## At a Glance

### Wednesday, January 14

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>9:00am—10:00am</td>
<td>Virtual Coffee Talk (Regional Meetings &amp; Equity Committee)</td>
<td>10:00am—10:15am</td>
<td>Break</td>
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<td></td>
<td>Business Meeting</td>
<td>10:15am—11:15am</td>
<td>Graduate Student Business Luncheon/Lunch on Your Own</td>
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<tr>
<td>11:15am—11:45am</td>
<td>Presidential Panel</td>
<td>12:30pm—12:45pm</td>
<td>Virtual Poster Hall, Syllabus Sharing, and Workshops</td>
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<td>11:45am—12:30pm</td>
<td>Break</td>
<td>12:45pm—1:15pm</td>
<td>Concurrent Session A</td>
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<td>1:15pm—1:45pm</td>
<td>Concurrent Session B</td>
<td>2:00pm—2:30pm</td>
<td>Concurrent Session C</td>
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<td>Concurrent Session D</td>
<td>2:00pm—2:30pm</td>
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<td>Concurrent Session F</td>
<td>3:15pm—3:45pm</td>
<td>4:15pm—5:00pm</td>
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### Thursday, January 15

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<tbody>
<tr>
<td>9:00am—10:00am</td>
<td>Virtual Coffee Talk (Committee Meetings)</td>
<td>10:00am—10:15am</td>
<td>Break</td>
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<tr>
<td>10:15am—11:00am</td>
<td>Fireside Chat with 2021 Awardees</td>
<td>11:00am—12:00pm</td>
<td>Graduate Student Workshop/Lunch on your own</td>
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<tr>
<td>12:00pm—3:30pm</td>
<td>Virtual Poster Hall, Syllabus Sharing, and</td>
<td>12:00pm—12:30pm</td>
<td>Concurrent Session G</td>
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<td>Concurrent Session G</td>
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<tr>
<td>Time</td>
<td>Concurrent Session H</td>
<td>Concurrent Session I</td>
<td>Concurrent Session J</td>
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<td>1:15pm—1:45pm</td>
<td>Workshops</td>
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**Room Maps**
Description of Conference Events

Virtual Coffee Hours

Synchronous opportunities to interact with either committees or regional groups in breakout rooms

Membership Events

Synchronous opportunities for all members to attend

Graduate Student Events

Synchronous opportunities for graduate students to interact and learn

Posters & Syllabus Sharing

Asynchronous sharing of posters and syllabi
Authors will submit files to be uploaded prior to the conference and contact information to share
Participants are invited to contact and engage with presenters

Paper Discussions & Round Tables

Authors will submit 7-10 minute videos prior to the conference, files will be uploaded and shared
Participants will be asked to view presentations prior to the conference session
Synchronous sessions (grouped into paper sets) will involve authors sharing 1 slide summarizing key ideas for 2-3 minutes and allowing for 20 minutes of discussion and questions

Explorations
Explorations will be occurring in a variety of formats. The majority have an asynchronous and synchronous component with the asynchronous component being completed prior to the session. Please make sure you check the session description to see if asynchronous work is necessary.

**Meet the Editors**

Synchronous opportunities to interact with editors from a variety of journals

**Workshops**

Synchronous opportunities to engage in a workshop and participate in professional learning

**3-Minute Thesis**

Participants will pre-record 3 minute videos prior to the competition
During the session videos will be watched and scored by judges
Winners will be announced at the end of the conference

**Virtual Happy Hours**

Synchronous opportunities to interact in Forums or meet other ASTE members in interest-based breakout rooms known as “Birds of Feather”

***Presider training will be provided asynchronously.***
Pre-Program & Program Sessions

Workshop: Using NGSS-Aligned Lessons to Promote Cultural Responsiveness and Diversity

Dr. Nancy Nasr, Granada Hills Charter High School
Dr. Leena Bakshi, STEM4Real

12:45pm - 1:45pm in Maple

Abstract: Stereotypical images of scientists hinder diverse students from envisioning the positive contributions they can make to science. Providing diverse students with opportunities to engage in science through the NGSS promotes cultural responsiveness and emphasizes the contributions of diverse scientists.

Format: Workshop
**Workshop: Methods for Secondary Science Education Methods**

*Ryan Summers, University of North Dakota*

*Stephanie Philipp, University of Tennessee at Chattanooga; Heather Wygant, Texas Tech University; Lauren Angelone, Xavier University; Lisa Pitot, University of Wisconsin-La Crosse; Rita Hagevik, University of North Carolina at Pembroke; Xinying Yin, California State University-San Bernardino; Matthew Perkins Coppola, Purdue University Fort Wayne*

12:45pm – 1:45pm in Maple

**Abstract** This workshop is designed to bring together teachers of middle and high school science methods courses. Come learn from your peers and discover how you can help add and make use of resources in this “methods for methods” workshop. Participants are encouraged to bring a syllabus, activity, assignment, or resource to share with colleagues.

*Format: Workshop*
**Workshop: Successful Grant Writing Ideas**

*Mary M Atwater*, University of Georgia

*Malcolm B Butler*, University of Central Florida; *Rhea Miles*, East Carolina State University; *Melody Russell*, Auburn University

12:45pm - 1:45pm in Oak

**Abstract**

ASTE members who have a one-page description of a proposal will desire to participate in this one-hour beginning and intermediate level grant-writing workshop. The workshop will focus on writing and submitting proposals and feedback to a one-page description of a proposal idea to the National Science Foundation and National Institute of Health. *Important note: Participants must register and must send us some information in advance to participate. Contact Dr. Atwater - matwaterchemi@bellsouth.net, Dr. Butler - malcolm.butler@ucf.edu, or Dr. Miles - milesr@ecu.edu for more information and to participate.*

**Format:** Workshop

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**Workshop: Resources for Supporting the Development of Elementary Teachers' Content Knowledge for Teaching About Matter**

*Deborah Hanuscin*, Western Washington University

*Emily Borda*, Western Washington University; *Josie Melton*, Western Washington University; *Jamie Mikeska*, ETS

2:00pm - 3:00pm in Maple

**Abstract**

The concept of matter is central to understanding many other scientific ideas, yet it is both complex to teach and difficult to learn. Come explore free instructional materials that can support the development of elementary teachers' content knowledge for teaching about matter that we developed as part of a collaborative NSF project.

