTEM touchstone development and implementation by participating teachers.

Format: Individual Paper Presentation  Presider: Preethi Titu
Science Teacher Professional Development - Sat, January 05

Professional Learning Communities and Their Facilitation for Advancing Ambitious Teaching Practices

John L. Russell, Math for America
8:00am - 9:00am  Scarbrough 2 - Session C

As we consider the dynamic vision of NGSS science learning, it should also be considered how teachers will lead others in this work through their classrooms. This design experiment of a two-tier set of PLCs suggest important supports for teachers (and researchers) when leading others through work focused on ambitious science teaching practices.

Format: Individual Paper Presentation

History, Philosophy, and Nature of Science - Sat, January 05

Addressing Interactions Between Science and Religion in Science Teacher Education

Joseph W. Shane, Shippensburg University
Lee Meadows, University of Alabama-Birmingham Ron Hermann, Towson University Ian Binns, University of North Carolina Charlotte Lisa Borgerding, Kent State University Briana Pobiner, Smithsonian Institution David Long, Morehead State University
8:00am - 9:00am  Scarbrough 3 - Session A

An overview of the importance of addressing science-religion interactions at all levels of science education will be given along with associated legal and pedagogical strategies specific to science teacher education.

Format: Small Group Roundtables

Preservice Science Teacher Preparation - Sat, January 05

Collaborating to Improve Stem Teacher Preparation in Washington State

Jose M. Rios, University of Washington Tacoma
Julie Antilla, Seattle Pacific University Edward Geary, Western Washington University Tamara Holmlund, Washington State University Vancouver
8:00am - 9:00am  Scarbrough 3 - Session B

A consortium of universities, colleges, and organizations is currently working to improve science learning for all Washington State students by collaboratively transforming STEM teacher preparation programs. We present the goals, structures, and activities associated with this NSF-funded collaboration to improve K-12 STEM teacher preparation.

Format: Small Group Roundtables

Curriculum, Pedagogy, and Assessment - Sat, January 05

Dimensions of the NGSS Science and Engineering Practices and Their Variations

Kelsey Lipsitz, The Exploratorium, Institute for Inquiry
8:00am - 9:00am  Scarbrough 3 - Session C

During this roundtable session, participants will gain insights into how elementary teachers are planning for the SEPs and the extent to which those align with the descriptors in the NGSS, as well as engage in discussions around how we can continue to support teachers as they shift their instruction to reflect the vision of the NGSS.

Format: Small Group Roundtables
Constructing Programs to Build Teacher Confidence and Competence in Physics and Computing

Colleen Megowan Romanowicz, American Modeling Teachers Association
Rebecca E Vieyra, American Association of Physics Teachers
8:00am - 9:00am  Scarbrough 4 - Session A

Computational Modeling Physics First with Bootstrap is an NSF-funded professional development program for 9th grade physics teachers. Bring a computer to participate in a mini-session on Modeling Instruction and Bootstrap: Algebra to program a conceptual model in physics.

Format: Exploratory Session

Sat, January 05

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8:00am - 9:30am  Scarbrough 5

Equity and Diversity – Sat, January 05

Using the Engineering Problem Solving Process to Increase Scientific Conceptual Understanding by Students With Visual Impairments

Ying-Ting Chiu, The Ohio State University
Tiffany Wild, The Ohio State University Deborah Grzybowski, The Ohio State University
8:00am - 9:00am  Sloane - Session A

This study presents part of the outcomes of a two-year long bio-engineering education project for students with visual impairments. The overall project focused on bio-engineering, a subset of the data that was collected focused on student understanding of climate change. This data will be presented for the purpose of this presentation.

Format: Themed Paper or Poster Set

STEM Education – Sat, January 05

Life Changing: What Happens When We Stemify Our Schools

Thomas F Meagher, Owatonna Public Schools/University of Minnesota
8:00am - 9:00am  Verelst - Session A

This study explores student perceptions of science, technology, engineering, math and the environment of over 500 students in grades 4-8, for five years. Findings from how students perceive STEM learning, and significant differences in academic test scores, provides evidence for a definitive model of integrative STEM teaching and learning.

Format: Individual Paper Presentation  Presider: Alex Gerber

STEM Education – Sat, January 05

Rethinking Structures of Instructional Time and Space in the Middle School Stem Classroom

Meg Gardner, Colgate University
8:00am - 9:00am  Verelst - Session B

This presentation focuses on how one integrated STEM model redefined instructional space and time. The researchers found that the team pooled instructional minutes and shared one student roster. Halls, atria, and green spaces were considered part of the instructional landscape. Teachers expressed feelings of collective ownership of the model.

Format: Individual Paper Presentation  Presider: Alex Gerber
Reflection on the Aspects of an Effective Stem Integration Partnership: A Collaborative Action Research Study

Justine N Kim, University of Minnesota
Corbin Rice, University of Minnesota Gillian Roehrig, University of Minnesota
8:00am - 9:00am Verelst - Session C

A school-university partnership engaged in collaborative action research to develop STEM curriculum as part of a year long professional development model. The process of implementation was documented and analyzed. This study makes recommendations for future partnerships to promote successful STEM integration for in school spaces.

Format: Individual Paper Presentation  Presider: Alex Gerber

Secondary Science Teachers’ Understanding of Formative Assessment and Its Practice With Three-Dimensional Teaching and Learning

Yotah A Koulagna, Georgia State University
Renee Schwartz, Georgia State University
8:00am - 9:00am Vernon - Session A

A qualitative case study to explore high school science teacher understanding of formative assessment, three-dimensional teaching, and assessment of integrated science knowledge. Preliminary results from multiple data sources indicate that teachers are experimenting with 3D and struggle to apply formative assessment understanding to assessing 3D.


How Well Does the edTPA Predict the Quality of Teachers' Classroom Practice?

Dawnne M LePretre, Illinois Institute of Technology
Selina L Bartels, Valparaiso University Judith S. Lederman, Illinois Institute of Technology
8:00am - 9:00am Vernon - Session B

The edTPA is used as a benchmark in the licensure of preservice teachers. The question is, how well it predicts teacher practice in the classroom? In this study, five inservice mathematics and science teachers' preservice to inservice edTPA scores were compared. Three of the five teachers scored the same or better on their inservice edTPA.


