Room Maps

FLOOR PLAN
3-D All Floors

GROUND / FIRST FLOOR

SECOND FLOOR

THIRD FLOOR

SIXTH FLOOR

TWENTY-SEVENTH FLOOR
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Welcome to the 25th ASTE International Conference!

On behalf of the Mid-Atlantic Region, we extend our warmest welcome to Baltimore and the annual meeting of ASTE! We hope that you take full advantage of the many opportunities to learn, network, and enjoy all that this great city has to offer.

We are excited to pilot test a number of new session formats that can expand opportunities for meaningful interactions among conference attendees over coffee and snacks. These formats include a Reflection Pool Session, Fireside Chats, an Unconference Session, and the screening of the movie Uncontrolled Variables: A Science Fair Story! Additionally, the Poster Session will take place on Thursday morning in the Pisces Room overlooking the Inner Harbor. Committee Meetings have been moved to Friday afternoon, so be sure to get some coffee and cookies and get involved in an ASTE committee! Our Graduate Student Forum is also excited to host the first annual ASTE Three Minute Thesis® Competition.

In addition to paper and poster presentations, consider attending professional development workshops and engaging with our exhibitors. Each has something to offer our community, and we appreciate their support of ASTE. Also, be sure to sign up for the preconference field trip to the National Aquarium and the Maryland Sea Grant Aquaculture Research Center Tour!

The ASTE promotes leadership and support for professionals involved in the education and development of teachers of science at all levels. Accordingly, our keynote speaker, Dr. Kacy Redd, was carefully selected to engage us in important thought and conversation about issues facing science teacher education. Dr. Kacy Redd is the Assistant Vice President of science and mathematics education policy at the Association of Public and Land-grant Universities (APLU). She co-directs the Network of STEM Education Centers, which currently links 149 STEM Education Centers at 126 institutions. Dr. Redd also manages APLU’s Science and Mathematics Teaching Imperative, a commitment by 132 public research universities to improve science and mathematics teacher preparation.

Make sure to join us at our Thursday evening ASTE social at the Columbus Center, a short walk or shuttle ride away! We’ll have a jazz band playing while you enjoy a taste of Baltimore before heading out to dinner at one of our amazing local restaurants. Included in our social is a tour of the USCGC Taney, one of the historic ships of Baltimore. Don’t forget to take pictures with your colleagues at the social in front of the red-carpet style ASTE backdrop and instantaneously share them to your social media platforms!

We encourage you to take full advantage of your time with us, and have a wonderful conference!

Ron Hermann, Rommel Miranda, Cindy Ghent, & Sarah Haines
ASTE 2018 Conference Co-Chairs
Reviewers

Krista Adams
Valarie Akerson
Len Annetta
Anna Maria Arias
Kathryn Arnone
Scott Ashmann
Sunreen Asim
Brenda Bartlett
Nazan Bautista
Amanda Benedict-Chambers
Ian Binns
Amber Bismack
Phillip Boda
Alec Bodzin
Sarah Boesdorfer
Lisa Borgerding
Mike Borowczak
Leslie Bradbury
Lisa Brown
Stephen Burgin
Andrea Burrows
Malcolm Butler
Jenna Carlson
Nate Carnes
Dan Carpenter
Tina Cartwright
Robert Ceglie
Lucia Chacon Diaz
Angela Chapman
Gina Childers
Michael Clough
Robert Cohen
Margaret Colicchio
Angelina Constantine
Julie Contino
Natasha Cooke-Nieves
Teha Cooks
Matthew Perkins Coppola
Emily Dare
Jeni Davis
Jeanelle Day
Hasan Deniz
Glenn Dolphin
Joshua Ellis
Gayle Evans
Kelly Feille
Michelle Forsythe
Ray Francis
Patricia Friedrichsen
Anne Gatling
Andrew Gilbert
Brent Gilles
Rory Glass
Katie Green
Amanda Gunning
Rita Hagevik
Jonathan Hall
Deborah Hanson
Stephanie Hathcock
Deb Hemler
Robbie Higdon
Peter Hillman
Rebecca Hite
Jenny Inger
Tobias Irish
Karen Irving
David Jackson
Sophia Jeong
Karl Jung
Meredith Kier
Jeffry King
Natalie King
Melanie Kinskey
Catherine Koehler
Jennifer Kreps Frisch
Mason Kuhn
Richard Lamb
Corinne Lardy
Felicia Leammukda
Carole Lee
SoonChun Lee
Yi Li
Ling Liang
Mila Rosa Librea
Lindsay Lightner
Illana Livstrom
Pamela Lottero-Perdue
Paula Magee
Katherine Mangione
Anita Martin
Anna Martin
Catherine Martin-Dunlop
Lisa Martin-Hansen
Heidi Masters
Jennifer Mayo
Stacy McCormack
Mandy McCormick Smith
Justin McFadden
Wayne Melville
Helen Meyer
Rhea Miles
James Minogue
Rommel Miranda
Patricia Morrell
Bridget Mulvey
Kim Murie
Shannon Navy
Suzanne Nesmith
Mark Newton
Ryan Nixon
Eunice
Nyamupangegedengu
Jennifer Oramous
Young-Shin Park
Meredith Park Rogers
Carolyn Parker
John Pecore
Jacob Pleasants
Kate Popejoy
Jenna Porter
Eric Pyle
Greer Richardson
Elizabeth Ring
Seema Rivera
Gillian Roehrig
Victoria Rosin
Danielle Ross
Ranu Roy
Jeffrey Sack
Line Saint-Hilaire
Dane Schaffer
Kathleen Schmidt
Therese Shanahan
Lesley Shapiro
Carrie-Anne Sherwood
Teresa Shume
Lara Smetana
Morgan Stewart
Michael Svec
Stephen Thompson
Vinta Tiarani
Peggy Tilgner
Preethi Titu
Regina Toolin
Amy Trauth-Nare
Meredith Vaughn
Matthew Vick
Peggy Ward
Angela Webb
Lindsay Wheeler
Jeanna Wieselman
Rachel Wilson
Cathy Wissehr
Francine Wizner
Teresa Woods
Yael Wyner
Sandra Yarem
Pre - Program Sessions

January 3
Preconference Field Trip to the National Aquarium and Maryland Sea Grant Aquaculture Facility

9:00am - 5:30pm in Hotel Lobby at 9:00 a.m.

Combined National Aquarium Behind the Scenes Tour & Maryland Sea Grant Aquaculture Facilities Tour

Ever wondered what goes on behind the scenes at the Aquarium? Here’s your chance to step into our stories and see the Aquarium in a brand new way. In this incredible experience, an expert will lead you through our exhibits.

Your guide will share fascinating stories about our animals and the habitats they call home, lead you to exclusive staff-only areas, take you up-close with one of our animal residents and so much more. Join us and become an Aquarium insider-you’ll never experience the National Aquarium the same way again!

You’re free to explore the Aquarium during regular hours before or after your tour. Tour length is 2½ hours. Participants will tour The Aquaculture Research Center (ARC) at the Institute of Marine and Environmental Technology in Baltimore, MD. The ARC is an extensive fish-holding facility located in the basement of the Columbus Center.

ARC is an 1,800-square-meter, state-of-the-art, environmentally responsible marine core facility that provides excellent experimental capacity for research with marine organisms. It is a completely contained, recirculating operation with large-scale mechanical and biological filtration and life support systems that enable safe and efficient re-use of tank water. ARC contains multiple tanks of 1, 2, 3 and 4 meters in diameter (ranging in volume from 1 to 20 cubic meters) specifically designed to maintain broodstock and conduct research with fish of various species and sizes, 32 smaller tanks of 350 liters each for carrying out experiments with multiple groups of fish, as well as a complete hatchery area equipped with larval-rearing systems and facilities for culture of a wide range of food chain organisms for larval diets. ARC also includes a 70-square-meter quarantine facility, a 50-square-meter pathogen room, and a 40-square-meter laboratory space designed for manipulating fish experimentally and performing basic bench work. At full capacity, this facility could maintain up to 8,000 adult fish and 7500 embryos. Tour length is 2 hours.

Note: Participants will be split into two groups. One group will tour the aquaculture facility first, the other will tour the aquarium first. For the second half, participants will switch venues.

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Developing Appropriate Assessment and Evaluation Practices for the Next Generation Science Standards

Paul Zachos, Association for the Cooperative Advancement of Science and Education (ACASE)

1:30pm - 3:30pm in Annapolis

Workshop participants will develop theoretical and practical tools for preparing teachers to design and carry out NGSS assessments and to use the resulting information for program improvement. The workshop includes participation in an assessment activity aligned to NGSS and a practical exercise in assessment building. The workshop is built around twelve essential teacher education learning goals.

Format: Workshop

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Exploring Invention Kits
David A Slykhuis, James Madison University, James Rutter, University of Virginia
1:30pm - 3:30pm in Baltimore
Participants will learn how to incorporate engineering principles into their science methods courses by completing the construction of invention kits. These kits will be free of charge and participants can keep them following the workshop.
Format: Workshop

Using Tools and Practice-based Teacher Education to Support Ambitious, NGSS-aligned Science Teaching within K-8 Methods Courses
Anna Maria Arias, Illinois State University, Amanda Benedict-Chambers, Missouri State University, Sarah J. Fick, Wake Forest University, Sylvie M Kademian, University of Michigan, Amber Sizemore, University of Michigan
1:30pm - 3:30pm in Chesapeake A
This workshop aims to prepare teacher educators to implement innovative strategies and tools for facilitating K-8 preservice teachers’ engagement in ambitious, NGSS-aligned science teaching. Drawing on the teacher education research around pedagogies of practice, we will introduce a learning cycle for practice-based teacher education that has been used in diverse K-8 science methods courses.
Format: Workshop

Brainstorm Cluster Mapping: A tool for supporting phenomenon-based, three-dimensional story-lines
Susan G Zwiep, CSU Long Beach, Jo Topps, K12 Alliance @WestEd, Jill Grace, K12 Alliance@ Wested
1:30pm - 3:30pm in Chesapeake B
The Brainstorm Cluster Mapping process develops 3 dimensional storylines (NGSS) for the K-12 classroom. The process uses phenomenon to plan an instructional sequence that links disciplinary core ideas, science and engineering practices and cross-cutting concepts into integrated storylines. Concepts are nested as big ideas, sub-concepts and lesson concepts to provide linear storylines for instruction.
Format: Workshop

Eureka! Grade 3-5 Science Activities and Stories
Donna Farland-Smith, The Ohio State University-Mansfield, Julie Thomas, University of Nebraska-Lincoln
4:00pm - 6:00pm in Annapolis
Invite scientists and engineers into your classroom without the hassle of searching for and scheduling guest speakers. At this workshop you will participate in some of the 27 lessons linking non-fiction historical trade books and science content that uniquely enable you to model scientific thinking by connecting stories of scientists with your elementary (3-5) science lessons.
Format: Workshop

Working towards NGSS-aligned instruction through development of multi-dimensional formative assessments
Stephanie B. Philipp, University of Louisville, Justin McFadden, University of Louisville
4:00pm - 6:00pm in Baltimore
This workshop will focus on the use of a process to develop multi-dimensional formative assessments in partnership with K-8 teachers as a way to support a trajectory of teachers’ increased knowledge and comfort in aligning instruction according to the vision of the NGSS. Student work samples from teacher-developed assessments and teacher will be examined.
Format: Workshop
Integrating Engineering Design with Science and Language Arts within Context of the Next Generation Science Standards
Hasan Deniz, University of Nevada Las Vegas, Erdogan Kaya, University of Nevada Las Vegas, Ezgi Yesilyurt, University of Nevada Las Vegas
4:00pm - 6:00pm in Chesapeake A
This workshop will engage participants in an engineering design activity that lends itself to integration of science content and, reading and writing activities. It will provide a framework for integrating science, engineering, and language arts at the elementary level while addressing the Next Generation Science Standards.
Format: Workshop

Exploring the Use of Simulated Classroom Environments to Develop Elementary Science Teachers’ Ability to Facilitate High Quality Discussions Focused on Argumentation
Jamie N Mikeska, ETS, Adam Devitt, NYU
4:00pm - 6:00pm in Chesapeake B
Attendees will review one performance-based science task, interact with student avatars in the simulated classroom around this science task, observe an example of a teacher’s performance in the simulated classroom, and discuss how these types of tasks can be used within elementary science method courses and professional development settings.
Format: Workshop

Presider Training
5:30pm - 6:30pm in Annapolis

Movie Night: Uncontrolled Variables
9:00pm - 10:30pm in Chesapeake A
On Wednesday, January 3, 2018 join us for a viewing Uncontrolled Variables: A Science Fair Story, produced by ASTE member Bill McComas. This documentary film follows the students and teachers in three northwest Arkansas schools as they compete in science fairs. All of the schools have a record of success at the national level. Also featured are stories of former students whose lives were changed by their experiences in science fairs. Enjoy the movie, some popcorn, and a chance to win Baltimore-themed items and a gift card for Howl at the Moon, a local live music bar. Additionally, the first 50 attendees will receive a free copy of the movie on DVD. The movie will begin in Chesapeake A at 9pm in the Hyatt.
Program Sessions

January 4

Breakfast
6:30am - 8:00am in Bistro 300 /Pisces (15th Floor)

Poster Session A
8:00am - 8:35am in Pisces (15th Floor)

Thread: Equity and Diversity

Re-thinking about Gender and Racial Inequities in Science Using Actor-Network Theory

Sophia (Sun Kyung) Jeong, University of Georgia, Deborah J. Tippins, UNIVERSITY OF GEORGIA

The gender and racial/ethnic inequities in STEM (which carries an ethical valence to the issue at heart) in relation to students’ science learning, requires rigorous investigation at the K-12 level and, thus, remains under-theorized. In this presentation, the researcher aims to re-think about gender and racial inequities as related to Asian American girls in science using actor-network theory.

Format: Poster Presentation

Presider: Cathy Wissehr

Thread: Science Teacher Professional Development

Planning Structures of an Effective Elementary Science Program

Kimberly Davis, University of Central Florida, Tonjua B. Freeman, University of Central Florida, Malcolm B. Butler, University of Central Florida

Many aspects of our world rely upon STEM; yet, US students struggle with science and/or math. Many studies on increasing science achievement focus on teachers’ efforts. This case study focuses on a school’s organization and leadership. Findings indicate that leadership at the school would be seen as effective with planning structures that are aligned with Parsons’ model of organizational effectiveness.

Format: Poster Presentation

Thread: Science Teacher Professional Development

Impact of Short Term Professional Development on K - 5 Teachers’ Knowledge of Subject Matter and Integration of Science and Nonfiction Texts

Terry Shiverdecker, The Ohio State University, Deborah Lan, The Ohio State University

This research tested the impact of a two-day conference on K - 5 teachers’ pedagogical knowledge of nonfiction text sets (NFTS) in inquiry-based science. Preliminary data analysis shows statistically significant gains in pedagogical knowledge. Data was also gathered on changes in subject matter knowledge (SMK) that might be associated with the construction NFTS. Changes in SMK were not significant.

Format: Poster Presentation

Thread: Science Teacher Professional Development

The Impact of the Urban Advantage Initiative on Middle School Science Teachers

Lauren Slagus, Stony Brook University, Angela Kelly, Stony Brook University

This qualitative study investigated the impact of participation in Urban Advantage, a professional development program for middle school science teachers in New York City, on three middle school science teachers. The preliminary interview data suggests that the program was effective because the teachers implemented what they learned in professional development workshops.

Format: Poster Presentation
Thread: Preservice Science Teacher Preparation

**Student Teachers’ Images of Science Instruction During Field Trips**

Karthigeyan Subramaniam, *University of North Texas*, Pamela Esprivalo-Harrell, *University of North Texas*, Eunyoung Lee, *University of North Texas*

This presentation details a study of student teachers’ images of science instruction during field trips. The study sought to explore and explain student teachers’ images through the use of drawings, and narratives as data. The following research question guided this study: What is the nature of student teachers’ images of science instruction during field trips?

*Format:* Poster Presentation

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Thread: Preservice Science Teacher Preparation

**Exploring pedagogical content knowledge of pre-service teachers through their participation in lesson study**

Sandra A Lampley, *University of Alabama in Huntsville*

This study explored the integration of Lesson Study—a form of teacher-led professional development—into a science methods course for pre-service teachers. Findings indicate that implementation of lesson study in a science methods classroom was a helpful tool in advancing pre-service teachers’ PCK for science teaching.

*Format:* Poster Presentation

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Thread: Preservice Science Teacher Preparation

**Give bugs a chance: Increasing preservice teacher knowledge of life sciences through hands-on experiences with live insects and related arthropods**

Faith J Weeks, *Towson University*

This presentation discusses the benefits and challenges of using live insects & related arthropods in preservice elementary instruction in life sciences. These animals are inexpensive, easy to care for, and can illustrate many life science concepts. This study found that using living “creepy crawlies” when teaching animal biology & behavior significantly increased student understanding of the topic.

*Format:* Poster Presentation

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Thread: Preservice Science Teacher Preparation

**Preservice Science Teachers’ Impressions of Initial Teaching Experiences and the Impact of Those Experiences on Motivation for Choosing Teaching as a Career**

Toshinobu Hatanaka, *Toho University*, William (Bill) F McComas, *University of Arkansas*

This research aims to find preservice teachers’ impressions of initial teaching practice and its effects on their motivation. The survey is conducted to the enrollees of the first class of the U Teach program called Step 1. From the survey result, it is clarified that initial teaching practice does not cause much anxiety or discomfort, and their motivations are increased through their initial teaching practice.

*Format:* Poster Presentation

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Thread: Preservice Science Teacher Preparation

**Accessing Science through Wonder: The Use of Wonder Journals and a Wonder Investigation Project with Pre-service Elementary Teachers**

Christie C. Byers, *George Mason University*, Andrew Gilbert, *George Mason University*

We share the findings from a study examining pre-service elementary teachers’ responses to a pedagogy designed to evoke wonder within a science methods course through the use of wonder journals and a wonder project. The results point to the potential of wonder to give future teachers the pedagogical courage necessary to make room in their future classrooms for meaningful and authentic science instruction.

*Format:* Poster Presentation  *Presider:* Jenna Porter
Thread: Preservice Science Teacher Preparation

**STEM Picture Books: An integrated and collaborative STEM project for Preservice Elementary Methods teachers.**

Kathy L Malone, The Ohio State University, Theodore Chao, The Ohio State University, Hochieh Lin, The Ohio State University, Ayse Ozturk, The Ohio State University

The STEM picture book project is an integrated project between two early elementary education Mathematics and Science education methods courses instructors. The presentation will discuss the project that integrates STEM as well as connects to issues of equity and social justice.

*Format: Poster Presentation*

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Thread: STEM Education

**Establishment of the STEM experimental materials in Japan -using Vargula hilgendorfii-**

Naoko Kosaka, Shizuoka University and Katoh Gakuen Gyoshu junior and senior high school, Yoshisuke Kumano, Shizuoka University

STEM education, though it is widely used in other countries such as America, is not very familiar to educators in Japan. Currently, educators in Japan are reviewing its school practices to help students develop the 21st century skills. In this study, student activities are designed using the STEM framework; and Vargula hilgendorfii is mainly used and its validity will be verified as a STEM experimental material.

*Format: Poster Presentation*

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Thread: Preservice Science Teacher Preparation

**A Multi-Institutional Approach to Methods Courses to Improve Pre-Service Teacher Understanding and Implementation of a NGSS-aligned Teaching Approach**

Mark McDermott, University of Iowa, John Bedward, Buena Vista University

A pilot program involving elementary and secondary science methods students from two diverse institutions collaborating on coursework to help develop a thorough understanding of effective instructional practices aligned with the NGSS will be described. Measures of impact on student self-efficacy, epistemic orientation, and ability to implement effective pedagogical practices will be presented.

*Format: Poster Presentation*

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Thread: Preservice Science Teacher Preparation

**Pathways to Science: Addressing a Critical Need to Prepare Science Teachers Through The NSF Noyce Program**

Andre Green, University of South Alabama, Susan Martin, University of South Alabama

Noyce Pathway to Science is a collaborative program between a university’s College of Education, Arts and Sciences, and local school system. The program addresses the need to increase the number of science teachers by enabling recent graduates to complete a master’s degree and science certification in an intensive four semester program. Participants are supported for at least two years after graduation.

*Format: Poster Presentation*
Thread: Preservice Science Teacher Preparation

**A Comparison of STEM vs. non-STEM majors as career changers in the middle school classroom**

Michelle Fowler, *Clemson University*, Lienne Medford, *Converse College*

This NSF-funded longitudinal study looks at the self-efficacy and effectiveness of STEM vs. non-STEM majors as career changer teachers in the middle school math and science classroom. Survey, interviews, and K-12 student scores are used to support conclusions.

*Format: Poster Presentation*

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**The Diverse Experiences of Four First Year Teachers in Urban Education**

Mindy Chappell Bonilla, Jennifer Clay-Akakpo, Diana Bonilla, Erin Cathcara, Melanie Butler

The findings and projects were in response to teaching in an urban Chicago communities, incorporating NGSS practices, and both culturally relevant and socially just practices to teach science courses.

*Format: Poster Presentation*

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Thread: Science Teacher Professional Development

**The Use of The Reformed Teaching Observation Protocol in an Elementary STEM Initiative**

Carolyn Parker, *American University*, Erica Smith, *Tulane University*

Our paper describes a study that examines the use of the Reformed Teaching Observation Protocol (RTOP) to assess elementary teachers’ STEM instruction in a large-scale, elementary STEM initiative. The initiative included the development of an integrated STEM curriculum for grade K-5 with accompanying teacher professional development. Findings inform the use of the RTOP in an elementary STEM classroom.

*Format: Poster Presentation*

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**Exploring Computational Thinking with Pre-service Science Teachers**

Amanda Peel, *University of Missouri*, Patricia Friedrichsen, *University of Missouri*

NGSS calls for incorporating computational thinking (CT) into science classrooms. As a whole, teachers are not prepared to incorporate CT into science classrooms. This exploratory study investigates pre-service teacher (PST) learning about CT and sense-making with CT. The study provides examples of CT activities integrated into PST education and how PSTs engage with CT to make sense of the teaching process.

*Format: Poster Presentation*

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**Preparing Elementary Teachers to Support Academic Vocabulary in Science**


Two elementary teacher educators, one science and the other literacy, explored the development of elementary pre-service teachers’ science content and process vocabulary knowledge and applications during an elementary science methods course. Study results revealed growth in science vocabulary knowledge, varied applications of science vocabulary use, and interviews round out triangulation of data.

*Format: Poster Presentation*
How well does edTPA predict the quality of inservice science teachers’ instruction?

Dawnne M LePretre, Illinois Institute of Technology, Selina L Bartels, Concordia University, Judith S Lederman, Illinois Institute of Technology

The edTPA is used as a benchmark in the licensure of preservice teachers. This raises the question of how well it predicts teacher practice in the classroom? This study looked at three inservice mathematics and science teachers’ who passed the edTPA. The teachers’ preservice to inservice scores were compared and it was determined that two of the three teachers scored the same or better on their inservice edTPA.