**Format:** Workshop
**Workshop: “One Student Does All the Work”: Rethinking Collaboration for Computational Thinking Settings**

*Cassie F Quigley*, University of Pittsburgh  
*Holly Plank*, University of Pittsburgh; *Dani Herro*, Clemson University; *Aileen Owens*, South Fayette School District; *Tori Lojek*, Samanta Edkins, South Fayette School District

2:00pm – 3:00pm in Oak

**Abstract** We know collaboration is a critical skill for 21st-century learning, however, fostering productive collaboration is challenging. Ever worry that one student is doing all the work? Curious about how to assess if students are collaborating well? If so, this workshop will teach you how ensure students are productively solving problems together.

**Format:** Workshop

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**Workshop: Methods for Methods – Elementary**

*Debi L Hanuscin*, Western Washington University  
*Valarie Akerson*, Indiana University; *Christina L. McDaniel*, Bradley University; *Aimee Hollander*, Nicholls State University; *Tina Vo*, University of Nevada-Las Vegas; *Nazan Bautista*, University of Miami-Ohio; *Sumreen Asim*, Indiana University Southeast; *Erin Mistry*, University of Florida

3:15pm – 4:15pm in Maple

**Abstract** This workshop is designed for science teacher educators to share tools and resources to support elementary preservice teachers. Come learn from your peers and discover how you can contribute to and curate our collective knowledge of ‘methods for methods'. *Participants are asked to bring a syllabus, activity, assignment, or resource to share.*

**Format:** Workshop
Workshop: Improving Student Writing Outcomes in the Science Classroom Using a Genre-Based Approach

Chris McGrai, University of Massachusetts Amherst

Ally Hunter, University of Massachusetts Amherst

3:15pm - 4:15pm in Oak

Abstract: As science educators we can be at a loss for how to enact meaningful writing instruction in the classroom. Many of us assign writing but feel that we are not effectively “teaching” writing. Participants will be introduced to genre-based pedagogy, a framework for writing, and activities that are supported by this pedagogical approach.

Format: Workshop

Workshop: Supporting Scientific Argumentation in the Classroom

Eric J Greenwald, University of California's Lawrence Hall of Science

Megan Goss, University of California's Lawrence Hall of Science; Christina Morales, University of California's Lawrence Hall of Science; Bryan Henderson, Arizona State University; April Holton, Arizona State University

3:15pm - 4:15pm in Redbud

Abstract: DiALoG is a freely available digital resource to help teachers recognize, formatively assess, and tailor instruction to support 8 important aspects of oral argumentation. In this session, we share research findings from DiALoG and provide hands-on experiences to help teachers monitor and support oral scientific argumentation in their classrooms.

Format: Workshop
**Workshop: Integrated STEM: Payload to Classroom Undergraduate Experience**

*Trina J Kilty, University of Wyoming*

*Phil T Bergmaier, University of Wyoming*

12:00pm - 1:00pm in Maple

**Abstract** We solicit feedback for future optimization in developing authentic, integrated STEM projects for K-12 students. We collected data from sensors on a high-altitude balloon and transformed our project to lessons and activities delivered to a K-12 audience. We collaboratively explore how to share an integrated STEM experience with K-12 audiences.

*Format: Workshop*

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**Workshop: Using Discussion Frames and Focused Transcript Coding to Support Pre-Service Teachers' Facilitation of Argumentation Discussions in Science**

*Pamela S. Lottero-Perdue, Towson University*

*Jamie N. Mikeska, ETS; Carla Finkelstein, Towson University*

12:00pm - 1:00pm in Oak

**Abstract** Participants will learn to use two types of tools—discussion frames and focused transcript coding—to support pre-service teachers (PSTs) as they learn to lead high-quality argumentation discussions in science. These tools were designed to help PSTs prepare for, facilitate, and then reflect upon those discussions.

*Format: Workshop*
Workshop: Facilitating Discourse and Integration of NGSS in Science Methods Courses With the ASET Toolkit

Corinne Lardy, California State University Sacramento

Donna Ross, San Diego State University; Meredith Vaughn, San Diego State University; Larry Horvath, San Francisco State University; Lisa Martin-Hansen, California State University Long Beach; Susan Gomez Zwiep, California State University Long Beach

1:15pm - 2:15pm in Oak

Abstract This workshop will introduce participants to the ASET Toolkit, a set of tools to facilitate discourse in order to support preservice teachers' understanding of NGSS. We will present activities and helpful strategies using the tools that have been tested in science methods courses across universities and additional contexts over the past five years.

Format: Workshop

Workshop: Productive Use of Video for Rich Teacher Learning

Connie Hvidsten, BSCS Science Learning

Betty Stennett, BSCS Science Learning; Abraham Lo, BSCS Science Learning; Susan Gomez Zwiep, BSCS Science Learning

2:30pm - 3:30pm in Maple

Abstract Participants will consider strategies for planning and leading video analysis activities that support rich conversations and deep teacher learning. Attendees will be introduced to a suite of tools and resources for implementing videocase-based learning experiences including an online collection of K-12 science classroom videos and transcripts.