Influential Factors Impacting the Design of Elementary-Based Formative Assessments

Justin R. McFadden, University of Louisville
Tom Tretter, University of Louisville Brian Robinson, University of Louisville
8:00am - 9:00am Vernon - Session C

The results of a two-year project involving 40 elementary teachers will be presented. During the project, teachers designed, implemented, and revised multi-dimensional, formative science assessments.

Exploring (Mis)alignment in Inservice and Preservice Science Teacher Mentoring Relationships With Respect to Standards-Based Reform

Alison Riley Miller, Bowdoin College
Brooke Whitworth, University of Mississippi
Laura Zangori, University of Missouri
Mandy Biggers, Texas Woman's University
Michael D Walsh, Bowdoin College

9:15am – 10:15am  Ballroom D – Session A

This qualitative study explores how mentor science teachers are selected across programs in two states, and characterizes pedagogical alignment, or misalignment of mentor and preservice science teacher (PST) pairs with respect to the NGSS. Findings indicate that PSTs and mentor teachers need greater support around this crucial mentoring experience.


The Impact of Cooperating Teachers on Pre-Service Science Teachers’ Pedagogical Content Knowledge

Kayla R Norville, North Carolina State University
Soonhye Park, North Carolina State University

9:15am – 10:15am  Ballroom D – Session B

Pedagogical content knowledge (PCK) is a specialized body of teacher knowledge required for effective teaching. This study explored the impact of cooperating teachers on pre-service science teachers’ (PSTs) PCK during the student teaching experience. The findings of this study provide implications for both PSTs and teacher education programs.


Faculty Co-Teaching in Elementary Stem Teacher Education: Lessons Learned, Suggestions, and Impact on Preservice Teacher Stem Self Efficacy

Elizabeth Allison, University of South Alabama
Todd Johnson, University of South Alabama
Kelly Byrd, University of South Alabama

9:15am – 10:15am  Ballroom D – Session C

This session gives insights into the process of refining and evaluating teacher education courses (elementary science and mathematics methods) to incorporate co-taught integrated STEM modules. Research findings and "lessons learned" will be shared.


Developing K-5 Science Educators Through Authentic Experiences in an Engineering Research Laboratory

Gayle N Evans, University of Florida
Kent Crippen, University of Florida
Chelsey Simmons, University of Florida
Renee Simmons, University of Florida

9:15am – 10:15am  Percival – Session A

Research experiences for teachers (RET) create opportunities for teachers to engage in science practice based experiences which are translatable into K-12 classrooms. This study evaluates a RET program where K-5th grade teachers spend 6 weeks as members of research teams in university engineering labs to gain a broader perspective of STEM practice.

Format: Individual Paper Presentation  Presider: Meredith Park Rogers
Preservice Science Teacher Preparation - Sat, January 05

**Infusing Project-Based Learning in Elementary Science Methods: Preparing Preservice Elementary Teachers to Provide Meaningful Learning Experiences for All**

Neporcha Cone, Kennesaw State University  
Charlease Kelly-Jackson, Kennesaw State University  

9:15am - 10:15am Percival - Session B

The study investigated the effect of Project-Based Learning (PBL) on preservice elementary teachers' self-efficacy beliefs as it related to teaching science to diverse student groups. Quantitative and qualitative findings suggest that preservice teachers' self-efficacy beliefs increased after participating in a PBL-focused science methods course.  
Format: Individual Paper Presentation  Presider: Meredith Park Rogers

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Student Learning P-12 – Sat, January 05

**Immersive Scenarios: Engaging Children in Authentic Inquiry**

Dana L. Zeidler, University of South Florida  
Mitch J. Ruzek, University of South Florida  
Melanie Kinskey, University of South Florida  
Kati Burns, Educational Foundation of Sarasota County - Florida

9:15am - 10:15am Percival - Session C

In this innovation idea paper, we describe and discuss the implementation of a novel pedagogical approach of authentic inquiry positioned in a progressive tradition of science education. We draw from transdisciplinary domains of knowledge and content important to human understanding in creating and implementing a school-wide immersion event.  
Format: Individual Paper Presentation  Presider: Meredith Park Rogers

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Equity and Diversity – Sat, January 05

"It's Not a Just Deaf or Just Black Thing, It's a Deaf/black Thing": Intersectionality and Mentorship in Stem for Deaf Youth

Jessica A Scott, Georgia State University  
Maggie Renken, Georgia State University  
Patrick Enderle, Georgia State University  
Scott Cohen, Georgia State University

9:15am - 10:15am Scarbrough 1 - Session A

Deaf and hard of hearing (DHH) youth and adults are underrepresented in STEM. There is evidence that mentorship from adults can be a positive experience for DHH students. This study examines focus group data with DHH youth on STEM mentorship. The findings have implications for teachers working with DHH youth and other under-represented groups.  
Format: Individual Paper Presentation  Presider: Mario Pickens

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Equity and Diversity – Sat, January 05

**American Sign Language Resources for Communicating About the Nature of Science**

Patrick J Enderle, Georgia State University  
Scott Cohen, Georgia State University  
Claudia Hagan, Georgia State University  
Renee Schwartz, Georgia State University

9:15am - 10:15am Scarbrough 1 - Session B

This study reviewed curricular resources available for science teachers of students who are deaf. Analysis focused on ASL signs available for communicating NOS concepts as these ideas are critical for enhancing students' overall understanding of science. The findings presented will highlight certain issues for equitable science education.  
Format: Individual Paper Presentation  Presider: Mario Pickens
Choosing Not to Teach: Parental Advice on Career Choice for a First Generation Stem Major

Carol C Johnston, Mount Saint Mary's University
Joshua Helston, Mount Saint Mary's University

9:15am - 10:15am  Scarbrough 1 - Session C

Noyce Teacher Scholarship Programs aim to increase the pipeline of talented STEM majors from underrepresented groups that choose to teach in high-need K-12 schools. This case study explores the reasons one potential scholar chose not to teach. Data from interviews led to an innovative idea for future recruitment.