Format: Poster Presentation

What’s a Crosscutting Concept? Cataloging Preservice Elementary School Teachers’ Understandings

James Minogue, NC State University

This poster session documents preservice elementary school teachers’ (N=108) conceptualizations of the Crosscutting Concepts presented in Next Generation Science Standards (NGSS). Through summative content analysis it catalogs their preexisting definitions and curricular examples. Implications for science teacher education are highlighted.

Format: Poster Presentation

Finding the Methods in Methods Education

Colby Tofel-Grehl, Utah State University, Emily Olsen, Utah State University

Teacher education programs require students to successfully complete methods courses in content areas. However, little formalized research exists exploring the content of those methods classes. This paper offers a dual analysis of secondary and elementary science methods class syllabi. Findings indicate that methods courses often fail to focus on instructional methods specific to science instruction.

Format: Poster Presentation

Integrating Service Learning and Science Methods for K-8 Teachers

Jenna Porter, Sacramento State

Preservice teachers are often faced with tension between theory and practice. Service learning is one method for bridging the disconnect that is mutually beneficial for preservice teachers and community partners. I’ve integrated service learning in my science methods course to provide authentic experiences for practicing the effective pedagogical strategies and theories learned in the course.

Format: Poster Presentation

Investigating Student Attitudes and Achievements in K-12 STEM Classrooms: A Preliminary Meta-Analysis

Ibrahim H Yeter, Purdue University, Cristina Diordieva, Texas Tech University

This study provides preliminary results on the relationship between student’s attitude and achievement in K-12 STEM classrooms. The study uses meta-analysis technique to examine 10 qualified recent studies consist of 18 effect sizes. There is a total number of 25,113 K-12 students participated in and out of the U.S with various effect sizes among the grade levels.

Format: Poster Presentation
Thread: Educational Technology

Can dissection alternatives replace traditional dissection in the biology classroom?


We created HAPI Helix, a digital 3D model of Helix pomatia (edible snail) as an anatomically-realistic, testable alternative to dissection. Differences in user learning with HAPI Helix vs. traditional dissection were evaluated for museum visitors, university students, and professors, providing much-needed data on the effectiveness of dissection alternatives for learning.

Format: Poster Presentation

Thread: History, Philosophy, and Nature of Science

Convergent educational design of science history in Korea

Yunji Kim,

In Korea, many universities have interest in big history and started to open the curriculum. In this study, big history literatures were analyzed in order to extract science concepts that could be included in convergence lessons. In addition, “Maps of Time” was analyzed in order to utilize it as class material for big history to examine how to apply it in pre-service science teacher’s conversion classes.

Format: Poster Presentation

Thread: College and University Science Education

Evidence-based Supports for Students with LD & EBD in Inclusive Science Classrooms

Jonte Taylor, Pennsylvania State University

The poster will present research and support for specific evidence-based strategies for improving science achievement for students with learning disabilities and emotional/behavioral disorders in inclusive settings.

Format: Poster Presentation

Thread: International Science Education

Science Education Research Trends in Latin America

William Medina, University of Texas at El Paso

The purpose of this study was to survey and report on the empirical literature at the intersection of science education research in Latin American and previous studies addressing international research trends in this field.

Format: Poster Presentation

Thread: Educational Technology

Training the Trainers: Designing the Power of Data Facilitation Academies

Brooke A Whitworth, University of Mississippi, Nena E Bloom, Northern Arizona University, Megan C Walker, Northern Arizona University, Lori A Rubinho-Hare, Northern Arizona University

This design-based research study examined two cycles of development, enactment, analysis, and redesign of the Power of Data (POD) Facilitation Academies. Facilitators’ geospatial technology skills, understanding of POD Principles, and preparation for implementing POD Teacher Workshops informed the process. We begin to generate design principles for scaling up teacher professional development.

Format: Poster Presentation
Thread: Curriculum, Pedagogy, and Assessment

Scientific Argumentation for Increasing Science Literacy
Carolanne Grogan, Texas Tech University
Teachers were trained on using argumentation strategies to aid science teachers in meet their new science standards which emphasize science literacy. To evaluate the effects of implementation of these strategies, students’ scientific literacy will be measured and teachers will keep journals and be interviewed to document the evolution of students’ argumentation skills and teachers’ attitudes.
Format: Poster Presentation

Thread: Preservice Science Teacher Preparation

A literature synthesis of Modeling-Oriented assessment as a form of Authentic Assessment and implications for Science Teacher Preparation
Young Ae Kim, University of Georgia, J. Steve Oliver
This synthesis of the research literature establishes connections between the scholarship on modeling-oriented assessment, authentic assessment and pre-service science teacher education. Recommendations for the preparation of science teachers in keeping with the directives of the NGSS are drawn from the interconnections of these three distinct areas of scholarship.
Format: Poster Presentation

Thread: Science Teacher Professional Development

Increasing elementary teacher science self-efficacy through cross level teaching experiences
Elisabeth Pope, University of North Texas
The study proposed in this paper suggests utilizing the concept of cross-level mentoring by combining primary and secondary teachers and their students for combined instruction to increase elementary teacher self-confidence and self-efficacy for teaching science.
Format: Poster Presentation

Thread: College and University Science Education

The Nature of Solutions and Solubility-Diagnostic Instrument English Language Version (NSS-DI Eng) pilot evaluation for alignment to US test and item layout norms
Mandy McCormick Smith, The Ohio State University, Jon Breiner, University of Cincinnati
Statistical findings revealed the NSS-DI Eng V.1 was useful in terms of diagnosing students’ ideas about solution chemistry concepts (Authors, 2016a;b; in review). However, data pointed that specific test items could be improved upon including the translation of text features and the visual layout of selected questions to be more like traditional American large-scale tests, e.g. ACT, SAT, etc.
Format: Poster Presentation

Thread: Ethnoscience and Environmental Education

Merging classroom and field-based investigation to support students’ understanding of water quality: The impact of a science field camp experience
Cathy Wissehr, University of Arkansas, Lisa Wood, University of Arkansas, Madison Brown, University of Arkansas
Students studied macroinvertebrates as water quality indicators through a variety of hands-on activities during a residential field-based environmental education experience with student drawing used to analyze the impact of concepts learned. Results demonstrated a decrease in understanding environmental issues in general, but an increase related to macroinvertebrates as indicators of water quality.
Format: Poster Presentation
**Thread: Curriculum, Pedagogy, and Assessment**

**Learning about culturally relevant pedagogy and simple machine through the creation of a cultural book**

Line A. Saint-Hilaire, Queens College/CUNY

In this case study, I used the integration of one strategy, the creation of a culture and science book, to bring cultural awareness and scientific knowledge to teachers within the context of learning science and provide them with a strategy that they can replicate. The tenets of culturally relevant pedagogy were used to understand how teachers learned cultural practices and scientific concepts.

*Format: Poster Presentation*

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**Thread: Preservice Science Teacher Preparation**

**Using Action Research to Improve an Elementary Preservice Teacher’s Science Self-Efficacy**

Melanie E. Kinskey, University of South Florida

Elementary preservice teachers consistently display low confidence in their abilities to teach science. This poster explores one elementary preservice teachers’ encounters as she practices action research to improve her self-efficacy while engaging in authentic experiences teaching science in the classroom.

*Format: Poster Presentation*

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**Thread: Science Teacher Professional Development**

**A Scientist, Teacher Educator and Teacher Collaborative: Innovative Professional Learning Design focused on Climate Change**

Mary K Stapleton, Towson University, Asli Sezen-Barrie, University of Maine

We describe an innovative professional learning (PL) workshop on climate change for secondary science teachers designed to improve teachers’ capacity to deliver effective three-dimensional instruction. We present the structure and goals of the workshop, describe how theories of effective PL drove the design, and address the affordances and challenges of implementing this type of PL experience.

*Format: Poster Presentation*

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**Thread: Ethnoscience and Environmental Education**

**Before the mangroves disappear: Moving towards education for sustainability in the education of prospective science teachers**

Deborah Tippins, University of Georgia, Sophia (Sun Kyung) Jeong, UNIVERSITY OF GEORGIA

In this poster session we share how a learning community comprised of prospective and practicing teachers, together with university faculty, engaged with issues of sustainability during a science teacher preparation field experience course. Our poster illustrates the tensions and paradoxes that emerged for us as we entertained new ideas shaping our understanding of sustainability in a rural community.

*Format: Poster Presentation*

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**Thread: Informal Science Education**

**Science Museum and STEM Preservice Teacher Preparation: A Collaboration**

Karen E. Irving, Ohio State University, Patti Brosnan, Ohio State University, Lin Ding, Ohio State University, Brittany Garvin-Hudson, Ohio State University, Sarah Donley, Ohio State University, Craig Kelley, Center of Science and Industry (COSI)

Preservice STEM teachers participated in a field experience at a Local Science Museum (LSM) presenting discovery hands-on learning opportunities with existing STEM carts. Preservice teachers had the opportunity to practice engaging people with science and math content, using language appropriate to the prior knowledge of the visitors, and testing a variety of approaches with the same content.

*Format: Poster Presentation*
Increasing Retention in Large Enrollment Undergraduate Courses by Preparing Faculty to Use Active Engagement Teaching and Learning Strategies

Sandra L Westmoreland, Texas Woman’s University, Tina L Gumienny, Texas Woman’s University

Active learning has been demonstrated to increase college student engagement and, indirectly, student persistence. Students enrolled in high-enrollment classes (>50 students) may be at higher risk of failure. An Active Engagement Academy was formed to train cross-disciplinary university faculty to implement active engagement teaching and learning to promote student retention and academic success.

Format: Poster Presentation

Exploring the Narratives of Youth Consumerism Through a Zika Virus Case: Unintended Consequences of the Commodification of Body, Health, and Diseases in a Science Teaching Methods Course

Sophia (Sun Kyung) Jeong, University of Georgia, Deborah J. Tippins, UNIVERSITY OF GEORGIA, Mutlu Sen, University of Georgia, Sun Young Jeong, Medical College of Wisconsin

To incorporate the discussion of issues in public health into the classroom experience, the course instructors co-wrote a case, “I Love Mother Nature. But, I Want My Nephew To Live: A Debate Over the Zika Virus and the Use of Pesticides.” Upon reflecting on our teaching experience of using the Zika virus case, we realized that our lesson had created an unintended artifact and narratives of youth consumerism.

Format: Poster Presentation

Examinations of cognitive processing of science writing tasks

Douglas Hoston, University at Buffalo, Sabrina Kenny, University at Buffalo, Kim Benowski, University at Buffalo, Richard Lamb, University at Buffalo, Brian Hand, University of Iowa

In this study we demonstrated the ability to distinguish between writing types in science using optical imaging techniques and the impact on learning.

Format: Poster Presentation

Departmentalized Elementary Science Teaching and Learning

Roberta M King, The George Washington University

This qualitative study aimed to understand the experiences of two fifth grade teachers and their principal as they implemented departmentalized science instruction. Interview data revealed positive experiences for all study participants such as increased time to attend to student data to drive instruction leading to improved student achievement.

Format: Poster Presentation

Educational Technology in Top-Tier Science Education Research: A Literature Review

Demetrice Smith-Mutegi, Morgan State University

This paper examines the technology tools implemented in formal and informal K-12 science settings published in top-tier science journals. Findings include the most commonly studied technology tools in physical science, life science, and earth/space science disciplines, as well as their reported impacts on student achievement, dispositions, and behaviors.

Format: Poster Presentation
Thread: Educational Technology

**An Exploratory Study of Video-based Coaching and a Virtual Community of Practice on a Beginning Science Teacher**

Justin McFadden, *University of Louisville*

This study explored the impacts of a classroom-embedded, video annotation tool on a beginning science teacher. The teacher’s virtual community of practice was also explored to better understand the types of supports teachers are investigating to learn about the NGSS and improve their practice.

*Format:* Poster Presentation

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Thread: Science Teacher Professional Development

**Teacher successes, challenges, and student attitudes related to the Science Education Against Drug Abuse Program curricula**

Rhea L Miles, *East Carolina University*

This qualitative study focuses on the successes and challenges of the Science Education Against Drug Abuse Program (SEADAP) program curricula and student attitudes related to drug use.

*Format:* Poster Presentation

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Thread: Educational Technology

**Blended Learning for Differentiation: Co-creating a Blended Science Module**

Lauren Angelone, *Xavier University*

Blended learning is a strategy combining both face-to-face and online components that can differentiate instruction by allowing students some control of the learning experience. In this poster session, one such module co-created between a middle school science teacher and a researcher, will be shared.

*Format:* Poster Presentation

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Thread: Student Learning P-12

**An Analysis of the Effects of Activity based on the Iceberg Model for High School Students’ Systems Thinking**


The purposes of this study are to explore Iceberg(IB) model as a systems thinking analysis tool for high school students, suggest a systems thinking analysis method using rubrics and verify its validity and reliability. For this study, the theoretical basis was examined through literature analysis about IB model and rubrics of evaluating the systems thinking.

*Format:* Poster Presentation

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Thread: Curriculum, Pedagogy, and Assessment

**A model for determining the nature and extent of integration in Engineering Design and Science Integrated Activities**

Frackson Mumba, *University of Virginia*, Vivien M Chabalengula, *University of Virginia*, Laura Ochs, *University of Virginia*, Alexis Rutt, *University of Virginia*

Although current science education reforms call for integration of engineering design in science instruction they do not provide models for characterizing the nature and extent to which engineering design is integrated in science instruction. We present a continuum model for characterizing engineering design and science integrated activities.

*Format:* Poster Presentation
**Undergraduate Students’ Beliefs About Their Motivational Reasons and Hurdles for Pursuing Geoscience as a Major or Geoscience Teaching Certification**


This NSF-funded qualitative study sought to determine undergraduate students’ beliefs about their motivational reasons and hurdles for pursuing geoscience as a major or secondary geoscience teaching certification in a large mid-Atlantic university.

**Factors that Contribute to the Success of African American STEM Professionals**

Yolande K Akexander Nealy, *Wayne State University*

This study examined factors that contribute to the success of African American professionals in STEM careers. Data were collected through a survey from 40 participants and in-depth interviews with eight of them. Results indicate that most of them attributed their choice of a STEM career to early exposure to and positive experiences in science and mathematics mediated by teachers and/or parents.

**Are we underestimating overconfidence? A disconnect between clinical educator and elementary student teacher perceptions of science ability and content knowledge**

Bryan Nichols, *Florida Atlantic University*, Lori Dassa, *Florida Atlantic University*

9:30am - 10:30am in Annapolis - Session A

A practicum coordinator and methods instructor worked together to compare data on science teaching skills and content knowledge between student teachers, their coordinating teachers, and university supervisors. The self-efficacy of the “everybody gets a trophy” generation may be greater than their actual performance; teaching tips and implications for teacher education programs are discussed.

**I Can Be a Scientist! Possible Selves, Conceptual Change, and Elementary Teacher Self-Efficacy in an NGSS Context**

Teresa M. Woods, *Fort Hays State University*

9:30am - 10:30am in Annapolis - Session B

This study analyzes essays of pre-service elementary teachers describing the effects a science methods course had on their conceptions of science and scientists, their identities as science teachers, and the course elements that caused these changes, including learned strategies. Based on NGSS reforms, the course serves predominantly online students, yet incorporates social learning effectively.

**Comparison of teacher preparedness between face-to-face and online elementary science methods courses**

John L Pecore, *University of West Florida*, Jennifer Mesa, *University of West Florida*, Benjamin M Waller, *University of West Florida*

9:30am - 10:30am in Annapolis - Session C

To address the deficit of studies examining online science methods courses, this study compared state exam pass rates of students enrolled in face-to-face and online science method courses. Findings revealed no statistical difference. Thus, an online course using the UDL framework to account for usability, interactivity and reflection can provide equitable access for non-traditional education majors.
**Thread: Student Learning P-12**

**Ins and Outs of Digestion for Middle School Students via 5-E Model**
Mohammed A Qazi, Tuskegee University, Shaik Jeelani, Tuskegee University, Ruth Lidell, Alabama State University, Shirley Scarbrough, Carol Banks, Tuskegee University

*9:30am - 10:30am in Baltimore - Session A*

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

*Format: Experiential Session*

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**Thread: STEM Education**

**Building a Growth Mindset through Engineering & Integrative STEM Education**
Bryanne M Peterson, Virginia Tech

*9:30am - 10:30am in Camden/Lombard - Session A*

Engineering is STEM’s key to unlocking the growth mindset in our students. Come take a walk through the engineering design process and see how engineering is well-situated to integrate instructional strategies and increase student achievement while your students’ build a growth mindset. Get hands-on in design challenge and engage in pedagogical content knowledge discussion with feedback and ideas.

*Format: Roundtable*

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**Thread: Science Teacher Professional Development**

**Using the MASTER model framework to support teachers in incorporating research practices in the secondary classroom**
Kathleen M. Hill, Pennsylvania State University, Amanda J. Smith, Pennsylvania State University, Matthew M. Johnson, Pennsylvania State University, Annamarie R. Ward, Pennsylvania State University

*9:30am - 10:30am in Charles - Session A*

Recent STEM education reforms emphasize the learning of disciplinary ideas through the practices of experts, however, teachers often lack experience in research. Immersion experiences in research settings support teachers to increase their knowledge of content and the practices. Using the MASTER model framework, two secondary teachers were able to plan and implement practices-based instruction.

*Format: Traditional Paper Set  Presider: Deb Hemler*

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

**Helping students “see like a geologist” using virtual field experiences (VFEs)**
Glenn Dolphin, University of Calgary, Brandon Karchewski, University of Calgary, Alex Dutchak, University of Calgary, Jonathan Cooper, University of Calgary

*9:30am - 10:30am in Charles - Session B*

Enrollments in the geology department have quadrupled in recent decades at the University of Calgary. This has placed stress on resources, including the discontinuation of essential field trips. We help students to “see like a geologist” using our virtual field experiences built from high resolution visual data collected by drone technology from specific areas of geologic significance in Western Canada.

*Format: Traditional Paper Set  Presider: Deb Hemler*
**Cultivating Environmental Problem Solvers in Urban settings: An Innovative Aquaponics’ System ‘For Teachers, By Teachers’**

Yvonne Franco, *University of Tampa*

9:30am - 10:30am in Charles - Session C

Urban settings necessitate innovative thinkers to solve environmental challenges. This study presents data from an intensive Aquaponics’ system launch, whereby inner city teachers used the system to support environmental learning in classrooms. Teachers designed curriculum for future teachers to use the system. A qualitative approach assessed ways the technology supported K-12 teaching and learning.

*Format:* Traditional Paper Set  *Presider:* Deb Hemler

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**Multimodality, Culturally Relevant Teaching, and STEM**


9:30am - 11:30am in Chesapeake A

Multimodality and CRT are two important considerations in science education. A growing national emphasis on STEM lends importance to the implementation of multimodal approaches in STEM learning environments that will allow teachers to adopt a CRT stance. A hands-on engineering activity (designing a robotic arm) will provide the basis for discussion of multimodality and CRT and their usefulness for teaching.

*Format:* Workshop

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**Using the NSTA Learning Center as an Online Textbook for Teaching Science Pre-service Teachers**


9:30am - 11:30am in Chesapeake B

Use the NSTA Learning Center to create a customized online textbook to enhance your science pre-service teachers’ content and pedagogical knowledge. The portal has a plethora of resources (many NGSS-aligned), a suite of tools, and an online community. Professors using the Center will be present to answer questions. [http://learningcenter.nsta.org/etextbook](http://learningcenter.nsta.org/etextbook)

*Format:* Workshop

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**Meet the JSTE Editors**

9:30am - 10:30am in Columbia

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**Integrating a Writing Activity in College Science Classrooms: Focusing on Resources and Demands for Scientific Literacy**

Sae Yeol Yoon, *Delaware State University*

9:30am - 10:30am in Douglass - Session A

This qualitative research examined the effects of feedback from 43 fifth grade students on 28 college students’ understanding of science and use of language in an interactive letter-writing task. The study explores an integrated science-literacy enactment in K-12 schools and college that implement a writing-to-learn approach to improve scientific literacy.

*Format:* Traditional Paper Set  *Presider:* Timothy Laubach
Thread: College and University Science Education

The Characteristics of Pedagogical Content Knowledge (PCK) in Community College Biology Instructors
Brandy L. Bowling, North Carolina State University
9:30am - 10:30am in Douglass - Session B

This multiple case study characterized the pedagogical content knowledge of four community college biology instructors. Four themes were identified, including teacher-centered orientations, time as a limiting factor, use of visual and verbal representations to enhance student learning, and limited use of formative assessment. Implications for community college professional development is discussed.

Format: Traditional Paper Set
Presider: Timothy Laubach

Thread: College and University Science Education

Using Geospatial Thinking And Reasoning Skills To Examine Vector Borne Disease Transmission Through Web GIS In Undergraduate Students Studying Public Health
Rajika E Reed, Lehigh University, Alec M Bodzin, Lehigh University
9:30am - 10:30am in Douglass - Session C

The implementation of an interdisciplinary public health curriculum that used Web GIS mapping to investigate global Vector Borne Disease Transmission through examination of patterns, data, along with the role of environmental and social factors is presented. Professional development implications for higher education faculty are discussed.

Format: Traditional Paper Set
Presider: Timothy Laubach

Thread: Science Teacher Professional Development

Supporting teacher development: Science teacher trajectories
Julie A Luft, University of Georgia, Brooke Whitworth, University of Mississippi, Shannon Navy, Kent State University, Amanda Berry, Royal Melbourne Technical Institute, Vanessa Kind, Durham University
9:30am - 10:30am in Frederick - Session A

Phases in teachers’ careers necessitate different professional learning opportunities. This means that knowledge bases, practices, and attributes need cultivating in different ways. How to progressively link professional learning opportunities to support teacher development is important to consider. This paper illustrates one approach to support ongoing teacher learning.

Format: Traditional Paper Set

Thread: Science Teacher Professional Development

Supporting K-12 Teachers’ Instruction about Water using Scientific Modeling: Looking Across Multiple Projects
Tina Vo, University of Nebraska-Lincoln, Cory T Forbes, University of Nebraska-Lincoln
9:30am - 10:30am in Frederick - Session B

Over the past five years, our research has focused on the designed and implementation of multiple programs which focus on professional learning of both preservice and inservice teachers. A consistent thread in this work has been an emphasis on scientific modeling to teach and support students’ learning about water systems.