Format: Workshop
Workshop: Too Anxious to Test: Exploring Student Knowledge in Creative Social Environments

Cherilyn Porter, Bryan ISD/Texas A&M
Monica Hernandez Valencia, Texas A&M

2:30pm - 3:30pm in Oak

Abstract Participants will explore the limitations and opportunities afforded by various social media applications and their use as a creative tool. This will involve creating media accounts, an orientation over their features, their place in society, and how to relate the activity to an aesthetic curriculum. Prompt design and student examples will be provi

Format: Workshop
Presiders
Past Presidents

Past ASTE Presidents

1932–34  S. Ralph Powers
1935–36  John C. Johnson
1936–38  W. L. Kikenberry
1938–40  E. Laurence Palmer
1940–41  Earl R. Glenn
1941–45  Anna M. Gemmill
1946–47  Victor L. Crowell
1947–48  Ellis Haworth
1948–49  H. Emmett Brown
1949–50  John Read
1950–51  George Haupt
1951–52  Robert Cooper
1952–53  Rose Lammel
1953–54  G. P. Cahoon
1954–55  Ned Bryan
1955–56  John Wells
1956–57  Robert Wickware
1957–58  June Lewis
1958–59  George Zimmer
1959–60  Harold Tannenbaum
1960–61  Herbert Schwartz
1961–62  Fletcher Watson
1962–63  Willard Jacobson
1963–64  R. Will Burnett
1964–65  Herbert Smith
1965–66  Ralph Lefler
1966–67  Edward Victor
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Past Award Winners

Award I
Award II
Award III
Award IV
Award V
John C. Park NTLI Fellowship

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)
2019  Lisa Martin-Hansen, California State University, Long Beach (10+yrs); Jerrid Kruse, Drake University (<10yrs)
2020  Colby Tofel-Grehl, Utah State University (<10 yrs); Gillian Roehrig, University of Minnesota (>10yrs)

**Outstanding Mentor (Award II)**

1997  John Penick, University of Iowa
1998  Hans Anderson, Indiana University
1999  Norman Lederman, Oregon State University
2000  Robert K. James, Texas A & M University
2001  Robert E. Yager, University of Iowa
2002  Walter S. Smith, Ball State University
2003  Larry Enochs, Oregon State University
2004  Catherine Yeotis, Wichita State University
2005  Sandra Abell, University of Missouri–Columbia
2006  Tom Koballa, University of Georgia
2007  Kenneth Tobin, Graduate Center of the City University of New York
2008  Dana Zeidler, University of South Florida
2009  Lloyd Barrow, University of Missouri, Columbia
2010  Kathryn Scantlebury, University of Delaware
2011  Gerry Saunders, Unity College
2012  Alec Bodzin, Lehigh University
2013  Julie Luft, University of Georgia
2014  Gillian Roehrig, University of Minnesota
2015  Pat Obenauf, West Virginia University
2016  Randy Bell, Oregon State University
2017  Kent Crippen, University of Florida
2018  William McComas, University of Arkansas
2019  Deborah Hanuscin, Western Washington University
2020  Michael P. Clough, Texas A&M University

**Emeritus Awards/Outstanding Longtime Service to ASTE (Award III)**
N. Eldred Bingham, University of Florida
Milton O. Pella, University of Wisconsin
Pinchas Tamir, Hebrew University
Clarence Boeck, University of Minnesota
Fletcher Watson, Harvard University
Marvin Druger, Syracuse University
R. Will Burnett, University of Illinois
Fred Fox, Oregon State University
Nasrine Adibe, Dowling College
Gerald Craig, Teachers College Columbia University
Herbert Smith, Colorado State University
Roger Olstad, University of Washington
Alfred De Vito, Purdue University
Hans Anderson, Indiana University
Paul Dehart Hurd, Stanford University
Robert W. Howe, Ohio State University
Ronald K. Atwood, Univ. of Kentucky
Dorothy Gabel, Indiana University
Addison Lee, University of Texas
Willard Jacobson, Teachers College Columbia University
Donald W. McCurdy, University of Nebraska- Lincoln
Ralph Lefler, Purdue University
Harold Tannenbaum, Hunter College
Steven Winter, Tufts University
William C. Ritz, California State University, Long Beach
Edward Victor, Northwestern University
Stanley Helgeson, Ohio State University
Floyd E. Mattheis, East Carolina University
Kenneth J. Appleton, Central Queensland University
William E. Baird, Auburn University
Michael Cohen, Indiana University-Purdue University
Vincent Lunetta, Pennsylvania State University
Gerald Craig, Teachers College Columbia University
Herbert Smith, Colorado State University
Roger Olstad, University of Washington
Dana Zeidler, University of South Florida
Jon Pedersen, University of Nebraska-Lincoln
Kevin Finson, Bradley University
Molly Weinburgh, Texas Christian University
Malcolm Butler, University of Central Florida

Innovations in Teaching Science Teachers (Award IV)