Format: Individual Paper Presentation  Presider: Mario Pickens

Research Practice Partnerships and Design-Based Research: Supporting Coherent Pre-Service and In-Service Science Teacher Professional Learning

Todd Campbell, University of Connecticut
Thomas J McKenna, Boston University Xavier Fazio, Brock University

9:15am - 10:15am  Scarbrough 2 - Session A

This presentation will reveal the ongoing process of the refinement of a research practice partnership (RPP) supportive of science teacher professional learning. The design-based research paradigm used and the methods of iterating the evolving project conjecture map will also be shared.

Format: Individual Paper Presentation  Presider: Meredith Kier

Using Visual Network Scales and Social Network Analysis in Teacher Professional Development

Samuel J Polizzi, Kennesaw State University
Brandon Ofem, University of Missouri - St. Louis Gregory T Rushton, Stony Brook University

9:15am - 10:15am  Scarbrough 2 - Session B

Introduction of Social Network Analysis (SNA) as a professional development activity. We demonstrate an SNA activity used with early career or experienced science teachers to facilitate discussions of the teaching profession and leadership opportunities. Includes a brief SNA overview, PD discussion materials, and teacher comment exemplars.

Format: Individual Paper Presentation  Presider: Meredith Kier

An Exploration of Effective, Systemic Educator Professional Development

Jennifer S Mayo, Portland Public Schools

9:15am - 10:15am  Scarbrough 2 - Session C

This paper explores perspectives on professional development (PD) & discusses contextual factors found important to consider in creation & design of systemic, sustainable PD. Contextual PD factors include: partnership/determining needs, teacher as learner, perspective/beliefs, & follow-up. Recommendations are made for PD design & development.

Format: Individual Paper Presentation
Positioning Stem Education as a Vehicle for Inclusivity

Sami Kahn, Ohio University
Merrie Koester, University of South Carolina Center for Science Education Terri Hebert, Indiana University South Bend Jenna Porter, California State University, Sacramento Kathy Gee, California State University, Sacramento

9:15am - 10:15am Scarbrough 3 - Session A

This themed paper set explores the unique potential of STEM education as a vehicle for inclusivity by presenting research focused on STEM instruction and teacher preparation designed to support the talents and needs of all students, including those with disabilities.

Format: Themed Paper or Poster Set

Developing Emergent Teacher Education Scholars

Felicia M Mensah, Teachers College, Columbia University
Gregory Benoit, Teachers College, Columbia University Ava Javid, Teachers College, Columbia University

Dora Kastel, Teachers College, Columbia University Kristen Larson, Teachers College, Columbia University Shamari Reid, Teachers College, Columbia University

Alexis Riley, Teachers College, Columbia University Shellina Shidnia, Teachers College, Columbia University

9:15am - 10:15am Scarbrough 4 - Session A

In this modified roundtable symposium, doctoral students present initial work as emergent scholars. Attendees will have an opportunity to visit two roundtables and interact with the researchers about their work, which covers a range of topics in teacher education and STEM education.

Paper #1 Ava Javid - Title: Teachers’ Meaning Making when Implementing Technology in Classrooms

Paper #2 Dora Kastel - Title: Science PD Provider Expertise

Paper #3 Kristen Larson - Title: Colorblindness and missed opportunities in science teacher education: A case study of preservice science teachers’ discussions around identity in their fieldwork experiences

Paper #4 Shamari Reid, Jesse Reid, and Jaron Reid - Title: BlackQueer Youth Agency as Pedagogy

Paper #5 Alexis Riley & Shellina Shidnia - Title: The Great Black Hope: An Examination of the Use of Black Bodies in a “Post-Segregation/New Integration” Educational Climate

Paper #6 Rashida Robinson - Title: Preparing Students to Transition Across Grade Levels: A Case Study of Two Science Teachers’ Methods

Paper #7 Gábor Salopek - Title: Mathematics in Popular Culture: An Investigation Through Videos

Format: Small Group Roundtables

What Elements Matter in Preparing Science and Math Teachers for High-Need Schools?

Meghan E Marrero, Mercy College
Amanda M Gunning, Mercy College Jessica F. Riccio, Teachers College, Columbia University

9:15am - 10:15am Sloane - Session A

This presentation will amplify novice teachers’ voices on effective elements of their preparation, triangulating findings with observation rubrics, mentors’ perspectives, edTPA scores, and more. Engage in a discussion of how best to meet the needs of novice teachers while still ensuring their effectiveness as teachers in high-need schools.

Format: Individual Paper Presentation Presider: Jennifer Oramous
An Examination of Preservice K-8 Teachers’ Autobiographies for Attitudes and Outlooks Toward Teaching Science

Amity F Gann, Temple University
Rebecca A Siegel, Temple University Janelle M Bailey, Temple University

9:15am - 10:15am Sloane - Session B

We used preservice elementary teacher autobiographies written for a science methods course to identify and examine the relationship between attitudes toward science and their prospective outlooks toward teaching science. Our analysis suggests autobiographies may an effective resource for identifying the needs of novice teachers.

Format: Individual Paper Presentation  Presider: Jennifer Oramous

Re-Kindling Wonder in Preservice Teachers

Josie C Melton, Western Washington University

9:15am - 10:15am Sloane - Session C

This session describes how activities to develop wonder in elementary preservice teachers influenced participants' experiences during a science methods course and informed their practice. The activities designed to engage preservice teachers' sense of wonder will be described, and study findings and implications will be shared.

Format: Individual Paper Presentation  Presider: Jennifer Oramous

Fresh Thinking for Students Through Steam

Richard Cox, Bullitt County Public Schools
Kristin L Cook, Bellarmine University Sarah B Bush, University of Central Florida

9:15am - 10:15am Verelst - Session A

Elementary student experiences/perspectives in an integrated Science, Technology, Engineering, Arts and Math (STEAM) Lab classroom, a traditional science classroom and a traditional mathematics classroom will be highlighted as models for educators working to develop, implement and refine richer, more authentic learning in science and mathematics.

Format: Individual Paper Presentation  Presider: Mary Norell Hedenstrom

Elementary Students’ Perceptions of Steam Learning

Sarah B Bush, University of Central Florida
Kristin L Cook, Bellarmine University Daniel Edelen, University of Central Florida Richard Cox, Bellarmine University

9:15am - 10:15am Verelst - Session B

We report on a qualitative analysis of more than 1000 student open responses from 8 teachers’ classrooms across 5 urban elementary schools regarding perceptions of learning in a STEAM environment intentionally focused on science and mathematics content and practices. This study is one of the first examining student perceptions of STEAM learning.