Format: Traditional Paper Set
Middle School Science Teachers’ Pedagogical Orientations Towards Inquiry Instruction
Alexis Rutt, University of Virginia, Frackson Mumba, University of Virginia, Laura Ochs, University of Virginia
9:30am – 10:30am in Frederick - Session C
This study assessed middle school science teachers’ pedagogical orientations towards inquiry science teaching before and after professional development. Results showed an increase in pedagogical orientations towards inquiry instruction among teachers after the intervention. Results have implications on teacher preparation, teaching and learning.
Format: Traditional Paper Set

Knowing the how, but not the why: Teachers’ struggles integrating literacy and STEM in an Elementary STEM school
Jonah B Firestone, Washington State University, Judy Morrison, Washington State University, Sarah N Newcomer, Washington State University
9:30am - 10:30am in Pratt/Calvert - Session A
This presentation focuses on struggles and tensions that teachers face at a new elementary STEM school as they integrate both STEM and literacy instruction. Our findings suggest that there are key structures/processes that support teachers in successfully integrating literacy and STEM. Finally, we will conclude with implications/suggestions for how teachers might overcome such tensions and struggles.
Format: Traditional Paper Set Presider: Frederick Bradley

STEM Education through Project Based Learning Lesson in Wastewater Issue
Lely Mutakinat L. M Mutakinat, Shizuoka University, Kumano K. Y Yoshisuke, Shizuoka University
9:30am - 10:30am in Pratt/Calvert - Session B
This research was conducted by 160 first grade Japanese middle school students. This STEM education-PBL lessons asked students to make wastewater treatment system. The findings were most of students’ solutions are filtering and evaporation. However, some students used biological solution (micro organism and okra). Besides, students’ critical thinking skill were classified in six stages.
Format: Traditional Paper Set Presider: Frederick Bradley

21st Century Learning Design in STEM Lessons: Shifting to Student Responsibility for Learning
Stephanie M Stehle, George Mason University, Erin E Peters-Burton, George Mason University
9:30am - 10:30am in Pratt/Calvert - Session C
Lesson plans and student work from eight exemplar Inclusive STEM High Schools were analyzed using the Microsoft Partners’ 21st Century Learning Design Rubrics to assess how responsibility for learning was shifted to the students. Discussion will include the differences found in short-term and long-term lesson plans as well as how small changes can lead to shifts toward student responsibility for learning.
Format: Traditional Paper Set Presider: Frederick Bradley
Using GIS tools to investigate socio-environmental science in the secondary classroom: Exploring the Urban Heat Island effect
Kate Popejoy, Popejoy STEM LLC, Thomas Hammond, Lehigh University, Alec Bodzin, Lehigh University, William Farina, Lehigh University, David Anastasio, Lehigh University, Breena Holland, Lehigh University, James Carrigan, Lehigh University, Scott Rutzmoser, Lehigh University, Dork Sahagian, Lehigh University
9:30am - 10:30am in President (1st Floor) - Session A
Come explore our NSF supported project that has developed a series of novel socio-environmental science investigations (SESI) using a geospatial curriculum approach. In this session, we present our project and conduct a sample investigation on the Urban Heat Island (UHI) effect. Bring your mobile phone, and be ready to gather geospatial data outdoors.
Format: Experiential Session

Short Coffee Break
10:30am - 10:45am in Bistro 300 and Foyer Area

The Role of Institutional Talk in Shaping Preservice Teacher Construction of Scientific Arguments
Brent Gilles, University of West Georgia, Gayle A Buck, Indiana University
10:45am - 11:45am in Annapolis - Session A
Research concerning preservice teachers constructing scientific arguments has largely focused on analyzing the end products. While this approach has yielded valuable insights into their abilities to construct arguments, it does not shed much light on the processes undertaken to do so. The purpose of this study was to examine how preservice teachers discursively constructed scientific arguments.
Format: Traditional Paper Set

Beyond the classroom: Advancing preservice teacher’s pedagogy to include out-of-classroom learning experiences
Kelly K Feille, University of Oklahoma
10:45am - 11:45am in Annapolis - Session B
This paper investigates how out-of-classroom learning experiences of preservice science methods students influences the inclusion of out-of-classroom learning included in student-constructed 5E lesson plans.
Format: Traditional Paper Set Presider: Jenna Porter

STEM Lesson Studies: A Preservice Teacher-Driven Professional Development Model
Jeni R Davis, Salisbury University, Michele Wiehagen, Hillsborough County Public Schools
10:45am - 11:45am in Annapolis - Session C
This session describes a university-district partnership that utilized STEM lesson studies in an elementary teacher preparation program. The aim of this study is to understand the impact of lesson studies as a professional development model on preservice teachers’ understanding of STEM teaching and learning.
Format: Traditional Paper Set Presider: Jenna Porter
Helping Learners Make Sense of Complex Inscriptions
Kevin D. Finson, Bradley University, Jon E Pedersen, University of South Carolina
10:45am - 11:45am in Baltimore - Session A
This session focuses on the application visual inscriptions to teach science concepts. We will work with a variety of science inscriptions to reveal salient versus perceived areas of interest in them. Implications for designing, selecting, and using visual inscriptions will be discussed.
Format: Experiential Session

Socially Situated Science Practice: Access to Science through an Integrated Science, Language, and Mathematics program for ELL
Molly H. Weinburg, Texas Christian University, Cecilia Silva, Texas Christian University, Kathy H Smith, Tarleton State University, Yohanis de la Fuentes, Texas Christian University, Daniella Biffi, Texas Christian University, Stacy Vasquez, Texas Christian University, Shelly Wu, Texas Christian University, Allison Silveus, Texas Christian University
10:45am - 11:45am in Camden/Lombard - Session A
This paper-set addresses the equity issue of access to science for ELL newcomers in middle school. Each paper explores how language development and conceptual understanding co-depend and co-develop during a language-rich, inquiry-based science unit. We describe the instructional practices and provide evidence of effectiveness.
Format: Themed Paper Set

Integrating instructional methods: A learning cycle approach to teaching ‘What is Science’
Meredith Park Rogers, Indiana University - Bloomington, Alex Gerber, Indiana University - Bloomington, Jing Yang, Indiana University - Bloomington, Ranu Roy, Indiana University - Bloomington, Roshan Lamichhane, Indiana University - Bloomington, Jared Allen, Indiana University - Bloomington
10:45am - 11:45am in Charles - Session A
We examine a pedagogical approach for developing preservice or inservice teachers PCK for ‘what is science’; emphasizing NOS specifically and its relationship to the body of knowledge and methods of science. Instructional materials used and results of the participants’ (preservice teachers in this case) knowledge and abilities to incorporate NOS within the broader concept of what is science will be shared.
Format: Traditional Paper Set Presider: Meredith Park Rogers

Elementary teacher actions and processes when planning instruction that scaffolds science academic language through an instructional coaching partnership
Karl G. Jung, University of South Florida
10:45am - 11:45am in Charles - Session B
In order for students to authentically engage in science learning, they must access the academic language found in science classrooms. For this to occur, teachers must provide scaffolds that support this use. This presentation examines the actions and processes that one elementary teacher engaged in when planning scaffolds for science academic language through an instructional coaching partnership.
Format: Traditional Paper Set Presider: Meredith Park Rogers
Developing the tool analyzing the components of science competency with indicators and its implementation in STEAM program

Young Shin Park, Chosun University, Miso Park, Chosun University, Gu Reum Park, Chosun University

10:45am - 11:45am in Charles - Session C

This study was to suggest the tool measuring the components of science core competency envisioned and their indicators in the revised science curriculum in 2015 of Korea. The science competency analyzing tool was employed to see what components of science competency were more used and how much they were exposed in the exemplary STEAM program, which is for constructing tool’s validity and its reliability.

Investigating Elementary Teachers’ Evolving Tensions with Integrating Engineering Design-Based Science Instruction

Jeffrey D Radloff, Purdue University, Brenda Capobianco, Purdue University

10:45am - 11:45am in Columbia - Session A

The purpose of this study was to identify and characterize the evolving tensions elementary school teachers experienced as a result of integrating engineering design-based science instruction. Tensions shifted from logistical to pedagogical in nature, and revealed a recognition by teachers of their shifting classroom roles as facilitators.

Strengthening High School Science Teachers’ Inquiry Instruction through an Authentic Green Chemistry Research Experience

Suzanne Nesmith, Baylor University

10:45am - 11:45am in Columbia - Session B

This study explored the impact of an authentic, scientist-teacher partnership research experience on high school teachers’ understanding and utilization of classroom-based inquiry instruction in general and green chemistry specifically. Findings provide implications for professional development experiences and attainment of classroom-based inquiry instruction goals.

Teacher Attrition: Comparing Retention between Traditional and Alternate Route Certified Teachers

Gabriel A Posadas, Mississippi State University, Katie Huston, Mississippi State University, Aressa Coley, Mississippi State University, Ryan Walker, Mississippi State University

10:45am - 11:45am in Columbia - Session C

Harnessing the power of Mississippi’s State Longitudinal Data System (SLDS), this study examines the magnitude of teacher attrition among novice teachers. Comprehensively describing the landscape, this analysis assesses the extent of teacher attrition between the two primary licensure pathways in Mississippi: traditional route and alternate route.

Equity Committee I

10:45am - 11:45am in Conway (1st Floor)
**Impacts of the Concept Mapping Strategy in Introductory Biology Courses on Learning & Retention of Underrepresented STEM Students**

Catherine Martin-Dunlop, Morgan State University, Samala Lewis, Morgan State University, Ernest J. Steele, Morgan State University

**10:45am - 11:45am in Douglass - Session A**

This study evaluates how concept mapping when used as a regular learning strategy can affect undergraduate biology students’ self-efficacy, metacognition, and grades. A 43-item survey used with 122 experimental and 84 control group students revealed higher average item means for all seven scales on the posttest due to the intervention. Interviews were also conducted and a rubric used to assess mapping skill.

**Format:** Traditional Paper Set  
**Presider:** Bridget Mulvey

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**STEM Graduate Students’ Changes in Nature of Science Conceptions in a Teaching Methods Course**

Bridget K Mulvey, Kent State University, Lindsay B Wheeler, University of Virginia, Jennifer L Maeng, University of Virginia, Randy L Bell, Oregon State University

**10:45am - 11:45am in Douglass - Session B**

This investigation explored 13 STEM graduate students’ conceptions following explicit, reflective NOS instruction in a science pedagogy course. Participants held more informed NOS views after instruction. Prior research experiences were connected to participants’ NOS conceptions and dispositions toward NOS-specific instructional approaches.

**Format:** Traditional Paper Set  
**Presider:** Bridget Mulvey

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**The World in a River: Designing an Entry-Level Earth Science Course for Preservice Elementary Teachers That Incorporates the NGSS, Active and Placed-based Learning, and Technological Tools**

Danielle Ford, University of Delaware, Susan McGearry, University of Delaware, Jennifer Gallo-Fox, University of Delaware, Cheryl Ackerman, University of Delaware

**10:45am - 11:45am in Douglass - Session C**

We share an earth science course for preservice elementary teachers that is place-based, technology enriched, and aligns with the NGSS. We use a design-based approach for curriculum improvement and a quasi-experimental design for evaluation to test and evaluate the impact of pedagogical approaches on preservice teachers’ science knowledge, self-efficacy for teaching, and motivation to learn science.

**Format:** Traditional Paper Set  
**Presider:** Bridget Mulvey

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**Mental models and instructional shifts: An analysis of teachers’ drawings of science teaching and learning in their classrooms before and after an NGSS-based PD experience**

Carrie-Anne Sherwood, Southern Connecticut State University

**10:45am - 11:45am in Frederick - Session A**

This study employed a mental model framework and analysis of drawings to examine in-service secondary science teachers’ conceptualizations of their science instruction relative to three-dimensional science teaching and learning before and after a three-day NGSS-based professional development experience.

**Format:** Traditional Paper Set  
**Presider:** Anita Martin
Thread: STEM Education

**What is the Science Content in Student Developed IT Projects?**

Helen Meyer, *University of Cincinnati*

**10:45am - 11:45am in Pratt/Calvert - Session A**

In this session we present an evaluation of high school students Information Technology projects. The purpose of the study was to understand the kind and quality of science knowledge students participating in a summer IT program incorporated into group selected projects. The study found students used basic and high level science in the projects.

*Format: Traditional Paper Set  Presider: Helen Meyer*

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Thread: STEM Education

**Framing Technological Literacy: Questions worth exploring in STEM Education**

Michael P. Clough, *Texas A&M University*, Jacob B. Pleasants, *Iowa State University*, Joanne K. Olson, *Texas A&M University*

**10:45am - 11:45am in Pratt/Calvert - Session B**

Our presentation and paper we will provide report a study we conducted of extensive literature regarding the nature of technology (NOT) to determine the fundamental issues about technology that appear within that literature and the thinking of technology scholars regarding those issues. We identify those NOT issues important for STEM education and address the implications for STEM education efforts.

*Format: Traditional Paper Set  Presider: Helen Meyer*

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Thread: STEM Education

**Make to Learn Invention Kits**

James Rutter, *University of Virginia*, Nigel Standish, David Slykuis, Glen Bull, *University of Virginia*, Joe Garofalo, *University of Virginia*

**10:45am - 11:45am in Pratt/Calvert - Session C**

This paper reports on student and teacher outcomes in the implementation of the Make To Learn Invention Kits, an integrated STEM curriculum leveraging key inventions of the 19th Century (e.g., the telegraph and electric motor).

*Format: Traditional Paper Set  Presider: Helen Meyer*

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Thread: Informal Science Education

**Engaging Families in STEM Activities in their Homes: A Mixed-Methods Study**

Kristie S. Gutierrez, *Old Dominion University*, Margaret R. Blanchard, *NC State University*

**10:45am - 11:45am in President (1st Floor) - Session A**

This study investigates the experiences of 42 families from three rural, high poverty schools who participated in quarterly STEM activities in their homes. Families’ level of participation, content knowledge, and perceptions of their experiences were analyzed to better understand novel ways to enhance the link from the school’s STEM Club to an in-home connection.

*Format: Traditional Paper Set*

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**Lunch on Own**

**11:45am - 1:00pm in Lunch on Own**

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**Graduate Student Forum and Business Lunch**

**11:45am - 1:00pm in Pisces (15th Floor)**
Thread: Equity and Diversity

The Practices of Science: Developing Explanations and Assessment for All Students.
Michele J. Koomen, Gustavus Adolphus College, Kevin Finson, Bradley University, Kevin Fleming, Area Cooperative Educational Services Professional Development and School Improvement, Dina Secchiaroli, Area Cooperative Educational Services Professional Development and School Improvement, Judith S. Lederman, Illinois Institute of Technology, Selina L. Bartels, Concordia University
1:00pm - 2:00pm in Annapolis - Session A

This themed paper-set seeks to mediate the gap in the research and published literature in inclusive science teacher education as a needed educational resource for learning about how to educate students with exceptionalities in general education science classrooms, including the pedagogies advanced by the Frameworks and the NGSS.

Format: Themed Paper Set

Thread: Preservice Science Teacher Preparation

Brett A Criswell, University of Kentucky, Joshua Ellis, Michigan Technological University, Shelly Forsythe, Texas State University, Ling Liang, LaSalle University, Jodi Maker, University of Texas at San Antonio, Vishodana Thamotharan, Florida International University
1:00pm - 2:00pm in Baltimore - Session A

A group of science teacher educators has been brought together to identify best practices for using video cases to support the preparation of science teachers. Attendees will explore the challenges of selecting and utilizing video cases, examine the video case analysis framework utilized by our group, become acquainted with video case resources, and pilot the video case analysis framework.

Format: Experiential Session

Thread: Educational Technology

Examining the Impact of a Relatively Short Intervention on Science Teachers’ Robotics Teaching Efficacy Beliefs and Interest in Educational Robotics
Erdogan Kaya, University of Nevada Las Vegas, Ezgi Yesilyurt, University of Nevada Las Vegas, Hasan Deniz, University of Nevada Las Vegas
1:00pm - 2:00pm in Camden/Lombard - Session A

We aimed to examine to what extent science teachers’ robotics teaching efficacy beliefs and interest in educational robotics change as a result of two weeks of classroom intervention about educational robotics as part of a graduate level technology course designed for science teachers.

Format: Traditional Paper Set Presider: Sumreen Asim

Thread: Educational Technology

Prospective Teachers’ Science Conceptual Understanding and Technology Self-efficacy: Affordances of an iPad-based Physics Curriculum
Deepika Menon, Towson University, Matthew Conway, Towson University, Meera Chandrashekhar, University of Missouri-Columbia, Dorina Kostzin, University of Missouri-Columbia
1:00pm - 2:00pm in Camden/Lombard - Session B

We investigate the development of preservice elementary science teachers’ technology self-efficacy and changes in science conceptual understandings as they engage in an innovative iPad-based curriculum, Exploring Physics, in a science content course. The results of the study and implications for preservice teacher preparation for technology integration in future science teaching will be discussed.

Format: Traditional Paper Set Presider: Sumreen Asim
Thread: Educational Technology

Using digital science notebooks to support elementary student learning: Lessons and perspectives from a 5th grade science classroom
Angelina M. Constantine, University of Minnesota - STEM Education Center, Karl G. Jung, University of South Florida
1:00pm - 2:00pm in Camden/Lombard - Session C

This exploratory case study takes an in-depth look at an elementary science teacher’s experiences incorporating digital science notebooks into their classroom. Coaching conversations, observations, student notebooks, and a stimulated recall interview illuminate the ways a teacher plans for digital science notebooks and how they support students’ science learning.

Format: Traditional Paper Set Presider: Sumreen Asim

Thread: Equity and Diversity

Providing Access to STEM Careers through STEM Gems™: A Community and University Partnership Approach
Natalie S King, Georgia State University, Katherine Wade-Jaimes, University of Memphis, Patricia S Dunac-Morgan, Fayette County Schools
1:00pm - 2:00pm in Charles - Session A

In this interactive presentation, attendees will learn strategies on how to foster mutually beneficial partnerships by leveraging community and university resources to engage pre-service teachers in the development of standards aligned lessons that expose children to careers in STEM. Discussions include successes in increasing non-traditional representation in STEM fields.

Format: Traditional Paper Set Presider: Jeffry King

Thread: Equity and Diversity

The Experiences of Successful Women in STEM Fields: A Phenomenological Study
Jonathan L. Hall, University of Central Florida, David N. Boote, University of Central Florida, Malcolm B. Butler, University of Central Florida
1:00pm - 2:00pm in Charles - Session B

This study explored the experiences of successful women serving in science, technology, engineering, and mathematics (STEM) fields. Data included semi-structured interviews and were analyzed using descriptive phenomenological methods. Implications of findings for facilitating programs and lessons aimed to encourage inclusive STEM communities will be discussed.

Format: Traditional Paper Set Presider: Jeffry King

Thread: Equity and Diversity

A Case Study of Family Engagement in STEM Education
Ramya Sivaraj, University of Minnesota, Bhaskar Upadhyay, University of Minnesota
1:00pm - 2:00pm in Charles - Session C

In this case study, we draw from postcolonial discourses to understand family interactions related to STEM experiences and opportunities. After critically analyzing family engagement data from home visits with two suburban families with middle school aged children, two central themes emerged: insecure identities in STEM, and cultural dissonance between a perceived STEM culture and home culture.

Format: Traditional Paper Set Presider: Jeffry King
Thread: Preservice Science Teacher Preparation

Using wonder infused pedagogy to interest preservice elementary teachers in science
Andrew Gilbert, George Mason University, Christie Byers, George Mason University
1:00pm - 2:00pm in Chesapeake A - Session A
This small group roundtable presentation is designed to share and discuss pedagogy infused with wonder. The goal is to both inform members of ASTE for the possibilities of wonder while simultaneously engaging members to assist in the further development of thinking through the concept of wonder as a pedagogical tool with pre-service elementary teachers (PSETs).
Format: Small Group Roundtable

Thread: Ethnoscience and Environmental Education

The Standard Comes First: Place-based Teaching and the Next Generation Science Standards
Regina Toolin, University of Vermont, Michael Blouin, University of Vermont
1:00pm - 2:00pm in Chesapeake A - Session B
The goal of this roundtable presentation is to discuss the outcome of research that examines teachers’ conceptions of project and place-based education and the influence of the NGSS on the design and implementation of a place-based project that teachers create as participants in the Champlain Research Experience for Secondary Teachers or "CREST" program.
Format: Small Group Roundtable Presider: Regina Toolin

Thread: Preservice Science Teacher Preparation

Preparing Pre-Service Science Teachers in Laboratory Design, Safety, and Procedures
Michelle J Childress, University of Arkansas
1:00pm - 2:00pm in Chesapeake B - Session A
Teaching science in the traditional classroom would not be adequate without incorporating effective laboratory experiments. Preparing our pre-service teachers to design and implement a laboratory safety portfolio is imperative to their teaching training. Attendees will be guided through correct chemical storage placement, laboratory design, safety procedures, and student portfolios.
Format: Experiential Session

Thread: Science Teacher Professional Development

Collaborative Professional Development Focused on Promoting Effective Implementation of the Next Generation Science Standards
Sarah A Haines, Towson University
1:00pm - 2:00pm in Columbia - Session A
This study examines the design, implementation, and initial outcomes of a collaborative PD program intended to prepare middle and high school educators to effectively implement the NGSS in classrooms with diverse learners.
Format: Traditional Paper Set Presider: Jeni Davis

Thread: Science Teacher Professional Development

“It’s Like Christmas Morning Every Time I Teach Science”: Stories of Elementary Science Teacher Enthusiasts’ Experiences
Leslie U. Bradbury, Appalachian State University, Rachel Wilson, Appalachian State University
1:00pm - 2:00pm in Columbia - Session B
his study investigates the experiences of elementary science teacher enthusiasts (STEs) using the theoretical framework of narrative framing of identity. We will discuss how these elementary teachers became STEs and how they stay motivated to teach science. Our goal is to learn from these STEs to improve elementary science teacher preparation.
Format: Traditional Paper Set Presider: Jeni Davis
Thread: Elementary Teachers’ Classroom Nature of Science Instruction following PD: Results of a RCT

Jennifer L. Maeng, University of Virginia, Randy L. Bell, Oregon State University, Tyler St. Clair, SUNY - Potsdam, Amanda L. Gonczi, Michigan Technological University, Brooke A. Whitworth, University of Mississippi

1:00pm - 2:00pm in Columbia - Session C

Grades 4 through 6 elementary teachers’ nature of science (NOS) instruction was examined following participation in professional development via an embedded mixed methods randomized control trial. More treatment teachers (66.9%) taught explicit NOS than control teachers (2.2%). Participants most often taught about the empirical and social aspects of science.

Format: Traditional Paper Set Presider: Jeni Davis

Thread: Informal STEM Afterschool Program: Preservice STEM Education Majors, Engineering Majors and Diverse Middle School Students

Anne P Gatling, Merrimack College, Cynthia Carlson, Merrimack College

1:00pm - 2:00pm in Douglass - Session A

We will describe our newly redesigned afterschool STEM program and its impacts on diverse middle school students as well as the STEM Education preservice teachers and Engineering students involved in the Community Partnership Afterschool Programming. Prior survey results had indicated a decrease in girls’ science enjoyment and perseverance.

Format: Traditional Paper Set Presider: Mike Borowczak

Thread: Developing Interest Bleeding Edge STEM Fields like Cybersecurity

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

1:00pm - 2:00pm in Douglass - Session B

How can we develop K12 teacher and student interest in bleeding edge STEM fields that did not even exist five years ago? This work leverages existing best known pedagogical methods in K12 curriculum to expose collegiate STEM majors to a STEM field that has only recently become a hot-field - Cybersecurity! This work leverages K12 classroom and PD experiences to implement a collegiate authentic science experience.