1990  A Reflective Approach to Science Methods Courses for Preservice Elementary Teachers, Dorothy Rosenthal, California State University-Long Beach
1991  Enhancing Science and Mathematics Teaching, Kenneth Tobin, Nancy Davis, Kenneth Shaw, and Elizabeth Jakubowski, Florida State University
1992  The Learning Cycle as a Model for the Design of Science Teacher Preservice and Inservice Education, Peter Rubba, Pennsylvania State University
1993  Reconstructing Science Teacher Education Within Communities of Learners, Deborah Tippins, University of Georgia, Sharon Nichols, Florida State University, and Kenneth Tobin, Florida State University
1994  No Award Given
1995  Science for Early Adolescence Teachers (Science FEAT): A Program for Research and Learning, Samuel Spiegel, Angelo Collins, and Penny J. Gilmer, Florida State University
1997  Reconceptualizing the Elementary Science Methods Course Using Reflective Orientation, Sandra Abell and Lynn Bryan, Purdue University
1998  What Science Education Standards Say: Implications for Teacher Education, Penny Hammrich, Temple University
1999  No Award Given
2000  Professional Development Programs for Elementary Science Teachers: An Analysis of Teacher Self- Efficacy Beliefs and The Professional Development Model, Tracy J. Posnanski, University of Wisconsin- Milwaukee
2001  Empowering Teachers as Researchers and Inquirers, Anne M. (Amy) Cox–Petersen, California State University, Fullerton
2002  Being There and Not Being “There:” The Experience of Teaching an Elementary Science Education Course on the Internet, Janice Koch and Michael Barriere, Hofstra University
2003  Using a Card-sorting Task to Elicit and Clarify Science Teaching Orientations, Patricia Friedrichsen, University of Missouri-Columbia and Thomas Dana, Pennsylvania University
2004  An Inquiry-based Laboratory Lesson to Construct an Understanding of Earth’s Seasons, Paul Ashcraft, Clarion University and Susan Courson, Clarion University
2005  No Award given
2006  No Award given
2007  Using Historical Non-fiction and Literature Circles to Develop Elementary Teachers’ Nature of Science Understanding, Sharon E. Nichols, The University of Alabama & William Straits, California State University Long Beach
2008  A Case Study of Fifth Grade Teachers’ Changes in Methodology During a Two-Year Timeframe, Anita Martin and Brian Hand, University of Iowa
2009  Flexibly adaptive professional development in support of teaching science with geospatial technology, Nancy M. Trautmann, Cornell University & James G. MaKinster Hobart & William Smith Colleges
2010  Learning to Teach Science Through Collaboration: Coteaching and Cogenerative Dialogue in Elementary Science Methods Courses, Christina Siry, University of Luxembourg, Nicole Lowell, Elizabeth Zawatski, Manhattanville College
2011  Exploring Multiple Outcomes: Using Cogenerative Dialogues and Coteaching in a Middle School Science Classroom, Nicole K. Grimes, The Graduate Center, The City University of New York What about those left behind? A template for developing quality science lessons for English language learners, Susan Gomez-Zwiep and William J. Straits, California State University, Long Beach
2012 Descriptive Inquiry in the Throes of Learning to Teach: Can Prospective Teachers Learn to Teach and Study their Teaching Closely? Michele Koomen and Jamie Mitchell, Gustavus Adolphus College,
2013 No Award Given
2014 Connecting to Our Community: Utilizing Photovoice as a Pedagogical Tool to Connect College Students to Science, Kristin Cook, Bellarmine University & Cassie Quigley, Clemson University
2015, If You Can’t Say Something Nice: A Design-Based Research Approach Investigating the Social Interactions of New Science and Math Teachers Using a Video Annotation Tool, Joshua Ellis, Tasneem Anwar, Justin McFadden, & Gillian Roehrig from the University of Minnesota STEM Education Center
2016, The Use of Journal Clubs in Science Teacher Education. Dr. Karen A. Tallman, Springfield College and Dr. Allan Feldman, University of South Florida
2017, Teachers’ classroom practices 2-5 years after having completed an intensive secondary science teacher education program. Michael Clough, Iowa State University; Joanne Olson, Iowa State University
2018, Collaborating to teach elementary science methods in the field with K-6 classroom teachers: Benefits for in-service and pre-service teachers. Matthew Vick, University of Wisconsin, Whitewater; Patricia Falk Mukwonago Area School District
2019, A Curriculum-linked Professional Development Approach to Support Teachers’ Adoption of Socio-Environmental Science Investigation Alec Bodzin, Lehigh University; Thomas Hammond, Lehigh University; Kate Popejoy, Popejoy STEM LLC; William Farina, Lehigh University, David Anastasia, Breena Holland, James Carrigan, Scott Rutzmoser, Dork Sahagian
2020, CyberSecurity and Technology: How do they Fit into a Science Classroom? Andrea C. Burrows and Mike Borowczak, University of Wyoming.

**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
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
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
2005 Culturalized Science Instruction: Exploring Its Influence upon Black and White Students’ Achievement, Eileen Parsons, North Carolina State University
2006 No Award given
2007 Narrative of Community: Visualizing Culturally Relevant Science Pedagogy Through the Identities of Black Middle School Teachers, M. Jenice Goldston and Sharon E. Nichols, The University of Alabama
   Co-Winner: Paper 2 – Expanding the Ways in Which Urban Students Participate in Science Education: Rituals, Transactions, and Fundamental Interactions, Christopher Emdin, Teachers College, Columbia University
2009 Pathways to success in science: A phenomenological study examining the life experiences of African- American women in higher education, Claudette L. Giscombe
2010 Exploring Multiple Outcomes: Using Cogenerative Dialogues and Coteaching in a Middle School Science Classroom, Nicole K. Grimes, The Graduate Center, The City University of New York
2011  Synergistic Teaching of Science to English Language Learners: Comparative Analysis of the Strategies, Daniel J. Bergman, Wichita State University
2012 A Mixed Methods Study of Mid-Career Science Teachers: The Growth of Professional Empowerment, Amy Moreland and Mary Hobbs, both of University of Texas at Austin
2013 Teachers’ NOS Practices Two to Five Years after Having Completed an Intensive Science Education Program, Benjamin Herman, University of South Florida, Michael Clough, and Joanne Olson, both of Iowa State University
2014 Educational Turbulence: The Influence of Macro and Micro Policy on Science Education Reform, Carla Johnson, Purdue University
2015 Using our Heads and HARTSS (Humanities, ARTs, and Social Sciences): Developing Perspective-Taking Skills for Socioscientific Reasoning, Sami Kahn & Dana Zeidler, University of South Florida.
2016, No Award Given
2017, Prevalence and predictors of out-of-field in the first five years. Ryan Nixon, Brigham Young University; Richard J. Ross, University of Georgia; Julie A. Luft, University of Georgia
2018, No Award Given
2019, Supporting Elementary Teachers’ Enactment of Nature of Science Instruction: A Randomized Controlled Trial. Jennifer Maeng, University of Virginia; Randy Bell, Oregon State University; Tyler St. Clair, SUNY Potsdam; Amanda Gonczi, Michigan Technological University; Brooke Whitworth, University of Mississippi