Format: Individual Paper Presentation  Presider: Mary Norell Hedenstrom
Informal Science Education - Sat, January 05

The Usefulness of Planetariums During Astronomy Study

William R Thornburgh, American Modeling Teachers Association
9:15am - 10:15am Verelst - Session C

In this study, treatment school students received an embedded planetarium program aligned with classroom material, while comparison school students did not. Results indicated that the planetarium played a positive role in attitude, learning, and knowledge retention, as well as students thinking differently about astronomical concepts.

Format: Individual Paper Presentation

Secondary Science Teachers Implementing Co-Designed Socio-Scientific Issues-Based Curriculum Units: Supports, Challenges, and Salient Outcomes

Li Ke, University of North Carolina at Greensboro
Patricia J Friedrichsen, University of Missouri Laura Zangori, University of Missouri Troy D. Sadler, University of North Carolina at Greensboro Amanda Peel, University of Missouri Eli Dryer, University of Missouri
9:15am - 10:15am Vernon - Session A

Secondary science teachers co-designed and implemented socio-scientific issues-based curriculum. Clarke and Hollingworth's (2002) Model of Professional Growth was used to examine the teachers' perceived supports for implementation, challenges during implementation, and the teacher's perceived salient outcomes related to this approach.

Format: Individual Paper Presentation  Presider: Sarah Boesdorfer

Is "Inquiry" Happening? Preservice and Practicing Teacher Experiences Before and After Becoming Teachers of Science

Alice (Jill) Black, Missouri State University
9:15am - 10:15am Vernon - Session B

For decades, inquiry-related methods have been recommended. Have pre- and inservice teachers experienced such methods themselves as K-12 students? Is that related to their ideas of science? Do inservice teachers practice inquiry? If not, what barriers exist, and can inquiry thinking and pedagogy use improve? This study considers these questions.

Format: Individual Paper Presentation  Presider: Sarah Boesdorfer

Student Teachers’ Attitudes Towards Including Creationism in the Science Classroom: A u.s.-Germany Comparative Study

Ian C Binns, UNC Charlotte
Mark A. Bloom, Dallas Baptist University
9:15am - 10:15am Vernon - Session C

This research compares two studies, one in Germany and one in the U.S., which examined how preservice teachers used their self-generated definition of 'science' to justify including or excluding creationism (and/or intelligent design) into a science curriculum.

Format: Individual Paper Presentation  Presider: Sarah Boesdorfer
Coffee and Conversations
10:15am - 10:45am  Ballroom Prefunction

Preservice Science Teacher Preparation - Sat, January 05

Elementary Pre-Service Teachers Preparation of Science Vocabulary and Instruction Strategies
Sarah J Carrier, North Carolina State University
Jill F. Grijenhagen, North Carolina State University
Becca Corsi-Kimble, North Carolina State University
10:45am - 11:45am  Ballroom D - Session A

Teachers contribute to students' science learning by strategically supporting young students' language development embedded in science activities and content instruction. The present study examined the role of language development and language instruction strategies with pre-service teachers enrolled in an elementary science methods course.

Format: Individual Paper Presentation  Presider: Karl G. Jung

Preservice Science Teacher Preparation - Sat, January 05

A Self-Study of Inclusive Practices in Initial Teacher Education: The Professional Learning of Two Science Teacher Educators
Karen Goodnough, Memorial University of Newfoundland
Saiqa Azam, Memorial University of Newfoundland
10:45am - 11:45am  Ballroom D - Session B

In this collaborative self-study, the authors examined their understanding of inclusive pedagogy and how to enhance their classroom practice in the area of inclusion. They report on the tools they used and the socio-cultural factors that influenced their ability to adopt inclusive pedagogy.

Format: Individual Paper Presentation  Presider: Karl G. Jung

Preservice Science Teacher Preparation - Sat, January 05

Planning Ambitious Science Lessons: Pre-Service Elementary Teachers’ Curricular Adaptations
Carrie-Anne Sherwood, Southern Connecticut State University
10:45am - 11:45am  Ballroom D - Session C

Using the tenets of ambitious science instruction, and Remillard’s (2005) teacher-curriculum Framework, this study examined the ways in which elementary pre-service teachers adapted published science curriculum materials in order to support students' engagement in ambitious, three-dimensional science learning.

Format: Individual Paper Presentation  Presider: Karl G. Jung

Science Teacher Professional Development - Sat, January 05

Success in Middle School Science: a Model for Professional Development
Cynthia C Gardner, Lander University
Jenny Risinger, Greenwood District 50
10:45am - 11:45am  Percival - Session A

Success in Middle School Science forms a collaboration between a school district and local university to provide sustained professional development in science content knowledge and pedagogy for middle school science teachers.

Format: Individual Paper Presentation  Presider: Jennifer Mayo
Bridging K-12 Science in a School District: An Exploratory Study Using a Vertically Aligned Professional Learning Community

Leana Peltier, Teachers College Columbia University
10:45am - 11:45am Percival - Session B

This study explored the impacts of a year-long science professional learning community on elementary and high school science teachers from the same district. Listen to how participant's practices and attitudes have changed as a result of participating in this vertically aligned group in the context of inquiry practices and NGSS adaptation.

Format: Individual Paper Presentation  Presider: Jennifer Mayo

Spontaneous Adoption of Online Text-Based Collaborative Tools Shaped Scientific Argumentation Discourse

Brent Gilles, University of West Georgia
Gayle Buck, Indiana University
10:45am - 11:45am Percival - Session C

The purpose of this discourse analysis study was to examine how online collaborative tools (i.e. Google Documents) shaped the discursive construction of arguments without the constraints of pre-existing argumentation frameworks.