Format: Traditional Paper Set Presider: Mike Borowczak

Thread: The Effectiveness of an Asynchronous Online Module on University Students’ Understanding of the Bohr Model of the Hydrogen Atom

William J Farina, Jr, Lehigh University, Alec M Bodzin, Lehigh University

1:00pm - 2:00pm in Douglass - Session C

We present a Knowledge Integration-aligned online instructional design for a college level first-year chemistry problem solving course. Results of online chemistry learning vs. business-as-usual instruction are presented. Implications for designing online science learning experiences are discussed.

Format: Traditional Paper Set Presider: Mike Borowczak
Thread: Preservice Science Teacher Preparation

Reimagining Preservice Science Teacher Preparation through the Lens of Access and Inclusion
Christopher L. Atchison, University of Cincinnati, Teresa Shume, North Dakota State University, Keri DeSutter, Minnesota State University Moorhead, Jenna Porter, CSU Sacramento, Bill Lindquist, Hamline University, Christina Carnahan, University of Cincinnati
1:00pm - 2:00pm in Frederick - Session A

During this themed paper session, authors of the forthcoming book, Toward Inclusion of All Learners through Science Teacher Education will share their perspectives of Preservice Science Teacher Preparation for promoting inclusive science instruction for students with disabilities.
Format: Themed Paper Set

Thread: STEM Education

Practicing Science and Engineering with a Scientist and an Engineer: The effect on Students’ Career Choices
Mojtaba Eslami Sabet, Shahid Rjaee University
1:00pm - 2:00pm in Pratt/Calvert - Session A

An after school program with the idea of integrating science and engineering practices is designed and implemented in five elementary schools in Iran. A scientist and an engineer went to schools to do the project. The Problem-solving process used for asking questions from students, helping them to learn the content in science, and then taking their attention to how an engineer design can be the outcome.
Format: Traditional Paper Set Presider: Meredith Kier

Thread: STEM Education

Guiding Students Toward STEM Career Pathways
Shana Lee, Mississippi State University, Ryan Walker, Mississippi State University
1:00pm - 2:00pm in Pratt/Calvert - Session B

As the demand for STEM careers increases, undergraduate STEM enrollment is progressing at a slower rate. Student’s social views and misconceptions about STEM career pathways influence career choice. Providing teachers with tools to embed aspects of career explorations into the STEM classroom, may help increase the retention rates in STEM degree programs.
Format: Traditional Paper Set Presider: Meredith Kier

Thread: STEM Education

A Structured and Collaborative STEAM program: Operationalizing a Professional Development Framework
Kristin Cook, Bellarmine University, Sarah Bush, University of Central Florida, Jon Saderholm, Berea College, Christopher Rakes, University of Maryland Baltimore County, Robert Ronau, National Science Foundation, Margaret Mohr-Schroeder, University of Kentucky
1:00pm - 2:00pm in Pratt/Calvert - Session C

This presentation presents a case study of the operationalization of the Professional Development: Research, Implementation, and Evaluation (PrimeD) framework to guide a Science, Technology, Engineering, Arts, and Mathematics (STEAM) professional development program through a collaborative and reflective process.
Format: Traditional Paper Set Presider: Meredith Kier

Unconference: Coffee and Conversations
2:15pm - 3:15pm in Bistro 300 and Foyer Area
Fireside Chat: Kevin Finson  
2:15pm - 3:15pm in Chesapeake A  
Guest: Dr. Kevin Finson, Bradley University (Illinois)  
Moderator: Dr. Joanne Olson, Texas A&M University

Fireside Chat: Felicia Moore Mensah  
2:15pm - 3:15pm in Chesapeake B  
Guest: Dr. Felicia Mensah, Teachers College, Columbia University  
Moderator: Dr. Erin Peters-Burton, George Mason University

Reflection Pools (advance registration required)  
2:15pm - 3:15pm in Pisces (15th Floor)

Manuscript Reviewing 101: Honing your skills to be an effective reviewer  
3:15pm - 4:45pm in Chesapeake A  
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. There will also be time for participants to practice their skills using blind samples submitted to the journals and you will receive one-on-one or small group feedback.

Introducing Preservice Teachers to the NGSS  
Morgan L. Presley, Drury University, Deborah L. Hanuscin, Western Washington University, Tiffany Hill, Emporia State University, Jeni R. Davis, Salisbury University  
3:15pm - 4:45pm in Chesapeake B  
Preservice teachers need to be familiar with the NGSS, its goals and assumptions, and how it applies to practice. Therefore, the purpose of this workshop is to help teacher educators, and specifically elementary science methods instructors, explore ways to introduce the NGSS to preservice elementary teachers, and support preservice teachers’ understanding of the NGSS and its pedagogical implications.  
*Format: Workshop*

*Thread: Preservice Science Teacher Preparation*

Development and comparison of discourse use in student teachers’ inquiry lessons  
Heidi Cian, Clemson University, Michelle Cook, Clemson University  
3:30pm - 4:30pm in Annapolis - Session A  
The purpose of this research is to use discourse analysis to examine how student teachers develop in their implementation of inquiry-based instruction during their student teaching year. Using field observations, interviews, and written reflections from three case students, we identify that particular patterns of discourse differentiate students who grow more markedly in their use of inquiry.  
*Format: Traditional Paper Set Presider: Karl Jung*
Thread: Preservice Science Teacher Preparation

**Elementary Preservice Teachers’ Authentic Inquiry Experiences and Reflections: A Multi-Case Study**
Mahsa Kazempour, *Penn State University (Berks campus)*

3:30pm - 4:30pm in Annapolis - Session B

The aim of this case study was to explore four elementary preservice teachers’ experiences and interpretations of these experiences during their independent authentic inquiry journey, their understanding of the process of science as experienced during the inquiry project, and their perceptions of the implications of their inquiry experiences and willingness to implement an inquiry approach.

*Format*: Traditional Paper Set  *Presider*: Karl Jung

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Thread: Preservice Science Teacher Preparation

**How Secondary Preservice Science Teachers’ having Inquiry Orientations View Inquiry Instruction: Implications for Practice in Science Teacher Education**

Peggy D. Ward, *University of Arkansas,* William F. McComas, *University of Arkansas*

3:30pm - 4:30pm in Annapolis - Session C

Does preferring inquiry instruction over other instructional methods equate to having accurate conceptions of inquiry? Join us to learn how five secondary preservice science teachers who indicate having inquiry instructional preferences view the pedagogy of inquiry. Implications for practice in science teacher education will be discussed.

*Format*: Traditional Paper Set  *Presider*: Karl Jung

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Thread: Preservice Science Teacher Preparation

**Creating Next Generation Science Standards-Based Experiences for Future Science Teachers**


3:30pm - 4:30pm in Baltimore - Session A

This session provides space for a dialogue with former ASTE Teaching Award winners who will facilitate an experiential session about different models for reforming or realigning teacher preparation programs in light of new emphases in science education.

*Format*: Experiential Session

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Thread: Ethnoscience and Environmental Education

**Filipino Preservice Teachers’ Level of Environmental Literacy and Views toward STS and STS-based Instruction**

Aidin Amirshokoohi, *DeSales University,* Boyce Jubilan, *DeSales University*

3:30pm - 4:30pm in Camden/Lombard - Session A

Implementation of Science, Technology, Society (STS) curriculum requires that teachers’ beliefs be compatible with the STS framework and they possess a positive attitude and sense of willingness and confidence to adopt STS-based instruction. This study aimed to explore Filipino elementary preservice teachers’ levels of environmental literacy and views toward STS issues and STS-based instruction.

*Format*: Traditional Paper Set  *Presider*: Justin McFadden
How Citizen Science May Be Integrated into the Science Classroom Using Twitter
Kayla R. Norville, North Carolina State University
3:30pm - 4:30pm in Camden/Lombard - Session B
Citizen science is increasingly used in the K-12 classrooms. This study investigates the social networks of three science teacher hashtags as well as two citizen science hashtags, focusing on the relationships among them to see how science teachers may be connecting with scientists outside the classroom.
Format: Traditional Paper Set  Presider: Justin McFadden

Teaching Evidentiary Reasoning Online with the PERSON framework
Robert B Marsteller, Lehigh University, Alec M Bodzin, Lehigh University
3:30pm - 4:30pm in Camden/Lombard - Session C
This paper presents a study that examined the efficacy of the Promoting Evidentiary Reasoning and Self-regulation Online (PERSON) theoretical framework for online science teaching and learning to promote NGSS scientific practices. Implications for professional development will be discussed.
Format: Traditional Paper Set Presider: Justin McFadden

A First-Year Middle School Science Teacher’s Experiences Navigating Science Content in a Dual Language Immersion Program
Patricia D. Morrell, University of Portland, Erik Mellgren, Madison High School, Sally Hood, University of Portland
3:30pm - 4:30pm in Charles - Session A
Dual language immersion (DLI) programs are offered as a way to address the needs of the students in our classrooms with a primary language other than English. This study examined a first year middle school science teacher’s experience in a DLI program. We focused on his challenges and how he handled the tensions between teaching science content and addressing issues of language development in a DLI environment.
Format: Traditional Paper Set Presider: Anne Gatling

Exploring Multiple Language Use in High School Science Classrooms
Rebecca Konz, University of Minnesota, Karl G Jung, University of South Florida
3:30pm - 4:30pm in Charles - Session B
For high school students learning English, science can be a particularly difficult subject. The use of technical vocabulary, as well as the language of inquiry and argumentation, can present a significant barrier to scientific concepts that students in public school are expected to learn. A possible scaffold to help English learners access science content is to allow for use of their primary home languages.
Format: Traditional Paper Set Presider: Anne Gatling

STEM Readiness: Connecting Science, Engineering and Business Entrepreneurship with Middle School Teachers and Students
Amy Cox-Petersen, Cal State Fullerton, Jidong Huang, Cal State Fullerton, Pradeep Nair, Cal State Fullerton, Kim Case, Cal State Fullerton, John Jackson, Cal State Fullerton, Len Annetta, East Carolina University
3:30pm - 4:30pm in Columbia - Session A
This paper outlines findings related to STEM-Inc, an afterschool program in four southern California middle schools that combines team-based, real-world engineering and computer science projects with business entrepreneurship concepts. The impact of the program on students, teachers, and university student mentors will be presented.

Format: Traditional Paper Set Presider: Morgan Stewart

Thread: Student Learning P-12

Learning the Engineering Design Process through Framework of Youth Participatory Action Research (YPAR)

Meghan Phadke, University of Minnesota, Justine Kim, University of Minnesota

3:30 pm - 4:30 pm in Columbia - Session B

In this study, upper elementary students explored the engineering design process through the framework of Youth Participatory Action Research (YPAR). As teacher-researchers, we argue that YPAR can complement the engineering design process by engaging students in collaborative, systematic inquiry driven by a civic ethic.

Format: Traditional Paper Set Presider: Morgan Stewart

Thread: Student Learning P-12

Project ReCharge: Results and correlations surrounding student achievement and interest in STEM

Catherine Pozarski Connolly, University of Nevada, Reno, David T. Crowther, University of Nevada, Reno

3:30 pm - 4:30 pm in Columbia - Session C

Results from two years of an NSF funded grant, Project ReCharge. Current research shows mixed results for correlations between student achievement and STEM interests of middle and high school students for each year. Focus groups suggest the differences in professional development given each year may be a rationale, supporting the need for strong PD to create higher interests and achievement in science.

Format: Traditional Paper Set Presider: Morgan Stewart

Thread: College and University Science Education

Chemistry students’ understanding of dissolving and associated phenomena: The case of sodium chloride

James M Nyachwaya, North Dakota State University, Katherine Carman, Drake University

3:30 pm - 4:30 pm in Douglass - Session A

This study explored general chemistry students’ understanding of the process of dissolving sodium chloride in water, and the nature and chemistry of the resulting solution. The study also sheds light on students’ use of relevant academic language and the nature of conceptual understanding this revealed.

Format: Experiential Session Presider: James Nyachwaya

Thread: Science Teacher Professional Development

The Impact of a Blended Professional Development Model on Panamanian Elementary Science Teachers

Katie Laux, University of South Florida, Jeni Davis, Salisbury University, Allan Feldman, University of South Florida

3:30 pm - 4:30 pm in Frederick - Session A

This presentation will describe research related to a professional development program designed for elementary science teachers in Panama. The purpose of this mixed-methods study was to explore the effectiveness of this program as related to inservice teacher self-efficacy, nature of science and inquiry skills, and elementary science content knowledge.

Format: Traditional Paper Set Presider: Lisa Borgerding
Ongoing Elementary Science Teacher Mentorship: Reflections on the Benefits of an Extended Apprenticeship Model of Teacher Professional Development

Katie L Brkich, Georgia Southern University, Tamra Lamb, Mattie Lively Elementary School

3:30pm - 4:30pm in Frederick - Session B

This session details the benefits of a long-term post-induction professional mentorship between a practicing fifth grade science and mathematics teacher and her former university elementary science methods instructor. Implications for science teacher education, ongoing professional development, and the creation of scholarship opportunities are discussed.

Format: Traditional Paper Set Presider: Lisa Borgerding

Children’s Ideas about Adaptation

Lisa A Borgerding, Kent State University, Fatma Kaya, Kent State University

3:30pm - 4:30pm in Frederick - Session C

We present findings about young children’s ideas about biological adaptation during two iterations of a preschool science camp. Collected work and interviews with 48 preschoolers revealed age-, biome-, and organism-related trends. Implications for pre- and in-service teacher education as well as curriculum development are provided.

Format: Traditional Paper Set Presider: Lisa Borgerding

Engagement with Technology in Informal Education Settings

Brenda L Bartlett, Texas Tech University

3:30pm - 4:30pm in Pratt/Calvert - Session A

This study is investigating participant engagement with technology in informal education spaces in an effort to improve informal opportunities and strengthen informal and K-12 partnerships.

Format: Traditional Paper Set Presider: Brenda Bartlett

Using Digital Technologies to Explore Student Engagement and Content Knowledge in Informal Science Contexts

Amanda Obery, Montana State University, Nicholas Lux, Montana State University

3:30pm - 4:30pm in Pratt/Calvert - Session B

Better understanding relationships between engagement and learning in informal contexts may play a critical role in improving STEM pathways, especially considering student engagement is a predictor future aspirations in science. As such, this study aims to understand how digital technologies can be implemented in informal science contexts to measure content knowledge and student engagement.

Format: Traditional Paper Set Presider: Brenda Bartlett

Investigating Teacher PLCs in support of an After-School STEM Club: A Comparative Case Study

Kylie J Hoyle, University of Colorado Colorado Springs, Margaret R Blanchard, North Carolina State University

3:30pm - 4:30pm in Pratt/Calvert - Session C

This study investigated the role of a PLC, as a Community of Practice (CoP) in the context of an informal setting (i.e., after-school STEM Club). This research study used the Dimensions of Success (DoS) observation tool to investigate whether or not a higher functioning CoP within a PLC related to higher STEM Club outcomes.

Format: Traditional Paper Set Presider: Brenda Bartlett
Thread: Equity and Diversity

Promoting Language and Literacy in the Science Classroom: Pre-service Collaboration

Annie Duguay, Center for Applied Linguistics, Jennifer Renn, Center for Applied Linguistics, Jillian Wendt, University of District of Columbia, Maria Peters, University of District of Columbia, J’Aron Heard, University of the District of Columbia

3:30pm - 4:30pm in President (1st Floor) - Session A

Introducing students to academic language is a challenge for all teachers, especially as classroom content becomes more complex with college and career readiness standards. This two-hour session will focus on preparing middle school science educators to meet the needs of linguistically and culturally diverse students.

Format: Experiential Session Presider: Anne Gatling

Regional Meetings

4:45pm - 5:45pm

Northeast Region Meeting in Annapolis
Mid-Atlantic Region Meeting in Baltimore
Northwest Region Meeting in Camden/Lombard
Southeast Region Meeting in Chesapeake A
International Region Meeting in Chesapeake B
North Central Region Meeting in Columbia
Southwest Region Meeting in Frederick
Far West Region Meeting in Pratt/Calvert

ASTE Social

6:00pm - 8:00pm in Columbus Center

*ASTE conference name badges are required to enter the Columbus Center and Coast Guard Cutter.

**It’s a short walk from the conference hotel and shuttle busses are available

Join us for an evening social to kick off the ASTE International Conference on Thursday, January 4, 2018. The event will be along the water at the Columbus Center, a short walk from the Hyatt. The event will take place from 6:00 to 8:30 with shuttles departing the event to take ASTE members to a few drop off locations throughout the city.

So be sure to make your dinner reservation early (see below).

We have also arranged for ASTE members to tour the US Coast Guard Cutter TANEY located directly outside the Columbus Center. The 327-foot-long cutter was tied up at Pier 6, Honolulu, where she was able to repeatedly engage Japanese planes which over flew the city during the Pearl Harbor attack. When the attack subsided, TANEY immediately commenced anti-submarine patrol duties off Pearl Harbor.
Inside the Columbus Center, ASTE members will enjoy music from the Towson University Jazz Band while sampling a taste of Baltimore. Hors d’oeuvres and light fare highlighting notable Baltimore foods such as, Crab Balls, Pit Beef, Old Bay Chicken Wings, Cream of Crab Soup, Vegan Macaroni and Cheese, Vegan Wings, Old Bay potato chips, and Goetz candies. We will also offer local craft beer and wine at the best prices you are likely to find in the city.

Be sure to stop by the ASTE backdrop to have your picture taken and instantaneously shared to social media platforms. We’ll be sure to have some props on hand so you can customize your photos.
January 5

Breakfast
6:30am - 8:00am in Bistro 300 /Pisces (15th Floor)

Thread: Preservice Science Teacher Preparation

Identifying phenomenon that support NGSS-aligned instructional planning: Using preservice teacher data to inform faculty understanding through active revision of science methods courses.

Michelle Sinapuelas, California State University East Bay, Larry Horvath, San Francisco State University, Donna Ross, San Diego State University, Meredith Vaughn, San Diego State University, Lin Xiang, Weber State, Corinne Lardy, Sacramento State University, Michele Korb, CSU East Bay, Rachelle DiStefano, CSU East Bay

8:00am - 9:00am in Annapolis - Session A

Phenomenon-based instruction plays a central role in NGSS-aligned classes. As science methods faculty in a Networked Improvement Community, we assigned preservice teachers to identify a phenomenon to anchor instruction as part of developing unit plans. Characterization of these phenomena, faculty shifts resulting from these, and our evolving efforts to support preservice teachers will be presented.

Format: Traditional Paper Set Presider: Mike Borowczak

Thread: STEM Education

RISE-ing to the Occasion: Collaborative Action Research to Improve STEM Teacher Recruitment, Preparation, and Retention

Frederick B Bradley, University of South Florida, Allan Feldman, University of South Florida

8:00am - 9:00am in Annapolis - Session B

This study examined the participation of STEM undergraduates in collaborative action research (CAR) on their roles as interns at informal science education institutions. Findings include that interns have shown the ability to recognize effective teaching strategies and incorporate them into their practice as a result of their observations, experiences and participation in AR in a community of practice.

Format: Traditional Paper Set Presider: Mike Borowczak

Thread: Community College Student Needs for Success in Science

Community College Students’ Interest and Motivation to Study Science.

Hope M Sasway, Stony Brook University/Suffolk County Community College, Angela M Kelly, Stony Brook University

8:00am - 9:00am in Baltimore - Session A

Research regarding factors that influence community college students’ interest and motivation to study science is crucial because enrollment and persistence in STEM is a national concern. Qualitative case study data (N = 12) revealed support structures necessary to bolster these constructs due to personal and academic experiences.

Format: Roundtable Presider: Ray Francis

Thread: STEM Education

Building Community in the Science Educator Preparation Classroom through Asynchronous and Synchronous Communication Strategies that Promote Learning and Performance

Raymond W Francis, Central Michigan University

8:00am - 9:00am in Baltimore - Session B
Let’s make technology work in science teacher education. The use of instructional technology in science teacher preparation is having a huge impact on instruction, learning, and student performance. One effective strategy that promotes student learning and performance is the inclusion of an effective asynchronous and synchronous communication cycle in the science teacher preparation program.

**Format:** Small Group Roundtable  **Presider:** Ray Francis

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**Thread:** STEM Education

**Federal Resources for STEM and Cybersecurity Education**

Daniel Stein, Department of Homeland Security, Cybersecurity Education and Awareness

**8:00am - 9:00am in Baltimore - Session C**

The Department of Homeland Security has teamed up with the Cyber Innovation Center (CIC) to offer project-driven, application-based curricula that is easily adaptable and can be integrated into current STEM and education standards. The curricula offer rigorous learning opportunities that are highly engaging and hands-on, to help students build aptitude in problem-solving and analytical skills.

**Format:** Small Group Roundtable  **Presider:** Ray Francis

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**Thread:** Policy and Reform

**Standards for Preparing Teachers of Mathematics: Connections to Preparing Teachers of Science**

Christine Browning, Western Michigan University

**8:00am - 9:00am in Baltimore - Session D**

The Association of Mathematics Teacher Educators has put forward a vision of initial teacher preparation for Pre-K-12 teachers of mathematics in their recently released Standards for Preparing Teachers of Mathematics. This session will share standards and indicators that could overlap and/or connect with standards for preparing teachers of science.

**Format:** Roundtable  **Presider:** Ray Francis

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

**A Dialogic Analysis of Teachers’ Perceptions and Practices of Language Systems in the Middle School Science Classroom**

Jeffry King, Texas State University

**8:00am - 9:00am in Charles - Session A**

Despite research which suggests that the use of dialogic strategies may increase students’ scientific reasoning development, teachers continue to rely primarily on traditional forms of pedagogy in their instruction. This study examined the impact of the relationship between teachers’ perceptions of classroom dialogue and their discourse practices with students on this pedagogical discord.

**Format:** Traditional Paper Set  **Presider:** Natalie King

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

**SLDS Research to Understand the Planned, Delivered, and Received Curricula: Finding Gaps in the Data**

Ryan M Walker, Mississippi State University, Shana Lee, Mississippi State University, Gabriel A Posadas, Mississippi State University, Aressa Coley, Mississippi State University, Christina McDaniel, Bradley University

**8:00am - 9:00am in Charles - Session B**

An overview of research using the application of large data analytics and reverse curricular mapping was used to illustrate gaps in the ability to link the education system to workforce. This analysis primarily focused on the components of a program of study aligned to desired career pathways that lead to more successful outcomes for our students.

**Format:** Traditional Paper Set  **Presider:** Natalie King
The Teacher-Curriculum Relationship: Engaging Teachers in Collaborative Curriculum Design and Examination of Student Work for Development of STEM Pedagogical Design Capacity
Charlene L Ellingson, University of Minnesota
8:00am - 9:00am in Charles - Session C
The purpose of this study was to explore the teacher-curriculum relationship for integrated approaches to science, technology, engineering and mathematics (STEM). The goal was to examine the effectiveness of engaging teachers in co-development of STEM curriculum, combined with examination of student work to promote development of STEM pedagogical design capacity (PDC).