Past winners of the John C. Park National Technology Leadership Initiative Fellowship

Park, J. C. (2003). Now that we have new technology tools, what is being built? Association for the Education of Teachers in Science (AETS), St. Louis MO. (North Carolina State University)
Irving, K. and Bell, R. (2004). *Educational technology use during secondary science student teaching: Three case studies.* Association for the Education of Teachers in Science (AETS), Nashville TN. (The Ohio State University, University of Virginia)

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)


CyberSecurity and Technology: How do they Fit into a Science Classroom? (2019). Andrea C. Burrows and Mike Borowczak, University of Wyoming.
# At a Glance

## Wednesday, January 14

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>9:00am—10:00am</td>
<td>Virtual Coffee Talk (Regional Meetings &amp; Equity Committee)</td>
<td>10:00am—10:15am</td>
<td>Break</td>
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<td>Business Meeting</td>
<td>10:15am—11:15am</td>
<td>Graduate Student Business Luncheon/Lunch on Your Own</td>
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<td>11:15am—11:45am</td>
<td>Presidential Panel</td>
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<td>Virtual Poster Hall, Syllabus Sharing, and Workshops</td>
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<td>11:45am—12:30pm</td>
<td>Break</td>
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<tr>
<td>12:45pm—1:15pm</td>
<td>Concurrent Session A</td>
<td>1:15pm—1:45pm</td>
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<td>Concurrent Session B</td>
<td>1:45pm—2:00pm</td>
<td>2:00pm—2:30pm</td>
<td>Break</td>
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<td>2:00pm—2:30pm</td>
<td>Concurrent Session C</td>
<td>2:30pm—3:00pm</td>
<td>Break</td>
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<tr>
<td>Concurrent Session D</td>
<td>3:00pm—3:15pm</td>
<td>3:15pm—3:45pm</td>
<td>3:45pm—4:15pm</td>
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<td>3:15pm—3:45pm</td>
<td>Concurrent Session E</td>
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<td>Virtual Happy Hour &amp; Forums</td>
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<td>Concurrent Session F</td>
<td>4:15pm—5:00pm</td>
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## Thursday, January 15

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<th>Time</th>
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<tbody>
<tr>
<td>9:00am—10:00am</td>
<td>Virtual Coffee Talk (Committee Meetings)</td>
<td>10:00am—10:15am</td>
<td>Break</td>
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<tr>
<td>10:15am—11:00am</td>
<td>Fireside Chat with 2021 Awardees</td>
<td>11:00am—12:00pm</td>
<td>Graduate Student Workshop/Lunch on your own</td>
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<td>12:00pm—3:30pm</td>
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<tr>
<td>12:00pm—12:30pm</td>
<td>Virtual Poster Hall</td>
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<td>12:30pm—1:00pm</td>
<td>Syllabus Sharing, and Workshops</td>
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<td>1:00pm—1:15pm</td>
<td>Concurrent Session G</td>
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<td>1:15pm—1:45pm</td>
<td>Concurrent Session H</td>
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<td>2:15pm—2:30pm</td>
<td>Concurrent Session I</td>
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<td>2:30pm—3:00pm</td>
<td>Concurrent Session J</td>
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<td>3:00pm—3:30pm</td>
<td>Concurrent Session K</td>
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<td>3:30pm—3:45pm</td>
<td>3-Minute Thesis Competition</td>
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<tr>
<td>4:15pm—5:00pm</td>
<td>Virtual Happy Hour</td>
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<td>(Birds of a Feather &amp; Equity Committee)</td>
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**Room Maps**
Description of Conference Events

Virtual Coffee Hours

Synchronous opportunities to interact with either committees or regional groups in breakout rooms

Membership Events

Synchronous opportunities for all members to attend

Graduate Student Events

Synchronous opportunities for graduate students to interact and learn

Posters & Syllabus Sharing

Asynchronous sharing of posters and syllabi
Authors will submit files to be uploaded prior to the conference and contact information to share
Participants are invited to contact and engage with presenters

Paper Discussions & Round Tables

Authors will submit 7-10 minute videos prior to the conference, files will be uploaded and shared
Participants will be asked to view presentations prior to the conference session
Synchronous sessions (grouped into paper sets) will involve authors sharing 1 slide summarizing key ideas for 2-3 minutes and allowing for 20 minutes of discussion and questions

Explorations
Explorations will be occurring in a variety of formats. The majority have an asynchronous and synchronous component with the asynchronous component being completed prior to the session. Please make sure you check the session description to see if asynchronous work is necessary.