Format: Individual Paper Presentation  Presider: Jennifer Mayo

Using Examples of Student Thinking to Improve Teachers’ Conceptions of Nature of Science

Jennifer C Parrish, University of Northern Colorado
Bridget Mulvey, Kent State University Joshua W Reid, Middle Tennessee State University
10:45am - 11:45am Plimsoll

This workshop will engage teacher educators in using the NOS Example Strategy, a new way to facilitate explicit, reflective NOS instruction. Participants will gain first-hand experience using the strategy and discussions will focus on how to use the strategy in methods courses and professional development settings.

Format: Workshop

Shaping Student Science Understandings: Modeling in Multimodal Representations

Rachel E. Wilson, Appalachian State University
Leslie U. Bradbury, Appalachian State University
10:45am - 11:45am Scarbrough 1 - Session A

Research has demonstrated that multimodality is an effective pedagogical approach for students in K-16 settings. In this exploratory session, we will review research support for the use of multiple modes of representation as a strategy for science teaching, engage attendees in participatory examples, and brainstorm ideas for use of this strategy.

Format: Exploratory Session
Problem-Based Learning: A Context to Support Student and Teacher Learning and Integration of Literacy, Nos and Inquiry Instruction

Jennifer L Maeng, University of Virginia
Elizabeth Edmondson, Virginia Commonwealth University Amanda Gonczi, Michigan Technological University Lindsay Wheeler, University of Virginia Ibukunoluwa Omole, University of Virginia

10:45am - 11:45am Scarbrough 2 - Session A

A multiple methods study found K-5 teachers' confidence and pedagogical knowledge improved following professional development that used problem-based learning (PBL) as a context for integration of nature of science, inquiry, and literacy. Students' content knowledge following teacher-developed PBL unit implementation also improved.

Format: Individual Paper Presentation Presider: Nate Carnes

A Case Study of a 6th Grade Science Teacher’s Implementation of the 5r Instructional Model

Molly Weinburgh, Texas Christian University
Cecilia Silva, Texas Christian University

10:45am - 11:45am Scarbrough 2 - Session B

Our research focuses on how in-service science teachers develop the skills and knowledge to help emergent multilingual students acquire conceptual knowledge and language to support the conceptual learning. Using case study design, we investigated how a middle school science teacher implemented the 5R Instructional Model.

Format: Individual Paper Presentation Presider: Nate Carnes

Comparing Engagement With the Assist Approach in Pre-Service and In-Service Teacher Programs

Mark McDermott, University of Iowa
Mason Kuhn, University of Northern Iowa John Bedward, Buena Vista University Kathleen Weiss, University of Iowa Nathan Quarderer, University of Iowa

10:45am - 11:45am Scarbrough 2 - Session C

Differences in the impact of engaging pre-service and in-service teachers in training based on the Argument-based Strategies for STEM-Infused Science Teaching (ASSIST) approach will be described. Critical characteristics for developing understanding and implementation of NGSS-aligned teaching approaches for both audiences will be highlighted.

Format: Individual Paper Presentation Presider: Nate Carnes

A Comparative Case Study of Teacher-Coaches Who Lead After-School Stem Clubs at Two Rural, Low Wealth Middle Schools

Kylie Hoyle, University of Colorado - Colorado Springs
Margaret R Blanchard, North Carolina State University

10:45am - 11:45am Verelst - Session A

This comparative case study investigated the beliefs and practices of two teacher-coach teams using the Dimensions of Success (DoS) observation tool, with 12 dimensions. Guided by Bandura’s Social Cognitive Theory, findings suggest that T-Coaches carried out different practices at the STEM Clubs based on their personal beliefs and values.

Format: Individual Paper Presentation
2020 National Science Teachers Association (NSTA) Standards for Science Teacher Preparation

Patricia Morrell, University of Portland
Meredith Park Rogers, Indiana University
Eric Pyle, James Madison University
Gillian Roehrig, STEM Education Center
William R. Veal, University of Charleston

10:45am - 11:45am  Vernon

In 2015 NSTA, in response to the changing standards for science education advocated in A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas(2012) and the development of the Next Generation Science Standards(2013), commissioned the Association of Science Teacher Educators (ASTE) to develop science teacher preparation standards for review of preparation programs. The work was completed and approved by ASTE and NSTA in 2018. The session will provide an in-depth review of the standards and how these can be used by all science teacher preparation programs to assist with accreditation and program reviews.
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<td>1965-66</td>
<td>Ralph Lefler</td>
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<td>1966-67</td>
<td>Edward Victor</td>
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<td>1967-68</td>
<td>Sylvan Mickelson</td>
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<td>1968-69</td>
<td>Stephen Winter</td>
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<td>1969-70</td>
<td>Eugene Lee</td>
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<td>1970-71</td>
<td>John Montean</td>
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<td>1971-72</td>
<td>Paul Westmeyer</td>
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<td>1972-73</td>
<td>Ronald D. Anderson</td>
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<td>1973-74</td>
<td>Robert E. Yager</td>
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<td>1974-75</td>
<td>David P. Butts</td>
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<td>1975-76</td>
<td>Jacob Blankenship</td>
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<td>1976-77</td>
<td>Patricia Blosser</td>
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<td>1977-78</td>
<td>David H. Ost</td>
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<td>1978-79</td>
<td>John Schaff</td>
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<td>1979-80</td>
<td>Ertle Thompson</td>
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<td>1980-81</td>
<td>Hans Anderson</td>
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<td>1981-82</td>
<td>Jerry C. Horn</td>
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<td>1982-83</td>
<td>James P. Barufaldi</td>
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<td>1983-84</td>
<td>Ron W. Cleminson</td>
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<td>1984-85</td>
<td>Thomas P. Evans</td>
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<td>1985-86</td>
<td>Marvin Druger</td>
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<td>1986-87</td>
<td>Robert K. James</td>
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<td>1987-88</td>
<td>Joyce Swartney</td>
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<td>1988-89</td>
<td>William C. Ritz</td>
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<td>1989-90</td>
<td>Floyd Mattheis</td>
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<td>1990-91</td>
<td>Gwendolyn Henderson</td>
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<td>1991-92</td>
<td>Roger Olstad</td>
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<td>1992-93</td>
<td>Catherine G. Yeotis</td>
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<td>Peter A. Rubba</td>
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<td>1994-95</td>
<td>Norman Lederman</td>
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<td>1995-96</td>
<td>Jim Ellis</td>
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<td>Paul Kuerbis</td>
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<td>1997-98</td>
<td>Bill Baird</td>
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<td>1998-99</td>
<td>Larry Flick</td>
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<td>1999-2000</td>
<td>John Staver</td>
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<td>2000-01</td>
<td>Julie Gess-Newsome</td>
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<td>2001-02</td>
<td>Molly Weinburgh</td>
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<td>2002-03</td>
<td>John Penick</td>
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<td>2003-04</td>
<td>Herb Brunkhorst</td>
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<td>2004-05</td>
<td>Julie Luft</td>
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<td>2005-06</td>
<td>Patricia Simmons</td>
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<td>Kathy Norman</td>
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<td>Janice Koch</td>
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<td>Warren DiBiase</td>
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<td>Jon Pedersen</td>
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<td>2010-11</td>
<td>Meta Van Sickle</td>
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<td>2011-12</td>
<td>Randy Bell</td>
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<td>2012-13</td>
<td>John Tillotson</td>
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<td>2013-14</td>
<td>Kathy Cabe Trundle</td>
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<td>2014-15</td>
<td>Joanne Olson</td>
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<td>2015-16</td>
<td>Lisa Martin–Hansen</td>
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<td>2016-17</td>
<td>Malcolm Butler</td>
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<td>2017-18</td>
<td>Gillian Roehrig</td>
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<td>2018-19</td>
<td>Patricia Morrell</td>
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<tr>
<td>2019-20</td>
<td>Valarie Akerson</td>
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</table>
Past Award Winners