Catherine L Quinlan, Howard University, School of Education, Ofosuwa M Abiola, Howard University, College of Arts and Sciences, Willa Banks, Benjamin Banneker Historical Park and Museum
8:00am - 10:00am in Chesapeake A
This workshop places the content and pedagogy of science into the culture of people of African origins by exploring the science and history of African rock art and the history and reverse engineer of Benjamin Banneker’s life and work.

Preparing Secondary Science Teacher Candidates for the edTPA: Supporting Students in Understanding and Using Feedback
Julie Contino, American Museum of Natural History, Natasha Cooke-Nieves, American Museum of Natural History, Elaine V. Howes, American Museum of Natural History
8:00am - 10:00am in Chesapeake B
Participants will develop an understanding of how to support teacher candidates in providing feedback and helping their students use feedback which are necessary skills for successful completion of Rubric 13: Student Understanding and Use of Feedback in Task 3: Assessing Student Learning for the edTPA, a performance-based assessment required for teacher certification in NY and other states.

Meet the Innovations Editors
8:00am - 9:00am in Columbia

Reframing a Secondary Science Methods Course with Culturally Relevant Science Teaching: A Self-Study
Xinying Yin, California State University-San Bernardino
8:00am - 9:00am in Douglass - Session A
This self-study explored a science methods instructor’s effort to enhance pre-service secondary science teachers’ (PSST)conceptions of culturally relevant science teaching through a reframed methods course. PSSTs’ development of their conceptions of culturally relevant science teaching and effectiveness of the course activities will be discussed.
Thread: Science Teacher Professional Development

**Now I Get It! Scientific Argumentation in Middle School Science**

Deborah Lan, *The Ohio State University*, Teresa Shiverdecker, *The Ohio State University*

8:00am - 9:00am in Douglass - Session B

Scientific argumentation has been positively linked to content knowledge, understanding of the nature of science, and participation in scientific practices. This study explores the effects of argumentation on teachers’ content knowledge, attitudes towards teaching science, and argumentation, showing significant increases in all categories after participating in a workshop on argumentation.

*Format: Small Group Roundtable*  
*Presider:* Kelly Feille

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Thread: Preservice Science Teacher Preparation

**Learning inquire-based science teaching practices assisted by a web-based professional development platform.**

Ryan D Gamm, *Wittenberg University*

8:00am - 9:00am in Douglass - Session C

This study investigated how pre-service science teachers’ self-efficacy beliefs were impacted by engaging in videotaping, analyzing, and discussing their own teaching in field experiences with their professors, clinical faculty and their peers when using the Edthena professional development platform, while learning to teach utilizing inquiry oriented methods.

*Format: Roundtable*  
*Presider:* Kelly Feille

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Thread: Science Teacher Professional Development

**Developing a School-Based Science Professional Development Model with Fourth Grade Teachers**


8:00am - 9:00am in Douglass - Session D

This study describes the steps taken to form a school-based science professional development model for a team of five fourth-grade teachers, with the goals of creating a community of practice of science and improving science instruction and content knowledge.

*Format: Roundtable*

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Thread: Science Teacher Professional Development

**Learning through classroom observation: Evaluation feedback that helps teachers and program leaders**

Stephanie B Philipp, *University of Louisville*, Steve Henderson, *Briarwood Enterprises, LLC*

8:00am - 9:00am in Douglass - Session E

This presentation will describe the development of the Science Classroom Observation Instrument and how we are using it with elementary and middle school science teachers in a two-year professional learning program to develop multi-dimensional formative assessment tasks aligned with the Next Generation Science Standards.

*Format: Roundtable*  
*Presider:* Kelly Feille

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Thread: Preservice Science Teacher Preparation

**Using analogies to capture personal beliefs of pre-service elementary teachers**

Deborah L Hanson, *Hanover College*

8:00am - 9:00am in Frederick - Session A

This presentation shares the analogies created by pre-service elementary methods students to provide insight into their beliefs and images of teaching science, math, English-language arts and social studies. These beliefs may lead to possible barriers in integrating science into other subjects.

*Format: Traditional Paper Set*  
*Presider:* Stephen Thompson
Thread: Preservice Science Teacher Preparation

STEM Integration: What’s Art Got To Do with It?
Andrea C Burrows, University of Wyoming, Christy Belardo, Mohonk Perserve, New York, Lydia Dambekalns, University of Wyoming
8:00am - 9:00am in Frederick - Session B
This study bridges discipline silos between the arts and sciences by indicating how science and art compliment content learning. A study of secondary education pre-service teachers (3 years, n = 52) participating in a science/art integration unit the semester before their student teaching semester, explores how integrated sessions capture both scientific and artistic discipline concepts.

Format: Traditional Paper Set Presider: Stephen Thompson

Thread: Preservice Science Teacher Preparation

Closing the Experience Gap: Embedding Science Methods Coursework within the Elementary Science Classroom Setting
Stephen L Thompson, University of South Carolina, ed Emmer, University of South Carolina
8:00am - 9:00am in Frederick - Session C
Data trends from three beginning elementary science teachers will be used to describe a framework for elementary science teacher development spanning pre-service and induction teaching periods that centers on three dimensions:
1) Pre-service Methods Course Emphasizing Conceptual Change Pedagogy
2) Pre-service Methods Course that Includes Classroom Immersion
3) Induction Collaborative Teaching
Format: Traditional Paper Set Presider: Stephen Thompson

Thread: STEM Education

A Review of Epistemic Practices of Engineering in Preservice Elementary Teacher Lesson Plans
Matthew P Perkins Coppola, Indiana University-Purdue University Fort Wayne
8:00am - 9:00am in Pratt/Calvert - Session A
A set of sixteen epistemic practices of engineering (EPE) proposed by Cunningham and Kelly in 2017 serve as the codes for analysis of preservice elementary teacher engineering unit plans. Results and lessons learned from the integration of engineering instruction into an elementary science methods course are shared.
Format: Traditional Paper Set Presider: Matthew Perkins Coppola

Thread: STEM Education

Development and Validation of the Classroom Observation Protocol for Engineering Design (COPED)
Lindsay B Wheeler, University of Virginia, Shannon Navy, Kent State University, Jennifer L Maeng, University of Virginia, Brooke A Whitworth, University of Mississippi
8:00am - 9:00am in Pratt/Calvert - Session B
With increasing emphasis on engineering in K-12 instruction, there is a need for a valid and reliable instrument to characterize engineering design in secondary science classrooms. The present study uses the engineering and protocol literature to create the Classroom Observation Protocol for Engineering Design (COPED) that includes design process, habits of mind, and connections engineering fields.
Format: Traditional Paper Set Presider: Matthew Perkins Coppola
Thread: STEM Education

Emergent Models of STEM integration when Prescribed Standardized Curricula is Present

Justine N Kim, University of Minnesota, Julie C Brown, University of Minnesota, Gillian Roehrig, University of Minnesota
8:00am - 9:00am in Pratt/Calvert - Session C

This study looked at the influence of a district’s prescribed standardized curriculum and what models teachers built that allowed STEM integration to co-exist in their content specific classrooms. Examining emergent models of STEM integration allows us to consider how teachers work with the restrictions imposed on them by prescribed curricula.

Format: Traditional Paper Set Presider: Matthew Perkins Coppola

Thread: Preservice Science Teacher Preparation

Research and Innovation in STEM Preservice Teacher Preparation: Extending the AAAS/NSF Noyce Regional Dialogue

Ann Cavallo, The University of Texas at Arlington, Greg Hale, The University of Texas at Arlington, David Sparks, The University of Texas at Arlington
8:00am - 9:00am in President (1st Floor) - Session A

With support from AAAS and NSF, The University of Texas at Arlington hosted the Southwest Noyce Regional Dialogue Meeting: Stimulating Research and Innovation for Preservice Education of STEM Teachers in High-Need Schools. This session will present the meeting summary and engage participants in expanded dialogue to incorporate views and experiences from national/international colleagues on the topic.

Format: Experiential Session

Thread: Preservice Science Teacher Preparation

Pre-Service Teachers’ Identification of NGSS Engineering and Science Practices in a Sample Lesson Plan

Laura K Ochs, University of Virginia, Frackson Mumba, University of Virginia, Alexis Rutt, University of Virginia
9:15am - 10:15am in Annapolis - Session A

This study focuses on the development of pre-service science teachers’ identification of NGSS elements within a lesson plan. Pre-service teachers participated in a 9-week intervention. Results indicate that participants improved in their identification of science practices and crosscutting concepts in a lesson plan. A detailed description of the intervention, instrument, and results are discussed.

Format: Traditional Paper Set Presider: Andrea Burrows

Thread: Preservice Science Teacher Preparation

Unpacking Pre-service Teachers’ Development of PCK for Using Robotics

Amanda M Gunning, Mercy College, Jessica Riccio, Teachers College, Meghan E Marrero, Mercy College
9:15am - 10:15am in Annapolis - Session B

In this mixed-methods study, the experiences of 13 preservice teachers were examined to find out how a week-long engineering and robotics training at a prominent engineering school would help support their development of PCK for using robotics to teach secondary math and science. Preliminary findings in this study indicate some familiarity development, but it seems more support is needed.

Format: Traditional Paper Set Presider: Andrea Burrows
Thread: Preservice Science Teacher Preparation

Transitioning From Scientist to Teacher: Coherences and Tensions Experienced by Science Content Experts and Career Changers Becoming Teachers
Shannon L. Navy, Kent State University, Melissa A. Jurkiewicz, Mercer University
9:15am - 10:15am in Annapolis - Session C

There is an interest in recruiting STEM professionals into teaching. However, little is known about the characteristics of these individuals and how they learn to teach STEM subjects. To contribute to the knowledge in this area, this study investigated the learning experiences and transformations of a cohort of science career changers enrolled in a one year intensive clinical teacher preparation program.

Format: Traditional Paper Set Presider: Andrea Burrows

NSTA sponsored Session: Preparing Preservice Teachers for 3D Learning to Support the Framework for Science Education
Jeni Davis, Salisbury University, Matthew Vick, University of Wisconsin-Whitewater, Paul Adams, Fort Hays State University
9:15am - 10:15am in Baltimore

Join us to explore some ideas and resources to help in the transition to three-dimensional teaching in alignment with the Framework for Science Education and the Next Generation Science Standards. You are encouraged to bring your own device (BYOD) to aid in the exploration.

Thread: Educational Technology

Virtual reality as a means to train preservice science teachers.
Richard Lamb, University at Buffalo, Elisabeth Etopio, University at Buffalo, Rebekah Lamb, Enterprise Charter School, Leonard Annetta, East Carolina University, Lynn Shannahahn, University at Buffalo, Julie Schwab, Enterprise Charter School
9:15am - 10:15am in Camden/Lombard - Session A

This proposal provides an overview and comparison of virtual reality based clinical experiences and real-life clinical experiences for preservice science teachers. Using a combination of neuroimaging, psychological measures and survey data the authors compare differences and similarities between real-life clinical experiences and virtual reality based clinical experiences.

Format: Traditional Paper Set Presider: Richard Lamb

Thread: Educational Technology

Exploring how Online Collaborative Technologies Can Support Co-Construction of Culturally-Specific Curricular Resources in STEM
Meredith W Kier, College of William and Mary, Deena Khalil, Howard University
9:15am - 10:15am in Camden/Lombard - Session B

This study describes how two African American teachers in an urban, predominantly Black community use online collaborative tools with professional engineers of color to personalize STEM learning for students in a virtual community of practice. We describe how their process of co-constructing mindmaps and communications created culturally specific engineering design challenges to teach STEM content.

Format: Traditional Paper Set Presider: Richard Lamb

Thread: Educational Technology

A Curriculum-linked Professional Development Approach to Support Teachers’ Adoption of Socio-Environmental Science Investigations
Alec Bodzin, Lehigh University, Thomas Hammond, Lehigh University, Kate Popejoy, Popejoy STEM LLC, William Farina, Lehigh University, David Anastasio, Lehigh University, Breena Holland, Lehigh University, James Carrigan, Lehigh University, Scott Rutzmoser, Lehigh University, Dork Sahagian, Lehigh University
9:15am - 10:15am in Camden/Lombard - Session C
We present a curriculum-linked professional development approach to support the adoption of socio-environmental science investigations using a geospatial curriculum approach with mobile field data collection and Web GIS analysis. First year implementation findings are presented.

*Format: Traditional Paper Set*

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

**The Impact of Professional Learning Community Collaboration on Teacher Self-Efficacy in Mastery Grading and Assessment**

Daniel Carpenter, *Texas Tech University*, Margaret R. Colicchio, *Texas Tech University*, Kimberly Myers, *Texas Tech University*

9:15am - 10:15am in Charles - Session A

Using a book study on Ken O’Connor’s A Repair Kit for Grading: Fifteen Fixes for Broken Grades (2010), a job-embedded professional development utilizing a professional learning community model was implemented in a middle school. Teacher self-efficacy was measured regarding mastery grading and assessment before and after the book study was conducted, leading to policy implementation in the school setting.

*Format: Themed Paper Set Presider: Dan Carpenter*

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**Beyond an Ethics of Economic Support: Poverty as Proxy for Perceptions of Cultural Bias based on Race**

Phillip A Boda, *Independent Researcher*

9:15am - 10:15am in Columbia - Session A

Using urban education and disability studies research, this analytic essay argues for science teacher education to study how poverty has played out in terms of teacher’s biases of students’ (cap)ability. Instead of looking at poverty as economic, I argue for an interrogation of assumptions and perceptions teachers hold about students based on socio-cultural markers of race from popularized neuroscience.

*Format: Traditional Paper Set Presider: Phillip Boda*

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**A learning progression for using scientific practices to understand the concept of evolutionary relatedness in living organisms**


9:15am - 10:15am in Columbia - Session B

This presentation describes a preliminary learning progression for using scientific practices to understand evolutionary relatedness of living organisms with a particular focus on street trees. We will show how content learning and scientific practices develop hand in hand as students move up the learning progression.

*Format: Traditional Paper Set Presider: Phillip Boda*

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**Vertically Aligned Professional Learning Communities for Professional Development and Support of Elementary Science Teachers**


9:15am - 10:15am in Columbia - Session C

This research study was conducted over a five-year period in five high-needs school districts with 60 science teachers. The study examines the use of vertically aligned professional learning communities to support practicing elementary science teacher growth, development, and professional learning in the context of NGSS adaptation.

*Format: Traditional Paper Set Presider: Phillip Boda*
Thread: College and University Science Education

**Conceptual Development of Chemical Knowledge of Preservice Middle School Teachers**

Mary M Atwater, *University of Georgia*

**9:15am - 10:15am in Douglass - Session A**

The syllabus of the physical science content course for preservice middle school teachers will be shared; however the focus will be on the chemistry component of the course. The activities, along with documentations of chemical learning, will be shared with the group.

*Format: Syllabus Sharing  Presider: Nate Carnes*

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Thread: Science Teacher Professional Development

**Model Development Using the ASSIST Approach**

Nathan A Quarderer, *The University of Iowa*, Kathleen Weiss, *The University of Iowa*, Mark A McDermott, *The University of Iowa*

**9:15am - 10:15am in Douglass - Session B**

In-service science teachers must gain familiarity with the NGSS, including the practices of engaging in argument from evidence, and developing and using models. To meet this challenge, an approach to teaching science known as Argument-based Strategies for STEM-Infused Science Teaching was developed. We’ll share highlights from our most recent workshops, including how our approach has evolved over time.

*Format: Syllabus Sharing  Presider: Nate Carnes*

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Thread: Preservice Science Teacher Preparation

**Interdisciplinary STEM Education Graduate Certificate Program**

SoonChun Lee, *Wichita State University*

**9:15am - 10:15am in Douglass - Session C**

The interdisciplinary Science, Technology, Engineering and Mathematics (STEM) education graduate certificate is designed for STEM educators and graduate students who are interested in designing and/or delivering an interdisciplinary STEM curriculum. The curriculum is developed in a way that facilitates key features to effective iSTEM instructions for K-12 classrooms.

*Format: Syllabus Sharing  Presider: Nate Carnes*

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Thread: College and University Science Education

**Syllabi for Improving NGSS Uptake in Secondary Science Teacher Preparation Courses**


**9:15am - 10:15am in Douglass - Session D**

This presentation describes the development of syllabi within science teaching methods courses resulting from discourse among K-12 preservice science teacher educators. Syllabi demonstrate improved pedagogy for NGSS-focused education. Results from a 2-year study demonstrating shifts in understanding and teaching practices among preservice teachers and teacher educators will be presented.

*Format: Syllabus Sharing  Presider: Nate Carnes*

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Thread: College and University Science Education

**A Diagnostic Assessment of Secondary Teacher Candidates’ Views on Science Teaching**

Nate Carnes

**9:15am - 10:15am in Douglass - Session E**

This exploratory case study documents use of the DASTT-C instrument as a diagnostic assessment of secondary teacher candidates’ perceptions of science teaching and learning. The presentation will include sample drawings and examples of how they were used to make the science methods course personally meaningful and relevant.

*Format: Syllabus Sharing  Presider: Nate Carnes*
In alignment with reform in science education: Inquiry-based science teaching

Rose M. Pringle, University of Florida
9:15am - 10:15am in Douglass - Session F

An effective elementary science teacher education program is important if the current reform efforts are to be realized. The syllabus being proposed for this presentation is the third in a series of three courses strategically developed to address the challenge of how to best prepare elementary teachers, who, upon graduation, will be the linchpin in effecting long term meaningful science learning.

Format: Syllabus Sharing  Presider: Nate Carnes

Unique Partnerships: Pre-service Secondary Science Teachers and Practicing Early Childhood Teachers Collaborate on Integrated STEM Lessons

Stephanie Fanselow, University of Northern Colorado
9:15am - 10:15am in Frederick - Session A

Unique partnerships were created between pre-service secondary science teachers and practicing early childhood teachers to collaboratively develop and implement interactive integrated STEM lessons for elementary classrooms. Come learn more details about this project and how unique partnerships might benefit your program.

Format: Traditional Paper Set  Presider: Melanie Kinskey

Elementary Preservice Teachers’ Planning for Supporting Student Sense-making: Use of Science and Literacy Practices

Anna Maria Arias, Illinois State University, Grace Kang, Illinois State University
9:15am - 10:15am in Frederick - Session B

This research study aimed to characterize preservice elementary teachers’ abilities to make connections between literacy and science as they were concurrently enrolled in literacy and science methods courses. This qualitative case study considers preservice teachers’ planning for supporting students to engage in disciplinary practices to make sense of ideas and concepts.

Format: Traditional Paper Set  Presider: Melanie Kinskey

Inquire about pedagogy: apply the inquiry continuum in science teacher education

Jianlan Wang, Texas Tech University
9:15am - 10:15am in Frederick - Session C

Inquiry, central in science education reform for decades, is a critical element required in most of teacher-preparation programs. Despite its various forms and content, inquiry has been taught to teacher candidates mainly through the means of direct instruction. In this study, I will present an inquiry-oriented approach to pedagogical instruction with the goal of preparing constructivist science teachers

Format: Traditional Paper Set  Presider: Melanie Kinskey

3MT Competition

9:15am - 10:15am in Pratt/Calvert

The ASTE Graduate Student Forum is pleased to offer its first annual Three-Minute Thesis (3MT) competition at ASTE 2018. The 3MT competition has been held at universities worldwide and celebrates exciting research conducted by doctoral students. At this year’s competition at ASTE, PhD and EdD students who will be defending their dissertations between January 7th 2018 and January 9th 2019 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 2019. The GSF co-presidents invite everyone at ASTE 2018 to witness this exciting event and help encourage graduate student involvement with ASTE.
Committee of Regional Units
9:15am - 10:15am in Conway (1st Floor)

Thread: STEM Education

Achieving the Promise of STEM Education as a Vehicle for Inclusivity
Heather A. Pacheco-Guffrey, Bridgewater State University, Sami Kahn, Ohio University, Michele Koomen, Gustavus Adolphus College
9:15am - 10:15am in President (1st Floor) - Session A

During this themed paper session, research in the area of STEM Education that promotes inclusive STEM instruction and career development for students with disabilities will be presented.
Format: Themed Paper Set

Coffee and Snacks
10:15am - 10:45am in Bistro 300 and Foyer Area

Keynote: Kacy Redd, Association of Public and Land Grant Universities
10:45am - 12:00pm in Sheraton Ballroom

The Keynote will be held in the Sheraton Inner Harbor which is located across the street from the Hyatt Regency Inner Harbor. Leave the Hyatt through the doors on the ground floor (hotel registration level). The doors are located by the President Room and Conway Room. Walk to the left and then cross the street to the Sheraton. Take the escalator to the third floor and the Plenary is located in the Chesapeake Ballrooms.

Kacy Redd Bio
Kacy Redd is the assistant vice president of science and mathematics education policy at the Association of Public and Land-grant Universities (APLU). She co-directs the Network of STEM Education Centers (NSEC), which currently links 149 STEM Education Centers (SEC) at 126 institutions. Dr. Redd also manages APLU’s Science and Mathematics Teaching Imperative (SMTI), a commitment by 132 public research universities to improve science and mathematics teacher preparation. Redd received her PhD in neuroscience from Columbia University.

Lunch on Own
12:00pm - 1:30pm in Lunch on Own
Thread: Preservice Science Teacher Preparation

Sunrise Science: How the Introduction of a unique field experience challenged what pre-service teachers thought about learning and engagement.

Kimberly Murie, John Brown University  
**1:45pm - 2:45pm** in **Annapolis** - Session A

Due to a challenge in scheduling, Sunrise Science was created, providing science enrichment for students & field experience for pre-service teachers. Comparing this with traditional field experience, pre-service teachers were able to re-examine their original thoughts on how students learn & what it means to provide an effective lesson that is engaging but also accurately assesses learning.

*Format*: Traditional Paper Set  
*Presider*: Sarah Boesdorfer

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Thread: Preservice Science Teacher Preparation

Homeschooling collaboration as clinical experience: a comparison of inservice teachers’ reflections on their preservice clinical experiences

Sarah B. Boesdorfer, Illinois State University  
**1:45pm - 2:45pm** in **Annapolis** - Session B

Homeschooled students desire for science laboratory experience presents an opportunity to teach for preservice science teachers. This study compared the reflections of inservice science teachers who had a clinical experience teaching homeschooled students with teachers who did not.

*Format*: Traditional Paper Set  
*Presider*: Sarah Boesdorfer

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Thread: Preservice Science Teacher Preparation

Pre-service Science Teacher Candidates’ Beliefs about Teaching in Culturally Diverse Contexts

Dr. Sheron L. Mark, University of Louisville, Dr. Lateefah A. Id-Deen, University of Louisville, Dr. Shelley Thomas, University of Louisville, Dr. Amy H. Stevens, Jefferson County Public Schools (KY)  
**1:45pm - 2:45pm** in **Annapolis** - Session C

We discuss how five secondary science pre-service teacher candidates articulated beliefs about teaching in culturally diverse contexts. We focus on how a clinical field experience, associated with their science methods course, in an urban high school influenced these beliefs. We discuss how these findings will inform our course and program design and ongoing clinical experiences.