**Meet the Editors**

Synchronous opportunities to interact with editors from a variety of journals

**Workshops**

Synchronous opportunities to engage in a workshop and participate in professional learning

**3-Minute Thesis**

Participants will pre-record 3 minute videos prior to the competition
During the session videos will be watched and scored by judges
Winners will be announced at the end of the conference

**Virtual Happy Hours**

Synchronous opportunities to interact in Forums or meet other ASTE members in interest-based breakout rooms known as “Birds of Feather”

***Presider training will be provided asynchronously.***
Pre-Program & Program Sessions

Southwest Region Meeting
9:00am - 10:00am in Apple

Format: General

Northeast Region Meeting
9:00am - 10:00am in Chestnut

Format: General

Northwest Region Meeting
9:00am - 10:00am in Dogwood

Format: General

Mid-Atlantic Region Meeting
9:00am - 10:00am in Elm

Format: General

Equity Committee Meeting
9:00am - 10:00am in Maple

Format: General
Southeast Region Meeting
9:00am - 10:00am in Oak

Format: General

North Central Region Meeting
9:00am - 10:00am in Palm

Format: General

International Region Meeting
9:00am - 10:00am in Pine

Format: General

Far West Region Meeting
9:00am - 10:00am in Spruce

Format: General

Break
10:00am - 10:15am

Format: General
Membership Business Meeting
10:15am - 11:15am in Redbud

Format: General

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Lunch on Your Own
11:15am - 11:45am

Format: General

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Graduate Student Business Lunch
11:15am - 11:45am in Fir

Format: General

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Presidential Panel
11:45am - 12:30pm in Redbud

Format: General

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Break
12:30pm - 12:45pm

Format: General
Nature Notebooks During a Pandemic
Jennifer Kreps Frisch, University of Minnesota Duluth
12:45pm - 1:15pm in Dogwood - Session A

Abstract
In restructuring a science methods course to go online during the pandemic, nature notebooks became a central feature. Candidates get outside safely to observe, calm anxiety, connect, and do science. Come to the roundtable and discuss the successes and challenges of nature notebooks in methods courses in an online elementary methods course.

Format: Small Group Roundtables  Preider: Katherine Seol

Writing Their Own Stories: The Importance of Student Autonomy in Informal Environmental Education Settings
Katherine Trudeau, University of Northern Colorado
Leah Weisman, University of Northern Colorado; Jayme Squires, Walking Mountain Science Center; Jennifer Parrish, University of Northern Colorado
12:45pm - 1:15pm in Dogwood - Session B

Abstract
How to engage elementary and middle grade students in science education has proven difficult for many teachers and researchers in the field of environmental education. This study aimed to identify salient factors science teacher educators can use to inform curriculum and instruction in informal science education settings.

Format: Small Group Roundtables  Preider: Katherine Seol
General Chemistry Students’ Representational Fluency and Conceptual Understanding of Precipitation

James Nyachwaya, North Dakota State University
Krystal Grieger, North Dakota State University; Abigail Tarburton, College of Wooster; Catherine Julius, St. Cloud State University

12:45pm - 1:15pm in Elm - Session A

Abstract

This study explored college level general chemistry students’ ability to navigate between different levels of representation within the context of a precipitation reaction as well as their conceptual understanding of the process of precipitation.

Format: Individual Paper Presentation  Presider: Nate Carnes

Influence of COVID-19 Science Perceptions and Sociocultural Membership on University Biology Students’ Pandemic Decisions

Benjamin C Herman, Texas A&M University
Michael Clough, Texas A&M University; Asha Rao, Texas A&M University; Joanne Olson, Texas A&M University; Alex Sobotka, Texas A&M University; Alister Olson, Texas A&M University; Sarah Poor, Texas A&M University

12:45pm - 1:15pm in Elm - Session B

Abstract

This session will address research and pedagogical recommendations based on how 569 university biology students’ COVID-19 science conceptions and sociocultural group membership associates with their COVID-19 behaviors and response beliefs.

Format: Individual Paper Presentation  Presider: Nate Carnes
Workshop: Using NGSS-Aligned Lessons to Promote Cultural Responsiveness and Diversity

Dr. Nancy Nasr, Granada Hills Charter High School
Dr. Leena Bakshi, STEM4Real

12:45pm - 1:45pm in Maple

Abstract: Stereotypical images of scientists hinder diverse students from envisioning the positive contributions they can make to science. Providing diverse students with opportunities to engage in science through the NGSS promotes cultural responsiveness and emphasizes the contributions of diverse scientists.

Format: Workshop

Workshop: Methods for Secondary Science Education Methods

Ryan Summers, University of North Dakota
Stephanie Philipp, University of Tennessee at Chattanooga; Heather Wygant, Texas Tech University; Lauren Angelone, Xavier University; Lisa Pitot, University of Wisconsin- La Crosse; Rita Hagevik, University of North Carolina at Pembroke; Xinying Yin, California State University -San Bernardino; Matthew Perkins Coppola, Purdue University Fort Wayne

12:45pm - 1:45pm in Maple

Abstract: This workshop is designed to bring together teachers of middle and high school science methods courses. Come learn from your peers and discover how you can help add and make use of resources in this “methods for methods” workshop. Participants are encouraged to bring a syllabus, activity, assignment, or resource to share with colleagues.

Format: Workshop
Workshop: Successful Grant Writing Ideas

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

12:45pm – 1:45pm in Oak

AbstractASTE members who have a one-page description of a proposal will desire to participate in this one-hour beginning and intermediate level grant-writing workshop. The workshop will focus on writing and submitting proposals and feedback to a one-page description of a proposal idea to the National Science Foundation and National Institute of Health. *Important note: Participants must register and must send us some information in advance to participate. Contact Dr. Atwater – matwaterchemi@bellsouth.net, Dr. Butler – malcolm.butler@ucf.edu, or Dr. Miles – milesr@ecu.edu for more information and to participate.

Format: Workshop
**An International Perspective on Policy Drivers Impacting Science Teacher Education**

*William R. Veal, College of Charleston*

*Patricia D. Morrell, University of Queensland; Meredith A. Park Rogers, Indiana University; Gillian Roehrig, University of Minnesota; Eric J Pyle.