Outstanding Science Educator of the Year (Award I)

- 1973 Gerald Krockover, Purdue University
- 1974 No Award Given
- 1975 Vincent Lunetta, University of Iowa
- 1976 No Award Given
- 1977 No Award Given
- 1978 Harold Jaus, University of Illinois-Chicago
- 1979 Roger W. Bybee, BSCS
- 1980 Anton Lawson, Arizona State University
- 1983 William R. Capie, University of Georgia
- 1985 James Dudley Herron, Purdue University
- 1986 Charles R. Coble, East Carolina University
- 1987 John Penick, University of Iowa
- 1988 James Barufaldi, University of Texas
- 1989 Lawrence F. Lowery, University of California
- 1990 William C. Kyle, Jr., Purdue University
- 1991 Barry Fraser, Curtin University of Technology, Australia
- 1993 Chel Mason, San Diego State University
- 1994 Patricia Simmons, University of Georgia
- 1995 J. Preston Prather, University of Virginia
- 1996 Sandra Abell, Purdue University
- 1997 Bonnie Shapiro, University of Calgary
- 1998 William F. McComas, University of Southern California
- 1999 Patricia Simpson, St. Cloud State University
- 2000 Wolf-Michael Roth, University of Victoria
- 2001 John Settlage, Cleveland State University
- 2002 No Award Given
- 2003 (10+ yrs): Ronald Bonnstetter, University of Nebraska; (<10 yrs): Michael Clough, Iowa State University
- 2004 No Award Given
- 2005 (10+ yrs): Larry Yore, University of Victoria, Canada (<10 yrs): Joanne Olson, Iowa State University
- 2006 (10+ yrs): Penny J. Gilmer, Florida State University (<10 yrs): John W. Tillotson, Syracuse University
- 2007 (10+ yrs): James A. Shymansky, University of Missouri-St. Louis (<10 yrs): G. Nathan Carnes, University of South Carolina
- 2008 (10+ yrs): Kathryn Scantlebury, University of Delaware (<10 yrs): Kathy Cabe Trundle, The Ohio State University
- 2009 (10+ yrs): Deborah Tippins, University of Georgia (<10 yrs): Catherine Milne, New York University
- 2010 (10+ yrs): Julie A. Luft, Arizona State University (<10 yrs): Randy L. Bell, University of Virginia
- 2011 (10+ yrs): Julie Gess-Newsome, Northern Arizona University
- 2012 (<10 yrs): Rebecca Schneider, University of Toledo
- 2013 (10+ yrs): Lynn Bryan, Purdue University (<10 yrs): Carla Johnson, University of Cincinnati
- 2014 Alec Bodzin, Lehigh University (10+ yrs)
- 2015 Gail Jones, North Carolina State Univ. (10+ yrs); Deborah Hanuscin, Univ. of Missouri (<10 yrs)
- 2016 Rose Pringle, University of Florida (10+ yrs); Erin Peters-Burton, George Mason University (<10 years)
- 2017 Felicia Moore Mensah, Columbia University, (10+ yrs)
- 2018 Ron Hermann, Towson University (<10yrs)
- 2019 Lisa Martin-Hansen, California State University, Long Beach (10+yrs); Jerrid Kruse, Drake University (<10yrs)
Outstanding Mentor (Award II)

- 1997 John Penick, University of Iowa
- 1998 Hans Anderson, Indiana University
- 1999 Norman Lederman, Oregon State University
- 2000 Robert K. James, Texas A & M University
- 2001 Robert E. Yager, University of Iowa
- 2002 Walter S. Smith, Ball State University
- 2003 Larry Enochs, Oregon State University
- 2004 Catherine Yeotis, Wichita State University
- 2005 Sandra Abell, University of Missouri-Columbia
- 2006 Tom Koballa, University of Georgia
- 2007 Kenneth Tobin, Graduate Center of the City University of New York
- 2008 Dana Zeidler, University of South Florida
- 2009 Lloyd Barrow, University of Missouri, Columbia
- 2010 Kathryn Scantlebury, University of Delaware
- 2011 Gerry Saunders, Unity College
- 2012 Alec Bodzin, Lehigh University
- 2013 Julie Luft, University of Georgia
- 2014 Gillian Roehrig, University of Minnesota
- 2015 Pat Obenauf, West Virginia University
- 2016 Randy Bell, Oregon State University
- 2017 Kent Crippen, University of Florida
- 2018 William McComas, University of Arkansas
- 2019 Deborah Hanuscin, Western Washington University

Emeritus Awards/Outstanding Longtime Service to ASTE (Award III)