*Format*: Traditional Paper Set  
*Presider*: Sarah Boesdorfer

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Thread: Ethnoscience and Environmental Education

Hands-on Interdisciplinary Learning for a Changing Planet

Amanda Clark, Chipola College  
**1:45pm - 2:45pm** in **Baltimore** - Session A

Engage in innovative activities to examine an approach integrating science education with math and social studies content, especially focusing on environmental themes. Participants will analyze tasks exploring how environmental education can be addressed to support pre-service teachers in engaging all learners.

*Format*: Experiential Session  
*Presider*: Anna Maria Arias

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Thread: Equity and Diversity

Science Teachers’ Experiences Integrating Culturally Responsive Pedagogy into Standards-based Curricula: Opportunities and Challenges

Illana C Livstrom, University of Minnesota, Julie C Brown, University of Minnesota  
**1:45pm - 2:45pm** in **Camden/Lombard** - Session A
This explanatory case study investigated the curriculum design process of four in-service secondary science teachers as they integrated culturally responsive pedagogy with standards-based curricula. Specifically, we examined the curriculum modification process, the challenges reported by teachers, resources they relied on when modifying curricula, and design successes.

**Format**: Traditional Paper Set  
**Presider**: Illana Livstrom

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**Thread**: Equity and Diversity  
**Exploring Science Teachers’ Beliefs Toward Culturally Relevant Teaching During Their First Year Classroom Teaching**

Preethi Titu, University of Minnesota, Hillary A Barron, University of Minnesota, Julie C Brown, University of Minnesota, Gillian H Roehrig, University of Minnesota  
**1:45pm - 2:45pm in Camden/Lombard - Session B**

Knowing that teacher’s beliefs toward culturally relevant teaching vary widely in education and have significant classroom impacts, this study investigated the beliefs of in-service science teachers toward culturally relevant teaching in their first year as a classroom teacher.

**Format**: Traditional Paper Set  
**Presider**: Illana Livstrom

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**Thread**: Science Teacher Professional Development  
**Rigorous Investigations of Relevant Issues: A Professional Development Supporting Teacher Design of Socio-Scientific Issue Units**

Amanda Peel, University of Missouri, Troy D Sadler, University of Missouri, Patricia Friedrichsen, University of Missouri  
**1:45pm - 2:45pm in Camden/Lombard - Session C**

To better prepare teachers for socio-scientific issues teaching, our team designed and implemented a PD program with explicit examples and design tools to support teacher SSI learning and unit design. We describe our PD process for supporting in-service secondary science teachers as they learned about SSI instruction and designed SSI units.

**Format**: Traditional Paper Set  
**Presider**: Illana Livstrom

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**Thread**: Curriculum, Pedagogy, and Assessment  
**The Reformed Teacher Observation Protocol and NGSS-aligned instruction: Challenges and limitations**

Joshua A Ellis, Michigan Technological University, Emily A Dare, Michigan Technological University, Gillian H Roehrig, University of Minnesota, Timothy D Sheldon, University of Minnesota  
**1:45pm - 2:45pm in Charles - Session A**

This study focuses on classroom observations of nine middle school physical science teachers who participated in an NGSS-aligned professional development. Results indicate that traditional assessment tools may not be appropriate for evaluating lessons that feature engineering integration. The concept of engineering content must be more fully understood before assessing lessons that feature it.

**Format**: Traditional Paper Set  
**Presider**: Joshua Ellis

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**Thread**: Curriculum, Pedagogy, and Assessment  
**The NGSS and the Historical Direction of Science Education Reform**

Rudolf V. Kraus, Rhode Island College, Lesley J. Shapiro, Northeastern University  
**1:45pm - 2:45pm in Charles - Session B**

While it has been argued that the NGSS represent a radical shift in science education (Bybee, 2014; Pruitt, 2015), this claim has not been well documented. Our research seeks to examine the direction of the NGSS and compare it to previous attempts at reform to highlight similarities and differences.

**Format**: Traditional Paper Set  
**Presider**: Joshua Ellis
Thread: Curriculum, Pedagogy, and Assessment

Biology Modeling Instruction: Barriers and Challenges of Implementation in Secondary Classrooms
Trudy C Giasi, The Ohio State University, Courtney R Irwin, The Ohio State University, Stephen T Lewis, The Ohio State University, Kathy L Malone, The Ohio State University
1:45pm - 2:45pm in Charles - Session C

The MoBILiSE Project supports secondary life science teachers in the use of models and modeling instruction. Barriers and challenges encountered in the context of pedagogy, connecting mathematics, and incorporating bio-engineering projects into the science classroom are highlighted. Recommendations for future professional development and implementation will be offered.

Format: Traditional Paper Set
Presider: Joshua Ellis

Thread: Informal Science Education

Teacher learning in informal settings: Research, trends, and emerging opportunities
Lara K. Smetana, Loyola University Chicago, Tiffany-Rose Sikorski, George Washington University, Matty Lau, Teacher Learning Consultancy, Jenna Carlson, Loyola University Chicago, Amy Bedford, Loyola University Chicago
1:45pm - 2:45pm in Chesapeake A - Session A

This themed paper set explores research, trends and emerging opportunities between universities and informal learning settings. It opens up conversations around efforts designed to help pre- and in-service teachers capitalize on informal science learning opportunities and resources in their classrooms and instructional practice.

Format: Themed Paper Set

Thread: Science Teacher Professional Development

Examination of Professional Development on Content Knowledge, Pedagogy, and Efficacy of Teaching Literacy and Science Concepts for Kindergarten through Eighth Grade Teachers in Four Rural Districts in Appalachia
Leslie Suters, Tennessee Technological University, Kristen Pennycuff Trent, Tennessee Technological University, Terry Lashley, Learning Curve, Inc., Queen Ogbomo, Tennessee Technological University, Stephanie Wendt, Tennessee Technological University, Kelly Moore, Tennessee Technological University
1:45pm - 2:45pm in Columbia - Session A

As participants in a Math Science Partnership grant, K-8 educators from four rural districts investigated research-based strategies for critical reading and technical writing embedded within science content and pedagogy. This paper explores data from Year 1.

Format: Themed Paper Set

Thread: College and University Science Education

Nurturing the Development of GATE Science Teachers
Judith A Bazler, Monmouth University, Meta Van Sickle, College of Charleston
1:45pm - 2:45pm in Douglass - Session A

Identification as giftedness and Talent is present in childhood and often persists for a lifetime. Faculty might not believe it necessary to provide accommodations. We identify traits of future teachers who have characteristics of GATE. Finally, adaptations in assignments for science methods classes for all students but especially GATE students in the class will be discussed.

Format: Traditional Paper Set
Presider: Mandy McCormick Smith
Thread: College and University Science Education

**Elementary Teachers’ Experience, Subject Matter Knowledge, and Knowledge of Student Misconceptions**
Leigh K. Smith, Brigham Young University; Ryan S. Nixon, Brigham Young University; Richard R. Sudweeks, Brigham Young University

1:45pm - 2:45pm in Douglass - Session B

This study explored the relationship between fifth and sixth grade teachers’ years of teaching experience, subject matter knowledge (SMK), and knowledge of students’ science misconceptions. Results suggest teaching experience does not predict knowledge of students’ science misconceptions; however, teachers’ SMK is a significant predictor of this knowledge.

*Format: Traditional Paper Set*  
*Presider: Mandy McCormick Smith*

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**The Effects of a Sustained, NGSS-based Professional Development of Teachers’ Beliefs**
Cindy L Kern, Quinnipiac University; Emily Sparago, Quinnipiac University; Amanda Bozack, Radford University; Rosemary Whelan, University of New Haven

1:45pm - 2:45pm in Douglass - Session C

This study used the theoretical framework, Theory of Planned Behavior (Ajzen, 2011) to focus on the effect a sustained, NGSS-based PD had on beginning (BTs) and mentor (MTs) teachers’ behavioral beliefs about effective science teaching and perceived behavioral control associated with implementing the NGSS as indicators for teachers enacting effective science teaching practices.

*Format: Traditional Paper Set*  
*Presider: Mandy McCormick Smith*

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**From Theory to Practice: Pre-service Teachers’ Use of Learning Theory in the Science Classroom**
Jennifer F Oramous, University of Arkansas; Stephen Burgin, University of Arkansas

1:45pm - 2:45pm in Frederick - Session A

The results from a 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 in the classroom will be included.

*Format: Traditional Paper Set*  
*Presider: Kathleen Schmidt*

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**Preservice Secondary Science Teachers’ Developing Understanding of the Science Practice of Analyzing and Interpreting Data**
Corinne Lardy, California State University, Sacramento; Hui-Ju Huang, California State University, Sacramento; Michelle Sinapuelas, California State University, East Bay; Michele Korb, California State University, East Bay; Rachelle DiStefano, California State University, East Bay; Donna Ross, San Diego State University; Larry Horvath, San Francisco State University; Jennifer Clasgens, Weber State University

1:45pm - 2:45pm in Frederick - Session B

This study aims to describe preservice secondary science teachers’ conceptualization of the science practice of Analyzing and Interpreting Data as they enter their teaching methods courses. We also examine their descriptions at the end of the course, after using a tool to guide reflection about this core practice, and explore some of the potential reasons behind and implications for emerging patterns.

*Format: Traditional Paper Set*  
*Presider: Kathleen Schmidt*
Thread: STEM Education

**What Does “Learning About Engineering” Mean to Teachers?**
Jacob B Pleasants, Iowa State University, Christopher Spinler, Iowa State University, Joanne Olson, Texas A&M

1:45pm - 2:45pm in Pratt/Calvert - Session A

When teachers implement engineering design activities with students, what do they indicate that students learn about engineering from engaging in them? Current standards documents emphasize engineering practices as a primary learning outcome, but what other elements of engineering are teachers targeting with their students?

*Format: Traditional Paper Set  Presider: Jacob Pleasants*

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Thread: STEM Education

**Developing STEM Teachers’ Identities in Emerging STEM Schools**
Mohamed A EL Nagdi, University of Minnesota, Felicia D Leammukda, University of Minnesota, Gillian Roehrig, University of Minnesota

1:45pm - 2:45pm in Pratt/Calvert - Session B

With the expansion of STEM education, understanding the identity and roles of STEM teachers is necessary. STEM teachers’ identities and roles are explored via grounded theory. Professional and personal facets constitute STEM teachers’ identity: alignment of personal teaching philosophy with STEM understanding, developer of STEM identity, ongoing learner, collaborator, and awareness of community.

*Format: Traditional Paper Set  Presider: Jacob Pleasants*

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Thread: Policy and Reform

**Using Authentic Assessments to promote candidate learning and demonstrate effective teaching in higher education**
Raymond W Francis, Central Michigan University

1:45pm - 2:45pm in President (1st Floor)- Session A

Concept Maps are an effective strategy for science education faculty to balance candidate assessment and evaluation with the constraints placed on faculty related to the demonstration of effective teaching for promotion and tenure decisions. These candidate artifacts are quantifiable, authentic, and provide a visual perspective of the effective teaching practice by science education faculty.

*Format: Experiential Session*

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**Coffee, Cookies, and Committees**

2:45pm - 3:45pm in Bistro 300 and Foyer Area

*Conference Program Committee in Annapolis
Elections Committee in Baltimore
Publications Committee in Camden/Lombard
Awards Committee in Columbia
Membership/Participation Committee in Douglass
Communications Committee in Frederick
Professional Development in Pratt/Calvert*

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Thread: Preservice Science Teacher Preparation

**Designing and implementing short-term travel study for preservice teachers**
Michael T Svec, Furman University, Robbie L Higdon, James Madison University

4:00pm - 5:00pm in Annapolis - Session A

Presentation will contrast two short-term travel study programs that engage pre-service teachers within European public education. The first program focused on cross-cultural experiences with field experiences in Irish classrooms. The second involved interdisciplinary faculty and multiple school visits in Finland and the Czech Republic.

*Format: Themed Paper Set  Presider: Michael Svec*
**Thread: Ethnoscience and Environmental Education**

**Environmental Topics in Physics by Inquiry Course: Integration Models Used by Physics Teachers**

David Kimori, *Minnesota State University, Mankato*, Gillian Roehrig, *University of Minnesota*, Bhaskar Upadhyay, *University of Minnesota*

4:00pm - 5:00pm in **Baltimore** - Session A

This study investigated how three physics teachers teaching a ‘Physics by Inquiry’ course integrated environmental topics in their classrooms and what integration models and strategies they used. Findings of this study indicate that teachers acknowledge the importance of teaching environmental issues in their classrooms but continue to struggle with effective integration strategies and models.

**Format:** Traditional Paper Set  **Presider:** Michael Svec

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**Thread: STEM Education**

**An Exploratory Study to Identify Constructs to Build the Assessment for Task Specific Creativities in STEM Integrated Learning Environment and its Related Issues**

Tomoki Saito, *Shizuoka University*

4:00pm - 5:00pm in **Baltimore** - Session B

A perspective to study creativities on STEM Integrated Learning Environment (SILE) will be discussed. By using traditional testing tools and qualitative analyses, the author found that the creativities in SILE have possibilities to transfer beyond the tasks among the projects’ context. Although the assessment indicated domain specificities, the specific tasks could transfer to the different context.

**Format:** Traditional Paper Set

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**Thread: Equity and Diversity**

**The Process of Becoming: Identity Challenges for African-American Female Science and Mathematics Pre-Service Teachers**

David M Sparks, *University of Texas at Arlington*

4:00pm - 5:00pm in **Camden/Lombard** - Session A

Three African-American female students majoring in STEM participated in a qualitative research study to share their experiences with choice of major, challenges of racism and sexism, and STEM identity development. The results showed these females were not discouraged by their underrepresentation, confident in their abilities, and expressed a wide variation in their experiences of identity development.

**Format:** Traditional Paper Set  **Presider:** Cathy Wissehr

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**Thread: Equity and Diversity**

**Promoting “Science for All” Through Teacher Candidate Collaboration and Community Engagement**


4:00pm - 5:00pm in **Camden/Lombard** - Session C

To address the challenge of teacher candidates’ lack of preparation to teach science to students with disabilities, the authors describe research findings from a novel project in which members of their college’s science and special education student organizations co-planned and co-taught inclusive science lessons using a Universal Design for Learning framework at a local hands-on discovery museum.

**Format:** Traditional Paper Set  **Presider:** Cathy Wissehr
A Qualitative Content Analysis of Scientists using the DAST-C in Middle Grade Science Textbooks

Rebecca Hite, Texas Tech University, Carolanne Grogan, Texas Tech University

4:00pm - 5:00pm in Camden/Lombard - Session D

Students’ perceptions of scientists continue to captivate educators and researchers. This study examines images of scientists using Draw a Scientist Test (DAST) framework from the 3 major (American) middle grade science textbooks. Results suggest that science textbooks may reinforce stereotypical views of scientists and scientific endeavor.

Format: Traditional Paper Set

Teleological alternative conceptions about evolution in pre-service and in-service science teachers

Kathryn Green, North Carolina State University, Cesar Delgado, North Carolina State University

4:00pm - 5:00pm in Charles - Session A

Alternative conceptions about evolution are present in teachers and students. This study presents results from an intervention about teleology, the belief that natural processes are purposeful, with pre-service/in-service teachers. An instrument measuring teleological conceptions was administered as a pre- and post-test; statistically significant gains of very large effect size were obtained.

Format: Traditional Paper Set Presider: Katie Green

A new approach to evolution curricula: Development and pilot testing of a new, NGSS-aligned unit that integrates evolution and heredity

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

4:00pm - 5:00pm in Charles - Session B

Evolution: DNA and the Unity of Life is a new unit for grades 9-10 biology that incorporates the three dimensions of The Framework. Additional key features include integration of heredity with evolution, engaging students in working with data from scientific studies of phenomena, and scaffolding students’ ability to construct evidence-based arguments. Development and pilot test results will be described.

Format: Traditional Paper Set Presider: Katie Green

Integrating Science and Technology Into Literacy Learning: Results from a year-long professional development project with early elementary (K-2) teachers.

Kimberly Lott, Utah State University, Sarah Clark, Utah State University, Mark Larese-Casanova, Utah State University

4:00pm - 5:00pm in Charles - Session C

This presentation will present findings related to the integrated early education project INSTILL. The primary goal of this project is to increase the capacity of K-2 teachers to provide innovative, integrated STEM learning opportunities that leverage technology tools for the enhancement of learning of both science and literacy content.

Format: Traditional Paper Set Presider: Katie Green
Thread: STEM Education

**Innovation in science education for the 21st century with international views:**

**STEAM/STEM education with challenges**

Young Shin Park, Chosun University, Muhammad Abd Hadi Bunyamin, Universiti Teknologi Malaysia, Nur Jahan Ahmad, Universiti Sains Malaysia, Nor Hasniza Ibrahim, Universiti Teknologi Malaysia, Yunhee Choi, Soong moon middle School, Wing Mui Winnie SO, Education University of Hong Kong, Tian LUO, Education University of Hong Kong

4:00pm - 5:00pm in Columbia - Session A

There had been emphasis on equipping students as creative problem solvers with core competences necessary for the 21st century for the years and STEAM/STEM education had been considered as the solution to meet this goal. These multiple studies from Korea, Hong Kong, and Malaysia introduced how STEAM/STEM education was successful and what challenges they faced.

Format: Themed Paper Set Presider: Young-Shin Park

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Thread: Policy and Reform

**Within-School Churn and the Re-Novicing of Elementary Teachers in Science**

Deborah Hanuscin, Western Washington University, Dante Cisterna, University of Nebraska-Lincoln, Kelsey Lipsitz, University of Missouri, Mark Ehlert, University of Missouri

4:00pm - 5:00pm in Douglass - Session A

There is growing recognition of negative impacts of ‘within school churn’, in which elementary teachers remain in a school but are assigned to a new grade. We argue these teachers ‘re-noviced’ as they encounter a new set of grade-specific standards, subject matter topics, and curricula. We explore the impacts of this re-novicing through a case study of an NSF-funded science PD program targeting grades 3-5.

Format: Traditional Paper Set Presider: Helen Meyer

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Thread: Policy and Reform

**School reform, collaboration and the shared workspace model**

Daniel Carpenter, Texas Tech University, Maggie Colicchio, Texas Tech University, Kimberly Myers, Texas Tech University

4:00pm - 5:00pm in Douglass - Session B

Educational reform efforts have called for a change in how educators interact and exchange information to improve teaching, learning and assessment. Reform efforts have focused on increasing teacher collaboration and creating a collaborative culture. This session provides a published grounded theory study on functional characteristics of the collaborative culture also called the shared workspace.

Format: Traditional Paper Set Presider: Helen Meyer

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Thread: Policy and Reform

**Linking Grade 1-2 Achievement and Transfer to Grade 3 Data in Science and Literacy to Promote Reform in Curricular Policy and Practice in Elementary Schools**

Nancy Romance, Florida Atlantic University, Michael R Vitale, East Carolina University

4:00pm - 5:00pm in Douglass - Session C

Implementing an interdisciplinary approach to science teaching for grade 1-2 learners builds children’s capacity for investigating how the world works and increases their ability to read with understanding. Multi-year data including transfer effects to grade 3 provide a compelling rationale to reform district curricular policies and practices by increasing instructional time for elementary science.

Format: Traditional Paper Set Presider: Helen Meyer

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Thread: Preservice Science Teacher Preparation

**Infusing Global Collaboration into STEM Preservice Teacher Preparation Programs**

Mariam Manuel, University of Houston, Kate York, University of Texas at Dallas, Tarah McDonald, University of the Bahamas

4:00pm - 5:00pm in Frederick - Session A
This interactive session will provide the benefits of engaging preservice teachers in global collaboration encouraging instruction rich in both STEM content acquisition and critical 21st century skills. Examples of incorporation preservice STEM teachers will be discussed in addition to resources utilized, challenges experienced and lessons learned along the way.

**Thread: STEM Education**

**Development Skills of Pedagogical Content Knowledge in STEM Education for Pre-Service Teachers: Meta Analysis Data**

Pramudya Dwi Aristya Putra, *Shizuoka University*, Yoshisuke Kumano, *Shizuoka University*

*4:00pm - 5:00pm in Pratt/Calvert - Session A*

This study presents a Meta-Analysis of professional development of STEM education for skills of knowledge. A current synthesis of professional development of STEM education across 2013 - 2017 articles in top ten journals. Major findings that included for the purposes in professional development of STEM were conducted at Pedagogical knowledge and Pre-service teachers become target for development program.

**Towards an Understanding of the Need for Holistic STEM Faculty Development A Systematic Literature Review**


*4:00pm - 5:00pm in Pratt/Calvert - Session B*

This review examines the literature regarding higher education STEM faculty development to determine how much of current research focuses on the development of the multiple roles of STEM faculty.

**Using Biography to Support Pre-Service Science and Engineering Teachers Learning about Engineering Practices and Habits of Mind**

Pamela S. Lottero-Perdue, *Towson University*, Malinda S. Zarske, *University of Colorado, Boulder*

*4:00pm - 5:00pm in Pratt/Calvert - Session C*

Teacher educators demonstrate how they use a biography to help grades 6-12 pre-service science and engineering teachers learn engineering practices and engineering habits of mind. This reading, reflection and writing experience complements students’ engagement in hands-on engineering design. Presentation includes data analysis from 44 assignments, the paper rubric, and student work samples.

**Using Hands-on Performance Assessment in K-12 Classrooms: An Effective Formative Assessment Strategy for 3D Learning** *(pre-registration required)*


*4:00pm - 6:00pm in Chesapeake A*

Engaging Teachers in Engineering and Science Curriculum Development

Maria S. Rivera Maulucci, Barnard College, Stefania Macaluso, Ellis Prep, Roya Heydari, Teachers College

4:00 pm - 6:00 pm in Chesapeake B

This workshop will focus on how to engage preservice and inservice teachers in developing curricula that integrate engineering with the existing science curriculum. We will engage participants in engineering design challenges, share our professional development model, and provide K-12 classroom examples of engineering design units developed by preservice and inservice teacher teams.

Format: Workshop

Towards Cultural Relevance: Developing Agency In Science and Math Educators in the Borderlands

Angela M Chapman, University of Texas Rio Grande Valley, Ariana Garza, University of Texas Rio Grande Valley, Felicia Rodriguez, University of Texas Rio Grande Valley, Mayra Hernandez, McAllen ISD, Juanita Rojas, McAllen ISD, Eva Rojas, McAllen ISD, Edgar Palomino, McAllen ISD, Carolina Zarinana, McAllen ISD

5:15 pm - 6:15 pm in Annapolis - Session A

We examined how we were positioned in an education system embedded with oppressive practices; including being positioned as migrants, immigrants, Hispanics, and Spanish dominant students, which led to an increased critical awareness. Now, ignoring oppressive educational practices is no longer an option. We will share our stories and experiences that helped us grow as culturally competent teachers.