12:45pm - 1:15pm in Palm - Session A

**Abstract**

This research paper uses a neoliberal framework to examine the influences and impacts of governmental policy on science teacher preparation in 17 countries. Results are based upon dyads on a spectrum of ideological thought. Science teacher preparation is influenced differently due to political focus and economic position in the world.

*Format: Individual Paper Presentation  Presider: Anna Ghurbayan*

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**Informal Science Education**

**Scientist's Perspectives and Values on Communicating the Nature of Science to the Public.**

*Sarah V Poor, Texas A&M University*

*Benjamin C Herman, Texas A&M University*

12:45pm - 1:15pm in Palm - Session B

**Abstract**

This investigation explored the NOS views of scientists and their perspectives on the importance and potential outcomes of communicating NOS to the public in order to support public scientific literacy.

*Format: Individual Paper Presentation  Presider: Anna Ghurbayan*
STEM Identity Authoring in Collaborative Intergenerational Partnerships

Laura Rodriguez, Eastern Connecticut State University
Todd Campbell, University of Connecticut; David Moss, University of Connecticut; John Volin, University of Connecticut

12:45pm - 1:15pm in Palm - Session C

Abstract

Informal science programs provide opportunities for learners of all ages to develop and deepen their identification with STEM. We present results and implications from a multiple case study examining STEM identity authoring in intergenerational collaborative partnerships utilizing geospatial technology in year-long community conservation pursuits.

Format: Individual Paper Presentation  Presider: Anna Ghurbanyan

Meet the Innovation Editors

12:45pm - 1:15pm in Pine

Format: General
Changes in Preservice Teachers' Sense of Community During Undergraduate Research Experiences

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

12:45pm - 1:15pm in Spruce - Session A

Abstract

Research experience (UREs) may be a tool used to increase inquiry understanding in teacher preparation programs. However, UREs occur within specific cultural units. This presentation describes the Communities of Practice Framework and its use in qualitative research analysis to explore STEM preservice teacher experiences during UREs.

Format: Individual Paper Presentation  Presider: Karl Jung

Authentic Science Investigations in a Virtual Science Methods Course

Judith Morrison, Washington State University Tri-Cities

12:45pm - 1:15pm in Spruce - Session B

Abstract

Preservice teachers engage in the NGSS practices by individually carrying out an authentic, long-term science investigation in an elementary science methods course. The assignment’s components and impact on preservice teachers’ learning about science will be discussed as well as how the assignment was adapted for use in a virtual methods course.

Format: Individual Paper Presentation  Presider: Karl Jung
Teaching Science Makes Me Nervous: Examining Science Teaching Emotions of Minority Elementary Pre-Service Teachers at an Urban University

Franklin S Allaire, University of Houston-Downtown
Patrick King, University of Houston-Downtown; Anne C Frenzel, Ludwig Maximilians University

12:45pm - 1:15pm in Spruce - Session C

Abstract

Scholarship suggests negative emotions connected to science teaching may impact the quality of science instruction. This presentation examines results of a study of science teaching emotions (enjoyment, anger, anxiety) of mostly minority and non-traditional PSTs (n=185) from an urban university using the Science Teaching Emotion Scales (Sci-TES).

Format: Individual Paper Presentation  President: Karl Jung

NSTA-Sponsored Poster: NSTA Student Chapters

Donna Governor, NSTA Division Director, Preservice Teacher Preparation

12:45pm - 4:15pm in the App - Session Poster

NSTA student chapters are a great way to support preservice science teacher education at your university. Visit this poster to learn more about the NSTA student chapter program and to connect with the NSTA Preservice Teacher Committee!

Format: General
NSTA-Sponsored Poster: Using NSTA as Your Textbook

Flavio Mendez, Assistant Executive Director, University Partnerships and e-Learning at NSTA
Richard Jones, University of Hawaii West Oahu; Ray Scolavino, University of Wisconsin-Milwaukee

12:45pm - 4:15pm in the App - Session **Poster**

NSTA provides numerous resources and a professional learning community to support the work of science teacher educators. Visit this poster to learn more about the resources and online tools and how university faculty are creating collections of interactive web modules, lesson plans, and seminar archives to promote preservice teacher learning.

*Format: General*

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Equity and Diversity

**Development of an Instrument to Assess Equity Among District Science Coordinators**

Ramshah M Eliza, University of Georgia
Shaunnessy R McCann, University of Georgia; Julie A Luft, University of Georgia

12:45pm - 4:15pm in The App - Session **Poster**

**Abstract**

In working with district science leaders, we needed an instrument to measure their views about equitable instruction. These views would ultimately be important in how they worked with their science teachers. This instrument was developed to measure their beliefs, mindset, knowledge and practices involved in equitable science instruction.

*Format: Individual Poster Presentation*
Gender Differences in Gifted Elementary Students’ Decision-Making

Younkyeong Nam, Pusan National University
Jina Yoon, Pusan National University; Jeanna Wiesemann, Southern Methodist University

12:45pm - 4:15pm in The App - Session Poster

Abstract
This study examines how gender affected gifted elementary students’ engineering-based argumentative practices and decision-making processes. Results show that girls' social negotiation was more affected by gender grouping (single or mixed) than boys. However, there was no significant gender difference in terms of collaborative reasoning.

Format: Individual Paper Presentation

Science Fairs as Service Learning Experiences for Preservice Elementary Teachers

Matthew Perkins Coppola, Purdue University Fort Wayne

12:45pm - 4:15pm in The App - Session Poster

Abstract
Undergraduate elementary education majors were provided the opportunity to participate in a science fair service learning project at an urban STEM magnet school in the Midwest. Analysis of structured reflections after each activity revealed increased understanding of how to support K-5 students and parents in authentic scientific research.