- N. Eldred Bingham, University of Florida
- Milton O. Pella, University of Wisconsin
- Pinchas Tamir, Hebrew University
- Clarence Boeck, University of Minnesota
- Fletcher Watson, Harvard University
- Marvin Druger, Syracuse University
- R. Will Burnett, University of Illinois
- Fred Fox, Oregon State University
- Nasrine Adibe, Dowling College
- Gerald Craig, Teachers College Columbia University
- Herbert Smith, Colorado State University
- Roger Olstad, University of Washington
- Alfred De Vito, Purdue University
- Hans Anderson, Indiana University
- Paul Dehart Hurd, Stanford University
- Robert W. Howe, Ohio State University
- Ronald K. Atwood, Univ. of Kentucky
- Dorothy Gabel, Indiana University
- Addison Lee, University of Texas
- Willard Jacobson, Teachers College Columbia University
- Donald W. McCurdy, University of Nebraska-Lincoln
- Ralph Lefler, Purdue University
- Harold Tannenbaum, Hunter College
- Steven Winter, Tufts University
- William C. Ritz, California State University, Long Beach
- Edward Victor, Northwestern University
- Stanley Helgeson, Ohio State University
- Floyd E. Mattheis, East Carolina University
- Kenneth J. Appleton, Central Queensland University
- William E. Baird, Auburn University
- Michael Cohen, Indiana University-Purdue University
- Vincent Lunetta, Pennsylvania State University
- Gerald Craig, Teachers College Columbia University
- Herbert Smith, Colorado State University
- Roger Olstad, University of Washington
- Dana Zeidler, University of South Florida
- Jon Pedersen, University of Nebraska-Lincoln
- Kevin Finson, Bradley University
Innovations in Teaching Science Teachers (Award IV)

- 1990  A Reflective Approach to Science Methods Courses for Preservice Elementary Teachers, Dorothy Rosenthal, California State University–Long Beach
- 1991  Enhancing Science and Mathematics Teaching, Kenneth Tobin, Nancy Davis, Kenneth Shaw, and Elizabeth Jakubowski, Florida State University
- 1992  The Learning Cycle as a Model for the Design of Science Teacher Preservice and Inservice Education, Peter Rubba, Pennsylvania State University
- 1993  Reconstructing Science Teacher Education Within Communities of Learners, Deborah Tippins, University of Georgia, Sharon Nichols, Florida State University, and Kenneth Tobin, Florida State University
- 1994  No Award Given
- 1995  Science for Early Adolescence Teachers (Science FEAT): A Program for Research and Learning, Samuel Spiegel, Angelo Collins, and Penny J. Gilmer, Florida State University
- 1997  Reconceptualizing the Elementary Science Methods Course Using Reflective Orientation, Sandra Abell and Lynn Bryan, Purdue University
- 1998  What Science Education Standards Say: Implications for Teacher Education, Penny Hammrich, Temple University
- 1999  No Award Given
- 2000  Professional Development Programs for Elementary Science Teachers: An Analysis of Teacher Self- Efficacy Beliefs and The Professional Development Model, Tracy J. Posnanski, University of Wisconsin- Milwaukee
- 2001  Empowering Teachers as Researchers and Inquirers, Anne M. (Amy) Cox-Petersen, California State University, Fullerton
- 2002  Being There and Not Being “There:” The Experience of Teaching an Elementary Science Education Course on the Internet, Janice Koch and Michael Barriere, Hofstra University
- 2003  Using a Card-sorting Task to Elicit and Clarify Science Teaching Orientations, Patricia Friedrichsen, University of Missouri-Columbia and Thomas Dana, Pennsylvania University
- 2004  An Inquiry-based Laboratory Lesson to Construct an Understanding of Earth’s Seasons, Paul Ashcraft, Clarion University and Susan Courson, Clarion University
- 2005  No Award given
- 2006  No Award given
- 2007  Using Historical Non-fiction and Literature Circles to Develop Elementary Teachers’ Nature of Science Understanding, Sharon E. Nichols, The University of Alabama & William Straits, California State University Long Beach
- 2008  A Case Study of Fifth Grade Teachers’ Changes in Methodology During a Two-Year Timeframe, Anita Martin and Brian Hand, University of Iowa
- 2009  Flexibly adaptive professional development in support of teaching science with geospatial technology, Nancy M. Trautmann, Cornell University & James G. MaKinster Hobart & William Smith Colleges
- 2010  Learning to Teach Science Through Collaboration: Coteaching and Cogenerative Dialogue in Elementary Science Methods Courses, Christina Siry, University of Luxembourg, Nicole Lowell, Elizabeth Zawatski, Manhattanville College
- 2011  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 What about those left behind? A template for developing quality science lessons for English language learners, Susan Gomez-Zwiep and William J. Straits, California State University, Long Beach
- 2012  Descriptive Inquiry in the Throes of Learning to Teach: Can Prospective Teachers Learn to Teach and Study their Teaching Closely? Michele Koomen and Jamie Mitchell, Gustavus Adolphus College
- 2013  No Award Given
- 2014  Connecting to Our Community: Utilizing Photovoice as a Pedagogical Tool to Connect College Students to Science, Kristin Cook, Bellarmine University & Cassie Quigley, Clemson University
- 2015  If You Can’t Say Something Nice: A Design-Based Research Approach Investigating the Social Interactions of New Science and Math Teachers Using a Video Annotation Tool, Joshua Ellis, Tasneem Anwar, Justin McFadden, & Gillian Roehrig from the University of Minnesota STEM Education Center
• 2016, The Use of Journal Clubs in Science Teacher Education. Dr. Karen A. Tallman, Springfield College and Dr. Allan Feldman, University of South Florida
• 2017, Teachers’ classroom practices 2-5 years after having completed an intensive secondary science teacher education program. Michael Clough, Iowa State University; Joanne Olson, Iowa State University
• 2018, Collaborating to teach elementary science methods in the field with K-6 classroom teachers: Benefits for in-service and pre-service teachers. Matthew Vick, University of Wisconsin, Whitewater; Patricia Falk Mukwonago Area School District
• 2019, A Curriculum-linked Professional Development Approach to Support Teachers’ Adoption of Socio-Environmental Science Investigation Alec Bodzin, Lehigh University; Thomas Hammond, Lehigh University; Kate Popejoy, Popejoy STEM LLC; William Farina, Lehigh University, David Anastasia, Breena Holland, James Carrigan, Scott Rutzmoser, Dork Sahagian