Format: Themed Paper Set

Presider: Angela Chapman

Noticing and responding: Attention to linguistic demands of young children during science engagements

Paula S Calderon, Southeastern Louisiana University, Mandy McCormick Smith, The Ohio State University, Angela W Webb, Louisiana State University

5:15 pm - 6:15 pm in Baltimore - Session A

The session focuses on linguistic demands and opportunities in diverse early childhood classrooms. Participants will engage with science concepts and materials through a pre-k learning cycle (Authors, 2017a) while assuming the role of DLLs in hopes to develop understanding of appropriate scaffolds and awareness of linguistic needs in young students.

Format: Experiential Session

Using Children’s Literature as a Basis for Teaching Nature of Science in an Early Childhood Preservice Methods Course

Valarie L Akerson, Indiana University, Banu Avsar Erumit, Indiana University, Naime Elcan, Indiana University

5:15 pm - 6:15 pm in Charles - Session A

Results of a study incorporating Nature of Science and literacy instruction within an early childhood science methods course are shared. The course instructor modeled explicit reflective NOS instruction connected to literacy goals. Additionally, course assignments included for the preservice teachers to design a NOS children’s picture book that would teach NOS aspects to children.

Format: Traditional Paper Set

Presider: Valarie Akerson
Investigating the Difference between Virtual Discussion-Based Interactions and Face-to-Face Interactions with Scientists with Middle School Students
Donna Farland-Smith, The Ohio State University, Brandon Grossman, NYC Schools
5:15pm - 6:15pm in Columbia - Session A

This study addresses the problem of addressing stereotypical images of scientists held by middle school students and this research provides data to help understand the factors that contribute to students’ perceptions of scientists.

On Jackalopes, STEM, and the Rapid Decline of Elementary Science Instruction
Joanne K. Olson, Texas A&M University
5:15pm - 6:15pm in Douglass - Session A

Elementary classrooms observed during the transition to NGSS show a rapid decline in science-focused lessons. Such lessons are being replaced by building activities, engineering design challenges, and other activities in the name of “STEM”. Teachers appear unaware that science has disappeared.

Scientific Curiosity and the Young Learner
Morgan Stewart, TCU
5:15pm - 6:15pm in Douglass - Session B

Scientific curiosity is defined as a desire for information related to natural phenomena. This multiple case study followed children (5 to 7 years old) through a series of family interactions where instances of scientific curiosity might be observed.

What Determines Inquiry Teaching Practices in High-Performing Countries?
Pongprapan Pongsophon, Faculty of Education, Kasetsart University, Benjamin C. Herman, Department of Learning, Teaching & Curriculum, College of Education, University of Missouri
5:15pm - 6:15pm in Douglass - Session C

This study validates a structural equation model of inquiry-based teaching in high-performing countries using data from the 2011 TIMSS (N = 2,579 teachers). Results indicate that teacher collaboration was positively related to occupational satisfaction, pedagogical confidence, and inquiry practices. Implications include using theory of planned behavior to inform professional development.

Professional Identity Shifts Surrounding Outdoor Classroom Experiences
Stephanie Hathcock, Oklahoma State University, Amy Olson, Oklahoma State University
5:15pm - 6:15pm in Frederick - Session A

This presentation showcases research on preservice elementary science teachers’ professional identity (PI) systems in relation to outdoor classroom experiences. We will discuss the application of a new, comprehensive theoretical framework for professional identity research, and highlight changes in the PI’s of our students based on their experiences learning and working in an outdoor classroom.
Engaging Elementary Students in Sustainability Education: A Service-Learning Project by Pre-Service Elementary Teachers (PSETs)

Carole K. Lee, University of Maine at Farmington, Patricia H. Williams, University of Maine at Farmington

5:15pm - 6:15pm in Frederick - Session B

This study examined the effectiveness of an Energy Fair, a sustainability education service-learning project. The project taught PSETs (n=41) and 4th grade students (n=65) about energy concepts and conservation practices. Post-data showed PSETs valued the teaching experience and learning about energy concepts. Both PSETs and elementary students reported positive commitment to energy saving habits.

Format: Traditional Paper Set Presider: Aimee Lee Govett

Student teachers’ attitudes to teaching evolution, creationism, and intelligent design: A comparative U.S.-German study

Ian C. Binns, UNC Charlotte, Armin Lude, PH Ludwigsburg University of Education, Mark A. Bloom, Dallas Baptist University, Alexandra Higelin, PH Ludwigsburg University of Education

5:15pm - 6:15pm in Frederick - Session C

This research compares how U.S. and German preservice teachers justify including or excluding creationism and/or intelligent design into a science curriculum.

Format: Traditional Paper Set Presider: Aimee Lee Govett

Who Succeeds in STEM? A Study of Elementary Girls’ Perceptions of Gender and STEM

Jeanna R. Wieselmann, University of Minnesota, Justine N. Kim, University of Minnesota, Gillian H. Roehrig, University of Minnesota

5:15pm - 6:15pm in Pratt/Calvert - Session A

This study explores elementary girls’ perceptions of STEM and how gender is related to STEM involvement and outcomes. Participants attended an out-of-school, integrated STEM program that situated learning within real-world contexts. Thirty fourth- and fifth-grade girls were interviewed, and findings suggest that elementary girls perceive STEM advantages for boys as early as fourth grade.

Format: Traditional Paper Set Presider: Jeanna Wieselmann

Preservice Science Teacher Field Experiences at a Science Museum: Communication Skills

Karen E. Irving, Ohio State University, Wahyu Setioko, Ohio State University

5:15pm - 6:15pm in Pratt/Calvert - Session B

The impact on preservice science teachers’ communication skills of an informal science teaching experience at a science museum is investigated. Video recordings, field observations, individual interviews, and focus group discussions provided evidence to document changes in the teachers’ performances when presenting science to visitors. Improvements in teacher communications skills are reported.

Format: Traditional Paper Set Presider: Jeanna Wieselmann

Meet the CITE Editors

5:15pm - 6:15pm in President (1st Floor)
JSTE Editorial Meeting and Reception: By Invitation Only
5:15pm - 6:15pm in Pisces (15th Floor)

WISE Dinner
7:00pm - 8:30pm in Morton’s (Sheraton)
January 6

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**Breakfast**
6:30am - 8:00am in Bistro 300 /Pisces (15th Floor)

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**Forum Meetings**
7:00am - 7:50am
Inclusive Science Education in Annapolis
Policy and Gov. Relations in Baltimore
Women in Science Education in Camden/Lombard
Scientist/Science Educators Collaboration in Charles
Small Colleges and Programs in Chesapeake A
Technology in Chesapeake B
Environmental Education in Columbia
Seniors as Resources for Science Education in Douglass

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*Thread: Science Teacher Professional Development*

**Urban Teacher Professional Development for a Literacy-rich, Problem Based Learning/Engineering Design Project for Elementary Students**
Anita M Martin, Indiana University Northwest, Sharon Pratt, Indiana University Northwest

8:00am - 9:00am in Annapolis - Session A

This research study examines the role of a new tool set in identifying the promises and possibilities of urban teachers and students as they take up STEM and engineering design notions in a literacy rich professional development initiative in three distinct urban districts. Knowledge of place; funds of knowledge, and identities in practice notions are visually displayed using a new methodology: ENA.

*Format: Traditional Paper Set Presider: Karen Irving*

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*Thread: Preservice Science Teacher Preparation*

**Experience of the Neophyte Science Teachers: Through Their Eyes**
David Thornton, University of South Florida

8:00am - 9:00am in Annapolis - Session B

A multi-case study looks through the eyes of four high school novice science teachers at their experiences in today’s world of science education. This study relates perceived experiences, changed beliefs, describes success and challenges, along with emergent themes.

*Format: Traditional Paper Set Presider: Karen Irving*

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*Thread: Science Teacher Professional Development*

**Digging Deep Into Science Literacy: Exploring Close Reading and Technical Writing in Science for Grades K-8**
Kristen Pennycuff Trent, Tennessee Technological University, Leslie Sutters, Tennessee Technological University, Stephanie Wendt, Tennessee Technological University, Queen Ogbomo, Tennessee Technological University, Kelly Moore, Tennessee Technological University, Terry Lashley, The Learning Curve, Inc.

8:00am - 9:00am in Baltimore - Session A

Explore, experiment, and analyze your way through CCSS’s literary demands and the content of NGSS with research-based strategies for K-8 for teaching close reading and technical writing developed as part of a Math Science Partnership grant.

*Format: Experiential Session*
Thread: Educational Technology

Lessons Learned and Issues Identified from the Online Teaching Experience of Science Teacher Educators

David F Jackson, University of Georgia, Lee Meadows, University of Alabama at Birmingham, Donna L Governor, University of North Georgia, David L Pauli, Gwinnett County Public Schools

8:00am - 9:00am in Camden/Lombard - Session A

We discuss each of our experiences with online professional development and graduate education of science teachers, with special emphasis on the influence of multiple factors on the formation of a Community of Inquiry. In particular we contrast entirely online vs. hybrid/blended courses, synchronous vs. asynchronous activities, and the balance between teacher-student and student-student interactions.

Format: Small Group Roundtable Presider: David Jackson

Thread: Informal Science Education

Museum Partnerships for Prekindergarten Science Professional Development

Jenny Ingber, American Museum of Natural History, Jacqueline Horgan, American Museum of Natural History, Daniel Zeiger, American Museum of Natural History

8:00am - 9:00am in Camden/Lombard - Session B

We present a model of professional development for prekindergarten (preK) teachers created through Museum partnerships. PreK teachers often are not provided opportunities to build their skills and practices in science teaching. The program addresses content and pedagogical content knowledge and accounts for the unique early learning environment and developmental abilities of young learners.

Format: Small Group Roundtable Presider: David Jackson

Thread: Equity and Diversity

Using Culturally Relevant Teaching as a Framework for Science Methods: Making Whiteness Visible

Paula A Magee, Indiana University - IUPUI

8:00am - 9:00am in Camden/Lombard - Session C

In this roundtable discussion I will share my own philosophical stance, activities and actions that have been used to develop a culturally relevant, racially-aware elementary science methods course. I will engage the participants in a critiquing discussion of my work as well as a critical discussion of their own work in developing such a course.

Format: Small Group Roundtable Presider: David Jackson

Thread: College and University Science Education

Addressing Climate Change in a Hot Political Climate

Bridget T Miller, University of South Carolina

8:00am - 9:00am in Camden/Lombard - Session D

As climate continues to change it will impact ecosystems and life around the world. As educators, it’s important to educate and prepare scientifically literate citizens. Today’s political climate may make the topic of climate change a “hot button” in many communities. What are ways that you can present information with scientific and engineering practices to students addressing this pressing issue?

Format: Roundtable Presider: David Jackson
A Comparative Analysis of Nature of Science Representations in National and Science High School Curricula in the Philippines

Mila Rosa L Librea-Carden, Kent State University, Tanzimul Ferdous, Kent State University, Bridget K Mulvey, Kent State University

8:00am - 9:00am in Charles - Session A

This study compared how nature of science (NOS) aspects are represented in the Philippine curricula nationally and for a main public science high school, using a document analysis approach of Abd-El-Khalick et al. (2017). Both curricula had mostly implicit yet informed NOS statements. The science high school curriculum included more NOS-related statements, albeit still largely implicit ones.

Format: Traditional Paper Set  Presider: Mila Rosa Librea

Scientific Inquiry in Chilean Primary school: An exploratory study

Juan P Jimenez, Illinois Institute of Technology

8:00am - 9:00am in Charles - Session B

This study analyzes the relationship between primary science teachers’ perceptions of inquiry and implementation of inquiry activities in four Chilean classrooms. Videotaped observations, interviews, and the Views about Scientific Inquiry (VASI) were used to assess knowledge of inquiry and implementation of inquiry activities. The results show difficulties moving to a true inquiry-based classroom.

Format: Traditional Paper Set  Presider: Mila Rosa Librea

A State-Wide Initiative for Professional Learning: SciCamps

Catherine Koehler, Southern CT State University, Jeff Thomas, Central CT State University, Todd Campbell, University of Connecticut, Marsha Bednarski, Central CT State University, Cindy Kern, Quinnipiac University

8:00am - 9:00am in Columbia - Session A

In this proposal, we will describe phase 2 of the CoNSEPT project, and how we leveraged a strong IHE professional learning community (PLC) to work toward our goal of introducing NGSS teaching and learning to inservice teachers through SciCamps in Connecticut.

Format: Traditional Paper Set  Presider: Tina Cartwright

Development and Analysis of Middle and High School Students’ Conceptions of Weather, Climate, & Climate Change

Tina J Cartwright, Marshall University, Deb Hemler, Fairmont State University, Paula Magee, Indiana University Indianapolis

8:00am - 9:00am in Columbia - Session B

This study analyzes the development of students’ understandings of weather, climate and climate change around a unit of instruction in middle school and 4 years later in high school. Development of students’ ideas in several content areas will be discussed. Recommendations for climate change instruction will be shared.

Format: Traditional Paper Set  Presider: Tina Cartwright

NTLI

8:00am - 9:30am in Conway (1st Floor)
The Triad Project: Meeting the Professional Development Challenges of the NGSS
Al Schademan, California State University, Chico
8:00am - 9:00am in Douglass - Session A

The Triad Project is a grant-funded program designed to simultaneously engage teacher candidates, cooperating teachers, and science education faculty in professional development around the NGSS. The presentation will focus on the design of the Triad model, research results, and an example of a Triad unit including student work samples from multidimensional performance-based assessments.

Format: Traditional Paper Set Presider: Carolyn Parker

MORE THAN ‘TEACHERS OF TEACHERS’: A MIXED-METHODS STUDY OF A PROFESSIONAL DEVELOPMENT LEADERSHIP WORKSHOP
Yi Li, Teachers College, Columbia University, Phillip A. Boda, Teachers College, Columbia University, Jiahui Zhao, Tilton School, Jiaha Li, Virginia Episcopal School
8:00am - 9:00am in Douglass - Session B

This study reports findings from a science teacher leadership professional development (PD) program that sought to train a new generation of PD leaders that can subsequently support science teachers toward reform in science education.

Format: Traditional Paper Set Presider: Carolyn Parker

Learning to Notice and Respond to Elementary Students’ Ideas: Lessons Learned From the CoLABorative Field Model
Dante I Cisterna, University of Missouri, Julie Birt, University of Missouri, Sheunghyun Yeo, University of Missouri, Deborah Hanuscin, Western Washington University
8:00am - 9:00am in Frederick - Session A

In this study we describe features of a new model (CoLABorative Field Model) that supports elementary pre-service teachers and integrates learning experiences in science methods courses and schools. We examined how pre-service teachers’ ideas about students develop through this model and their learning outcomes. We also discuss potentials and challenges of this model to be implemented in other contexts.

Format: Traditional Paper Set Presider: Matthew Vick

Academic and Practical Knowledge Gains Reported by Pre-Service Teachers in a Third Space Methods Course
Matthew E Vick, University of Wisconsin-Whitewater
8:00am - 9:00am in Frederick - Session B

Third space methods courses combine academic pedagogical knowledge facilitated by university professors and practical knowledge facilitated by in-service teachers by locating methods courses in an elementary school. Results of an open-ended survey of pre-service teachers will share the self-reported academic and practical knowledge learned.

Format: Traditional Paper Set Presider: Matthew Vick

An Early Shared Clinical Experience as the Foundation for Successful STEM Teacher Preparation
Gayle N. Evans, University of Florida, Kristen Apraiz, University of Florida
8:00am - 9:00am in Frederick - Session C
We discuss how an early, shared and supported clinical experience in an elementary afterschool setting promotes the integration of university coursework with school-based teaching experience, and builds a strong foundation for a teacher preparation program focused on preparing undergraduate STEM majors to teach in middle and high schools.

**Format:** Traditional Paper Set  
**Presider:** Matthew Vick

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**Thread:** Informal Science Education

**Bridging the gap between science and society: Exploring citizens’ motivations and influences in attending science cafés**

Gina Childers, *University of North Georgia*, Donna Governor, *University of North Georgia*, Stacey Britton, *University of West Georgia*

**8:00am - 9:00am in Pratt/Calvert - Session A**

Science Cafés create an open dialogue between scientific experts and the public. The majority of attendees (65%) reported gaining information or knowledge was a significant motivational factor. Additionally, 54% of attendees stated they share and/or discuss the information gained from a Science Café event with others (e.g., family members, friends, colleagues).

**Format:** Traditional Paper Set  
**Presider:** Gina Childers

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**Thread:** Informal Science Education

**Extracurricular programming: Increasing access to appropriately challenging STEM opportunities for high-achieving students in economically disadvantaged rural communities**

Lori M Ihrig, *University of Iowa*, Erin M. D. Lane, *University of Iowa*, Duhita Mahatmya, *University of Iowa*

**8:00am - 9:00am in Pratt/Calvert - Session B**

Extracurricular STEM programming offers one pathway to develop talent in high-achieving rural students. Using a concurrent triangulation mixed methods research design, this study evaluates the experiences of students and teachers, participating in extracurricular, school-based, STEM talent development. Findings support informal education environments for underserved gifted populations.

**Format:** Traditional Paper Set  
**Presider:** Gina Childers

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**Oversight Committee**

**8:00am - 9:00am in President (1st Floor)**

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**Thread:** STEM Education

**Differences in Teachers’ Practices and Ways in Which Their Conceptual Models of STEM are Enacted During Implementation of an Integrated STEM Curriculum Unit**


**9:15am - 10:15am in Annapolis - Session A**

This study, contextualized within a professional development (PD) experience, aimed to explore how teachers’ practices differ during their implementation of an integrated STEM curriculum unit and how, if at all, teachers enact their conceptual models of integrated STEM education in the classroom when implementing this unit.

**Format:** Traditional Paper Set

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**Thread:** STEM Education

**Not as Easy as it Looks: Ranking Different STEM Models in a Continuum**

Emily A Dare, *Michigan Technological University*, Elizabeth A Ring, *University of Minnesota*, Gillian H Roehrig, *University of Minnesota*

**9:15am - 10:15am in Annapolis - Session B**
By asking teachers to rank different models of STEM by placing them in a continuum, this work seeks to understand how teachers perceive different models presented to them. This information helps teacher educators and educational researchers identify what features of STEM are most in line with teachers’ conceptions of STEM, further indicating what STEM might look like in classroom practice.

**Format:** Traditional Paper Set

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**Thread:** STEM Education

**Elementary Teachers’ Conceptions and Integration Methods of iSTEM Education: An Exploratory Cross-Sectional Survey Study**

Kathryn “Annie” Arnone, *NASA Endeavor*, Deborah Hanuscin, *University of Missouri*

**9:15am - 10:15am in Annapolis - Session B**

We know very little about the unique needs of elementary teachers regarding instructional approaches to iSTEM Education. This study examines and describes the ways in which elementary teachers conceptualize iSTEM Education and the integrative approaches they use when teaching STEM content, with the intent to inform the development of elementary specific iSTEM Education professional development.

**Format:** Traditional Paper Set

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**Thread:** Educational Technology

**Developing Critical Thinking Skills with sInvestigator**


**9:15am - 10:15am in Baltimore - Session A**

This experiential session will give participants access to and initial training with sInvestigator, a software tool designed to aid students in collaborative evaluation of evidence and development of hypotheses. Facilitators will provide preliminary research findings on the sInvestigator project and will share a new measure of student ability to evaluate evidence. Laptops recommended.

**Format:** Experiential Session

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

**Effect of Participation in Modeling Instruction in Biology Year Long Professional Development**

Mary LeFever, *The Ohio State University*, Kathy L. Malone, *The Ohio State University*, Karen E. Irving, *The Ohio State University*

**9:15am - 10:15am in Camden/Lombard - Session A**

Professional development, including school year video analysis, focused on Modeling Instruction in Biology was assessed based upon changes in teacher practice. Groups of teachers were surveyed, interviewed and observed. Outcomes and modifications to the observation protocol are presented. Findings have implications for in service teacher PD.

**Format:** Small Group Roundtable

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

**Making a Case for STEAM: It’s Not Just an Educational Fad**


**9:15am - 10:15am in Camden/Lombard - Session B**

Explore how an academically rigorous, STEAM approach can result in science education curriculum that is empowering, inclusive, creative, and collaborative. This session is designed to deeply engage participants in the theory and practices of STEAM, featuring a conceptual model and learning progression as well as field tested K-12 case studies.

**Format:** Small Group Roundtable
Thread: Science Teacher Professional Development

Assisting Elementary Teachers implement STEAM in the K-8 classroom
Nancy K DeJarnette, University of Bridgeport
9:15am - 10:15am in Camden/Lombard - Session C
This project addresses the need for STEAM (Science, Technology, Engineering, Arts, and Math) initiatives in the elementary school. This grant funded ethnographic research focuses on observing the impact of professional development and consistent support on elementary teachers’ self-efficacy, dispositions, and rate of implementation of STEAM content within their curriculum.
Format: Small Group Roundtable

The UTeach Maker Showcase: A Micro-credentialing framework
Shelly R. Rodriguez, The University of Texas, Austin, Jason R. Harron, The University of Texas, Austin
9:15am - 10:15am in Camden/Lombard - Session D
UTeach Maker is a selective micro-credentialing program that helps preservice science teachers develop the mindset and skills to bring making to schools. In this session, the program framework and the micro-credentialing process will be discussed. This session should appeal to anyone interested in bringing maker education and its accompanying technologies into formal school settings.
Format: Small Group Roundtable

Thread: History, Philosophy, and Nature of Science

History of Science in the Preparation of Future Science Teachers: Illustrations from Multiple Cases with Implications for Science Teacher Education
William (Bill) F McComas, University of Arkansas, Noushin Nouri, University of Texas, Rio Grande Valley
9:15am - 10:15am in Charles - Session A
We report on the range of instructional methods and classroom practices in a model curriculum (used nationally in the UTeach program) focused on the history of science with data from 11 universities (16 instructors). The multiple case study approach revealed that instructors have variety of rationales and methods for teaching such a class which we will discuss including insights about NOS instruction.
Format: Traditional Paper Set Presider: Line Saint-Hilaire

Place-based Contentious Environmental Socioscientific Issues Instruction and Students’ NOS Views, Compassion, and Pro-Environmental Intent and Action
Benjamin C Herman, University of Missouri
9:15am - 10:15am in Charles - Session B
This investigation explored how place-based contentious environmental issues instruction focused on wolf reintroduction in Yellowstone influenced sixty secondary students’ NOS views, compassion toward others, and pro-environmental intent; and how those perspectives were associated with the students’ pro-environmental action of donating to a Yellowstone environmental organization.
Format: Traditional Paper Set Presider: Line Saint-Hilaire

How religion influences elementary preservice teachers’ discernment of science from non-science
Mark A Bloom, Dallas Baptist University, Ian C Binns, UNC Charlotte
9:15am - 10:15am in Charles - Session C
This research explored the influence of religion on elementary preservice teachers’ decisions to include or exclude creationism and/or intelligent design into a science curriculum.
Format: Traditional Paper Set Presider: Line Saint-Hilaire
Thread: Student Learning P-12

The Association between Parental Beliefs and Preferences in Early Science Education

Mesut Sackes, Balıkesir University, Kathy Cabe Trundle, NC State University, Maria Shaheen, Primrose Schools

9:15am - 10:15am in Columbia - Session A

This study examined the association between parental beliefs about their children’s interest and competence in learning science and the parental preferences regarding academic content areas during the early years (n= 1,490 parents). Findings suggest that parental beliefs regarding their children’s interest and competence influence the science learning opportunities parents offer to their children.