Implications of Research for Educational Practice (Award V)

• 1978 Teacher Behavior Does Make a Difference in Hands-On Science Classrooms, James A. Shymansky, University of Iowa, and John E. Penick, University of Iowa
• 1981 Wait-time and Learning in Science, Kenneth Tobin, Western Australia Institute of Technology and William Capie, University of Georgia
• 1983 The Disadvantaged Majority: Science Education for Women, Jane Butler Kahle, Purdue University
• 1984 Training Science Teachers to Use Better Teaching Strategies, Russell H. Yeany and Michael J. Padilla, University 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, University of Georgia
• 1987 Training Teachers to Teach Effectively in the Laboratory, Pinchas Tamir, The Hebrew University
• 1988 What Can Be Learned From Investigations of Exemplary Teaching Practice, Kenneth Tobin, Florida State University
• 1990 Helping Students Learn How to Learn: A View from a Teacher-Researcher, Joe Novak, Cornell University
• 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 University
• 1994 Teaching Evolution: Designing Successful Instruction, Lawrence Scharmann, Kansas State University
• 1995 Using Visits to Interactive Science and Technology Centers, Museums, Aquaria and Zoos to Promote Learning in Science, Leonie Rennie and Terrence McClafferty
• 1996 General Biology: Creating a Positive Learning Environment for Elementary Education Majors, Larry Scharmann and Ann Stanheim-Smith, Kansas State University
• 1997 Empowering Science Teachers: A Model for Professional Development, Ann Howe, University of North Carolina at Raleigh and Harriet Stubbs, North Carolina State University
• 1999 A Dynamical Systems Based Model of Conceptual Change, Andrew Hurford, Haskell Indian Nations University
• 2000 Teachers and Technology: A Case Study From an Implementation Project, Myra Halpin and Ann Howe, North Carolina School of Science and Mathematics, and North Carolina State University
• 2001 Visual/Spatial Thinking: A Forgotten Fundamental for School Science Programs, Alan J. McCormack and Cheryl L. Mason, San Diego State University
• 2002 What Knowledge is of Most Worth for Lateral Entry Secondary Science Teachers? William R. Veal, University of North Carolina at Chapel Hill
• 2003 Teacher Student Con-Construction in Middle School Life Science, Maria Nunez-Oviedo, University of Massachusetts-Amherst, Mary Ann Rea-Ramirez, Hampshire College, John Clement and Mary Jane Else, both of, University of Massachusetts-Amherst
• 2004 ‘I Be Bangin’! Understanding How Urban African American Youth Can Sustain Agency Across Social Field, Rowhea Elmesky, Washington University in St. Louis
• 2005 Culturalized Science Instruction: Exploring Its Influence upon Black and White Students’ Achievement, Eileen Parsons, North Carolina State University
• 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, The University of Alabama
Co-Winner: Paper 2 – Expanding the Ways in Which Urban Students Participate in Science Education: Rituals, Transactions, and Fundamental Interactions, Christopher Emdin, Teachers College, Columbia University
• 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, both of 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
• 2015 Using our Heads and HARTSS (Humanities, ARTs, and Social Sciences): Developing Perspective-Taking Skills for Socioscientific Reasoning, Sami Kahn & Dana Zeidler, University of South Florida.
• 2016, No Award Given
• 2017, Prevalence and predictors of out-of-field in the first five years. Ryan Nixon, Brigham Young University; Richard J. Ross, University of Georgia; Julie A. Luft, University of Georgia
• 2018, No Award Given
• 2019, Supporting Elementary Teachers’ Enactment of Nature of Science Instruction: A Randomized Controlled Trial. Jennifer Maeng, University of Virginia; Randy Bell, Oregon State University; Tyler St. Clair, SUNY Potsdam; Amanda Gonczi, Michigan Technological University; Brooke Whitworth, University of Mississippi

Past winners of the John C. Park National Technology Leadership Initiative Fellowship

Park, J. C. (2003). Now that we have new technology tools, what is being built? Association for the Education of Teachers in Science (AETS), St. Louis MO. (North Carolina State University)

Irving, K. and Bell, R. (2004). Educational technology use during secondary science student teaching: Three case studies. Association for the Education of Teachers in Science (AETS), Nashville TN. (The Ohio State University, University of Virginia)


Schneider, R. M. (2007). Examining the instructional design of a technology enhanced course for new mentor teachers. Association of Science Teacher Education, Clearwater Beach, FL. (University of Toledo)


Hagevik, R., & Stinger-Barnes, P. (2011). The effects of geospatial informational technologies on preservice science teachers’ technological pedagogical content knowledge. Association for Science Teacher Education, Minneapolis, MN (The University of Tennessee, Carson-Newman University)

Young, T., Farnsworth, B., Grabe, C., & Guy, M. (2012). Exploring new technology tools to enhance astronomy teaching & learning in grades 3-8 classrooms: Year one implementation. Association for Science Teacher Education, Clearwater Beach FL. (University of North Dakota)


2020 Conference Preview

The SW ASTE Region cordially invites you to the 2020 conference which will begin with pre-conference activities on January 8 and continue through Saturday, January 11th. The program will include a wide variety of topics that will surely result in stimulating conversations.

San Antonio just celebrated its 300th birthday and continues to be a leading vacation and meeting spot. Recent accolades include:

- **National Geographic Traveler's** editorial board selected San Antonio as a “Best of the World” destination for 2018.
- **Travel & Leisure** selected San Antonio as one of its “50 Best Places to Travel in 2018.”
- **Frommer's** names San Antonio as a “Best Place to Go in 2018.”
- San Antonio also was chosen by **Fodor's Travel** for their “2018 Go List.”
- In 2018, San Antonio is ranked #1 in **SmartAsset's** “10 Best Cities for Meetings,” for the third consecutive year.

Lots more information can be found at https://www.visitsanantonio.com/

... And of course, don't forget the Alamo

See y'all in San Antonio

2020 ASTE Conference Planning Committee Co-Chairs

Gil Naizer and Janice Meyer

*Photos courtesy of visitsanantonio.com*