Format: Traditional Paper Set Presider: Gayle Evans

Thread: Student Learning P-12

Teaching Socioscientific Issues in an Evolving Context

Dana L Zeidler, University of South Florida, Scott Applebaum, University of South Florida, Michael Mitchell, University of South Florida, Karrie Wikman, University of South Florida, Tara Trumah, University of South Florida, Selene Willis, University of South Florida, Melanie Weitz, Eunhang Lee, University of South Florida

9:15am - 10:15am in Columbia - Session B

This paper explores how students’ epistemological reasoning related to elements of social and moral compassion were revealed prior to and after an academic year in a high school SSI and content rich course, and to examine the challenges faced by their teacher in establishing a sociocultural norm that engages students in these types of issues. Implications for science teacher are addressed.

Format: Traditional Paper Set Presider: Gayle Evans

Thread: Science Teacher Professional Development

PrimeD: A Professional Development Framework to Build Partnerships and Empower Teachers

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

9:15am - 10:15am in Columbia - Session C

The Professional Development: Research, Implementation, and Evaluation (PrimeD) framework emerged from research and practice in diverse, urban school districts through an iterative development process and synthesizes research and theory to describe and distinguish characteristics of effective PD, evaluation, and research. This session will share results from using PrimeD across multiple projects.

Format: Traditional Paper Set Presider: Gayle Evans

Thread: Science Teacher Professional Development

Using the Growth Mindset to Improve Opportunities for Negotiation in Argument-Based Inquiry Elementary Classrooms.

Bridget Tharp, University of Northern Iowa, Mason Kuhn, University of Northern Iowa

9:15am - 10:15am in Douglass - Session A

This presentation will discuss a study where researchers evaluated if teaching students about the growth mindset as a strategy to enhance their meaning making improved student performance on standardized science tests. The teachers in the study used an Argument-Based Inquiry approach in their classrooms and routinely ask students to construct claims and offer them for public critique by their peers.

Format: Traditional Paper Set Presider: Angela Webb
Science Teacher Professional Noticing: What do “expert” teachers notice and how does professional development change their noticing ability?
Meredith Houle Vaughn, San Diego State University, Lauren Stewart, San Diego State University, Megan D’Errico, San Diego State University, Donna Ross, San Diego State University
9:15am - 10:15am in Douglass - Session B

Professional noticing is how a teacher attends, interprets and responds to students’ thinking. In this presentation, we will share the development of an instrument to measure professional noticing and how 16 “expert” science teachers’ noticing skills have developed as part of an on-going five-year NSF-funded fellowship grant.

Thread: Science Teacher Professional Development

Relational-Cultural Theory as a Lens to Understanding Science Teacher Induction: Exploring the Relational Maps of a Newly Hired Alternative Licensed Science Teacher’s Induction Experiences
Angela W Webb, Louisiana State University, Leiflyn Gamborg, Louisiana State University
9:15am - 10:15am in Douglass - Session C

This presentation considers the induction experiences of a newly hired, alternatively licensed science teacher through the lens of Relational-Cultural Theory to develop a deeper understanding of the relationships she found supportive during her initial years of teaching.

Thread: Science Teacher Professional Development

The Use of Action Research to Change Secondary Science Teacher Practice through Reflection
Rita Hagevik, The University of North Carolina at Pembroke
9:15am - 10:15am in Frederick - Session A

The twenty secondary science candidates involved in this action research experience were in a Masters of Arts in Comprehensive Secondary Science Teaching at the University over the past four years. How these candidates viewed their total experiences, as reported in a follow-up survey as well as from other data sources revealed benefits the candidates received from the total action research experience.

Thread: Preservice Science Teacher Preparation

Exploring the Influence of Situated Work Experiences on Paraprofessional Preservice Teachers’ Science Teaching Self-Efficacy
Lindsay K Lightner, Washington State University, Judith A Morrison, Washington State University
9:15am - 10:15am in Frederick - Session B

This qualitative study investigates the relationship between work experiences and the science teaching self-efficacy beliefs of paraprofessional preservice elementary teachers in an alternate route certification program. Participants who balanced mastery and vicarious teaching experiences and integrated their funds of knowledge with school-based expertise had stronger self-efficacy beliefs.
Thread: Preservice Science Teacher Preparation

**Predicting Persistence through Science Teaching Identity and Course and Field Experiences**

Vishodana Thamotharan, Florida International University, Zahra Hazari, Florida International University

9:15am - 10:15am in Frederick - Session C

Presenters will share findings regarding 1) a valid and reliable quantitative Science Teaching Identity instrument; 2) Science Teaching Identity and its link to persistence and career interest in science teaching; 3) Results of regression model identifying course and field experiences factors that are predictive of Science Teaching Identity.

*Format: Traditional Paper Set  Presider: Larry Horvath*

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Thread: Ethnoscience and Environmental Education

**How Teachers’ Beliefs About Climate Change Influence Their Instruction, Student Understanding, and Willingness to Take Action**

Molly T Nation, University of South Florida, Allan Feldman, University of South Florida, Glenn G Smith, University of South Florida

9:15am - 10:15am in Pratt/Calvert - Session A

This study examines the complex relationship that exists between science teachers’ beliefs and understandings of climate change and their instructional practices of a climate-centered curriculum. The study further examines how teachers’ beliefs and understandings influence resulting student outcomes including understanding of climate change science.

*Format: Traditional Paper Set  Presider: Erin Peters-Burton*

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Thread: Curriculum, Pedagogy, and Assessment

**Digging into Gardening to Grow Science Learning**

Kathy Cabe Trundle, NC State University, Katherine McCance, NC State University, Maria Shaheen, Primrose Schools

9:15am - 10:15am in Pratt/Calvert - Session B

For decades agricultural extension agencies and horticulture organizations have promoted the integration of gardening into school curricula, and recent research indicates that gardening increases student motivation and science learning. This study synthesizes previous empirical studies and theoretical literature on gardening and science teaching and the efficacy of gardening for science learning.

*Format: Traditional Paper Set  Presider: Erin Peters-Burton*

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Coffee Break

10:15am - 10:45am in Bistro 300 and Foyer Area

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Thread: STEM Education

**Building STEM Schools from the Ground Up: How Teacher Leadership Teams Shape STEM Integration in Schools**

Elizabeth A Crotty, University of Minnesota, Elizabeth A. Ring, University of Minnesota, Illana Livstrom, University of Minnesota, Gillian H. Roehrig, University of Minnesota

10:45am - 11:45am in Annapolis - Session A

The Federal Government recently called for an increase in the number of STEM schools in the U.S. to improve access to STEM for a broader population of students (PCAST, 2010). This study explores the ways in which STEM integration can be facilitated through teacher leadership STEM teams in systematic and individual ways within a school and explores how teachers learn leadership through this process.

*Format: Traditional Paper Set*
**Thread: Educational Technology**

**An Integrated Approach to Water Science and Computational Literacy**
Bess Caplan, Cary Institute of Ecosystem Studies, Garrett Love, North Carolina School of Science and Mathematics, Alan R. Berkowitz, Cary Institute of Ecosystem Studies

10:45am - 11:45am in Baltimore - Session A

CompHydro is a collaborative research and development project that supports an integrated approach to Water Science and Computational literacy. It combines authentic learning experiences in the schoolyard, physical, conceptual and computational models and data interpretation to enable high school students and teachers to reason about an important local issue: urban runoff and flooding.

**Format:** Experiential Session

**Thread: College and University Science Education**

**Science Education within the Cultural Context: A Sense of Purpose, A Sense of Place**
Lori Fulton, University of Hawaii at Manoa, Jon Yoshioka, University of Hawaii at Manoa

10:45am - 11:45am in Camden/Lombard - Session A

This presentation examines how we use both standards and the cultural context to develop meaningful learning experiences in science. Examples will be shared along with successes and challenges in developing place-based experiences. Attendees will be asked to consider their own place and how they incorporate that into their science instruction.

**Format:** Experiential Session

**Presider:** Adam Johnston

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

**Introducing NOS Box as an Educational Tool for Teaching Nature of Science in Elementary Science Method Classes**
Noushin Nouri, University of Texas Rio Grand Valley

10:45am - 11:45am in Charles - Session A

Understanding the nature of science is critical for preservice teachers. Sometimes Elementary Science Methods classes are the only place that there is a chance to help preservice teachers to learn about it. In this proposal, a very simple method that does not need lots of time is introduced to incorporating NOS to such classes.

**Format:** Traditional Paper Set

**Presider:** Teresa Woods

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

**Impact of Nature of Science Teaching on Elementary Teachers’ Nature of Science Conceptions**
Elif Adibelli Sahin, TED University, Hasan Deniz, University of Nevada Las Vegas

10:45am - 11:45am in Charles - Session B

This study aimed to study to what extent nature of science (NOS) teaching experience can further improve elementary teachers’ NOS views immediately after they participate in a professional development program designed to improve their NOS. We found that NOS teaching experience helped elementary teachers to further develop their NOS views.

**Format:** Traditional Paper Set

**Presider:** Teresa Woods

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

**Using Explicit and Reflective Strategies in a Biology Course to Develop Pre-Service Elementary Teachers’ Understandings of Specific Aspects of Nature of Science and Scientific Inquiry**
Jennifer C. Parrish, University of Northern Colorado, Grant Gardner, Middle Tennessee State University, Katherine Mangione, Middle Tennessee State University

10:45am - 11:45am in Charles - Session C
This study examined the effectiveness of two explicit and reflective strategies designed to improve preservice elementary teachers’ conceptions of NOS and SI, as well as their intentions to integrate NOS into their future instruction. Results, details about each strategy, and the framework used to code small-group reflective discourse will be presented.

Format: Traditional Paper Set  Presider: Teresa Woods

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**Thread: Doctoral Student Development**

**The Work and Process of Doctoral Student Preparation for Research in Teacher Education**

Felicia M Mensah, Teachers College, Columbia University, James Barron, Teachers College, Columbia University, Anna Beck, Teachers College, Columbia University, Allison Bookbinder, Teachers College, Columbia University, William Davis, Teachers College, Columbia University, Alyssa Getzel, Teachers College, Columbia University, Kristina Hopkins, Teachers College, Columbia University, Xiaoxin Lyu, Teachers College, Columbia University

10:45am - 11:45am in Chesapeake A - Session A

Doctoral students present initial work as emergent researchers. Attendees will have an opportunity to visit two roundtables and interact with the researchers about their work. In the closing, the organizer will present an outline of the models used in developing emerging academic researchers. Faculty may use the models to support student development and a community of researchers at their institution.

Format: Small Group Roundtable

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**Thread: Preservice Science Teacher Preparation**

**Enhancing Science Vocabulary and Scientific Literacy with ABC Books**

Velta Napoleon-Fanis, Middle Tennessee State University, Cindi Smith-Walters, Middle Tennessee State University, Candace M. Quinn, Middle Tennessee State University, Joshua W. Reid, Middle Tennessee State University

10:45am - 11:45am in Chesapeake B - Session A

Improving vocabulary acquisition and content knowledge are keys to promoting development of scientific knowledge and literacy in preservice teachers. ABC books support both goals by exposing students to science vocabulary inadvertently leading to the acquisition of content. This session explores a novel formative assessment tool to achieve these goals, student developed ABC Books.

Format: Small Group Roundtable

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**Equity Committee II**

10:45am - 11:45am in Conway (1st Floor)

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**Thread: Science Teacher Professional Development**

**Teaching Old-dogs New Tricks: Creating Space for Project-based Learning in a Vocabulary-focused Classroom through a Year-long Professional Development**

Rory J Glass, State University of New York at Albany, Alandeom Oliveira, State University of New York at Albany

10:45am - 11:45am in Douglass - Session A

This presentation will discuss results of a year-long professional development project working with high school teaching teams to improve the learning outcomes of ELLs in content area classes. We will share results that suggest explicit instruction may be less effective than simply working with, and around, language artifacts; as long as the context is familiar.

Format: Traditional Paper Set  Presider: Jamie Mikeska

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**Thread: Science Teacher Professional Development**

**Engineering in Elementary School Year 2: Building 21st Century Learners**

Vinta A. Tiarni, Ohio State University, Karen E. Irving, Ohio State University, Kathy L. Malone, Ohio State University, Trudy Giasi, Ohio State University, Rachel L. Kajfez, Ohio State University

10:45am - 11:45am in Douglass - Session B
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 first two years of implementation.

**Format:** Traditional Paper Set  **Presider:** Jamie Mikeska

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**NSTA-sponsored Session: National Survey on the Preparation of Preservice Teachers**

Paul Adams, *NSTA Preservice Teacher Preparation Division Director, Fort Hays State University*

**10:45am - 11:45am in Frederick**

The NSTA Preservice Teacher Preparation Committee is developing a survey to explore practices and inclusion of the Framework for Science Education and NGSS as part of the preparation of science teachers. This town-hall type session is intended to seek input and insights on developing the survey from ASTE members.

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**Thread: Educational Technology**

**Developing Scientific Citizenship Identity Using Mobile Learning and Authentic Practice**

Duane Wallace. *Lehigh University, Alec M Bodzin, Lehigh University*

**10:45am - 11:45am in Pratt/Calvert - Session A**

An educational approach consisting of mobile learning and the authentic practice of participating in a citizen science project to foster scientific citizenship identity and interest in STEM education and careers is presented.

**Format:** Traditional Paper Set  **Presider:** Carolyn Parker

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**Thread: Educational Technology**

**Learning Technology Integration in High School Biology: A Case Study of Eight Teachers**


**10:45am - 11:45am in Pratt/Calvert - Session B**

This study investigated the practices of high school biology teachers on their use of learning technologies (probes, simulations, and modeling tools) and whether using these technologies alleviated misconceptions among students. Findings reported mixed results about reducing misconceptions among students. Teachers were found to use the learning technologies as visual tools to supplement instruction.

**Format:** Traditional Paper Set  **Presider:** Carolyn Parker

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**Thread: Educational Technology**

**Mobile Apps for Learning STEM (MALS)**

Seema Rivera, *Clarkson University, Mahesh Banavar, Clarkson University, Dana Barry, Clarkson University*

**10:45am - 11:45am in Pratt/Calvert - Session C**

The central focus of this work-in-progress is to motivate high school students to develop an interest in STEM as well as prepare teachers to carry out these tasks. The objectives of this project are to design and develop immersive mobile app-based laboratories that enable and motivate students to learn STEM topics by immersing themselves in interactive apps.

**Format:** Traditional Paper Set  **Presider:** Carolyn Parker

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**Thread: STEM Education**

**Impacts of an Authentic Astronomy Research Project on the STE(A)M Voice of Traditionally Underserved Youth in an Informal Setting**

Robert J Palmer, *University of Minnesota, Felicia Leammukda, University of Minnesota, Sarah Komperud, The Bell Museum and Planetarium, Bonnie Boyd, Franklin Middle School, Joshua Haislip, Skynet, Daniel E. Reichart, Skynet, Vivian Hoette, Yerkes Observatory, Gillian Roehrig, University of Minnesota*

**10:45am - 11:45am in President - Session A**
Participants in this session will experience part of the innovative informal astronomy curriculum known as Skynet Junior Scholars (SJS). This single embedded case study examines impacts of SJS on the STEM voice of participants. The authors primary goal is to explore the impacts SJS has on the STEM voice of students who are members of groups traditionally underrepresented in STEM.

Format: Traditional Paper Set

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**ASTE Awards and Business Luncheon**

12:00pm - 2:00pm in Sheraton Ballroom

The ASTE Awards and Business Luncheon will be held in the Sheraton Inner Harbor which is located across the street from the Hyatt Regency Inner Harbor. Leave the Hyatt through the doors on the ground floor (hotel registration level). The doors are located by the President Room and Conway Room. Walk to the left and then cross the street to the Sheraton. Take the escalator to the third floor and the Awards and Luncheon is located in the Chesapeake Ballrooms.
Presiders

Valarie Akerson
Sumreen Asim
Brenda Bartlett
Phillip Boda
Sarah Boesdorfer
Lisa Borgerding
Mike Borowczak
Frederick Bradley
Andrea Burrows
Nate Carnes
Dan Carpenter
Tina Cartwright
Angela Chapman
Gina Childers
Emily Dare
Jeni Davis
Mike Dias
Joshua Ellis
Gayle Evans
Kelly Feille
Ray Francis
Anne Gatling
Katie Green

Deb Hemler
Rebecca Hite
Larry Horvath
Karen Irving
David Jackson
Adam Johnston
Karl Jung
Meredith Kier
David Kimori
Natalie King
Jeffry King
Melanie Kinskey
Richard Lamb
Timothy Laubach
Aimee Lee Govett
Illana Livstrom
Pamela Lottero-Perdue
Anna Maria Arias
Anita Martin
Mandy McCormick Smith
Justin McFadden
Helen Meyer
Jamie Mikeska
Bridget Mulvey
Noushin Nouri
James Nyachwaya
Young-Shin Park
Meredith Park Rogers
Carolyn Parker
Matthew Perkins Coppola
Erin Peters-Burton
Jacob Pleasants
Jenna Porter
Mila Rosa Librea
Line Saint-Hilaire
Kathleen Schmidt
Morgan Stewart
Michael Svec
Stephen Thompson
Regina Toolin
Matthew Vick
Angela Webb
Jeanna Wieselmann
Cathy Wissehr
Teresa Woods
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<tr>
<th>Year</th>
<th>President</th>
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<tr>
<td>1932-34</td>
<td>S. Ralph Powers</td>
<td>1980-81</td>
<td>Hans Anderson</td>
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<td>1935-36</td>
<td>John C. Johnson</td>
<td>1981-82</td>
<td>Jerry C. Horn</td>
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<td>1936-38</td>
<td>W. L. Kikenberry</td>
<td>1982-83</td>
<td>James P. Barufaldi</td>
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<td>1938-40</td>
<td>E. Laurence Palmer</td>
<td>1983-84</td>
<td>Ron W. Cleminson</td>
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<td>1940-41</td>
<td>Earl R. Glenn</td>
<td>1984-85</td>
<td>Thomas P. Evans</td>
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<td>1941-45</td>
<td>Anna M. Gemmill</td>
<td>1985-86</td>
<td>Marvin Druger</td>
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<td>1947-48</td>
<td>Ellis Haworth</td>
<td>1987-88</td>
<td>Joyce Swartney</td>
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<td>1949-50</td>
<td>John Read</td>
<td>1989-90</td>
<td>Floyd Mattheis</td>
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<td>1950-51</td>
<td>George Haupt</td>
<td>1990-91</td>
<td>Gwendolyn Henderson</td>
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<td>1951-52</td>
<td>Robert Cooper</td>
<td>1991-92</td>
<td>Roger Olstad</td>
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<td>1952-53</td>
<td>Rose Lammel</td>
<td>1992-93</td>
<td>Catherine G. Yeotis</td>
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<td>1953-54</td>
<td>G. P. Cahoon</td>
<td>1993-94</td>
<td>Peter A. Rubba</td>
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<td>1955-56</td>
<td>John Wells</td>
<td>1995-96</td>
<td>Jim Ellis</td>
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<td>1957-58</td>
<td>June Lewis</td>
<td>1997-98</td>
<td>Bill Baird</td>
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<td>1958-59</td>
<td>George Zimmer</td>
<td>1998-99</td>
<td>Larry Flick</td>
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<td>1959-60</td>
<td>Harold Tannenbaum</td>
<td>1999-2000</td>
<td>John Staver</td>
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<td>1960-61</td>
<td>Herbert Schwartz</td>
<td>2000-01</td>
<td>Julie Gess-Newsome</td>
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<td>1961-62</td>
<td>Fletcher Watson</td>
<td>2001-02</td>
<td>Molly Weinburgh</td>
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<td>1962-63</td>
<td>Willard Jacobson</td>
<td>2002-03</td>
<td>John Penick</td>
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<td>1963-64</td>
<td>R. Will Burnett</td>
<td>2003-04</td>
<td>Herb Brunkhorst</td>
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<td>1964-65</td>
<td>Herbert Smith</td>
<td>2004-05</td>
<td>Julie Luft</td>
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<td>1965-66</td>
<td>Ralph Lefler</td>
<td>2005-06</td>
<td>Patricia Simmons</td>
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<td>1966-67</td>
<td>Edward Victor</td>
<td>2006-07</td>
<td>Kathy Norman</td>
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<td>1967-68</td>
<td>Sylvan Mickelson</td>
<td>2007-08</td>
<td>Janice Koch</td>
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<td>1968-69</td>
<td>Stephen Winter</td>
<td>2008-09</td>
<td>Warren DiBiase</td>
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<td>1969-70</td>
<td>Eugene Lee</td>
<td>2009-10</td>
<td>Jon Pedersen</td>
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<td>1970-71</td>
<td>John Montean</td>
<td>2010-11</td>
<td>Meta Van Sickle</td>
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<td>1971-72</td>
<td>Paul Westmeyer</td>
<td>2011-12</td>
<td>Randy Bell</td>
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<td>1972-73</td>
<td>Ronald D. Anderson</td>
<td>2012-13</td>
<td>John Tillotson</td>
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<td>1973-74</td>
<td>Robert E. Yager</td>
<td>2013-14</td>
<td>Kathy Cabe Trundle</td>
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<td>1974-75</td>
<td>David P. Butts</td>
<td>2014-15</td>
<td>Joanne Olson</td>
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<td>1975-76</td>
<td>Jacob Blankenship</td>
<td>2015-16</td>
<td>Lisa Martin-Hansen</td>
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<td>1976-77</td>
<td>Patricia Blosser</td>
<td>2016-17</td>
<td>Malcolm Butler</td>
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<td>1977-78</td>
<td>David H. Ost</td>
<td>2017-18</td>
<td>Gillian Roehrig</td>
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<td>1978-79</td>
<td>John Schaff</td>
<td>2018-19</td>
<td>Patricia Morrell</td>
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<tr>
<td>1979-80</td>
<td>Ertle Thompson</td>
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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 Cherl 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 (<10 yrs)

**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

**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
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

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

**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

Past winners of the NTLI 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)

Koballa, T., Upson, L., Minchew, C., Parlo, A., & Inyega, J. (2005). *Using technology to support evidence-based science teaching and mentoring.* Association for the Education of Teachers of Science (ASTE), Colorado Springs, CO. (University of Georgia)


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)