Format: Individual Poster Presentation
Modeling the Use of History of Science to Teach Nature of Science in a History and Philosophy of Science Course for Preservice High School Teachers

Khadija E Fouad, Appalachian State University
Alan J King, Appalachian State University; Matthew A Lance, Appalachian State University

12:45pm - 4:15pm in The App - Session Poster

Abstract
A course for teaching history and philosophy of science to preservice secondary teachers was developed to include examples of methods of using history of science and current events to teach nature of science (NOS). Preservice teachers improved their NOS understandings and began development of pedagogical content knowledge for teaching NOS.

Format: Syllabus Sharing

Ethnoscience and Environmental Education

Bridging Home Culture and School Science Culture Through Ethnic Education: A Case Study in an Indigenous Community in Taiwan.

Mu-Yin Lin, University of Georgia

12:45pm - 4:15pm in The App - Session Poster

Abstract
Globally, Indigenous People are marginalized and underrepresented in STEM professional fields in settler societies. The purpose of the study is to explore how ethnic education might become a cultural bridge to empower students and teachers to negotiate the borders between home culture and school science culture.

Format: Individual Poster Presentation
Impacting Higher Education Faculty’s Teaching Practices in the Physical Sciences

Brooke A Whitworth, Clemson University
Lauren A Simpson, University of Mississippi; Whitney Jackson, University of Mississippi; Julie James, University of Mississippi; Alice Steimle, University of Mississippi

12:45pm - 4:15pm in The App - Session Poster

Abstract
This exploratory case study examined how the development of physical science educative curriculum materials (ECMs) designed specifically for preservice elementary teachers impacted the practices of higher education faculty.

Format: Individual Poster Presentation

One Preservice Teacher’s Reflection on Collaborative Co-Teaching in Science and Special Ed While Student Teaching: Exploring Inclusive Pedagogy in Action.

Ibrahim D Dincer, Teachers College
Jessica Riccio, Teachers College; Amanda mazin, Teachers College; Kristen Larson, Teachers College

12:45pm - 4:15pm in The App - Session Poster

Abstract
Science and Special Education preservice programs at a graduate school piloted a program for co-teaching. An overview of the collaboration, an example of a preservice teacher lesson plan and supporting video will be provided to demonstrate the eagerness of the preservice partners who created this collaboration to better serve future learners.

Format: Individual Poster Presentation
A Critical Analysis of a Collaborative Elementary Education Program: Striving for Integrated Science Teaching

Selina L Bartels, Valparaiso University
Benjamin Boche, Valparaiso University; Douglass Wassilak, Valparaiso University

12:45pm - 4:15pm in The App - Session Poster

**Abstract**

This study looked at a collaborative elementary education program’s impact on preservice teachers’ (PST). This program was integrated in the delivery of Science content, other disciplines during field experience. Study describes how this program transferred to student teaching classrooms.

*Format: Individual Poster Presentation*

Informal Science Education

Using Museum Exhibits to Engage Preservice Earth Science Teachers and Their Future Students

Julie Contino, Richard Gilder Graduate School/American Museum of Natural History
Rondi M Davies, Queensborough Community College, CUNY & AMNH

12:45pm - 4:15pm in The App - Session Poster

**Abstract**

This poster describes how various exhibits at the American Museum of Natural History were used to develop Earth science content knowledge and pedagogical content knowledge in preservice science teachers completing an MAT program, and how graduates of this program constructed field trips for their own students.

*Format: Individual Poster Presentation*
How Well Prepared Are Teachers to Teach in a Culturally Diverse Environment: Exploring Initial Findings to Inform Preservice Science Preparation

Lorna V. Otero, Teachers College
Felicia M. Mensah, Teachers College

12:45pm - 4:15pm in The App - Session Poster

**Abstract**

Teachers with different educational backgrounds were interviewed to determine how well they felt regarding teaching in a culturally diverse classroom and environment. My aspiration is that the ASTE community is exposed to the needed awareness of culturally relevant teachings and curriculums.

_Format: Individual Poster Presentation_

Creating an Online Community of Elementary Science Teaching Practice

Frederick W Freking, USC Rossier School of Education

12:45pm - 4:15pm in The App - Session Poster

**Abstract**

This syllabus focuses on preparing elementary urban science teachers with a deep dive into the scientific practices using Speedometry, a video club to situate student teaching practice, and teacher research to problem solve in one area of student teaching practice.

_Format: Syllabus Sharing_
How Teachers Center Race in Their View of Discourse as a Tool to Support Science Identity Construction: A Preliminary Study

Emelia Pelliccio, Teachers College, Columbia University
Felicia M Mensah, Teachers College, Columbia University

12:45pm - 4:15pm in The App - Session Poster

Abstract

A preliminary study was done to understand how science teachers view the role of discourse in fostering students’ science identity construction. Additionally, the study asks if and how teachers center race in these views of discourse. Initial findings reinforce a need for continued racial literacy development as it relates to classroom discourse.

Format: Individual Poster Presentation
Preservice Elementary Teacher Knowledge and Use of Scientific Modeling Across a Teacher Education Program

Adam Bennion, University of Michigan
Elizabeth A. Davis, University of Michigan

12:45pm - 4:15pm in The App - Session Poster

Abstract
To understand modeling and teacher preparation, we followed a group of preservice elementary teachers through their preparation program. They primarily engaged in modeling by making real-world connections and comparing models. Science teacher educators can work with preservice teachers to help them focus on the sensemaking aspect of modeling.

Format: Individual Poster Presentation

Integrating STEM Into Elementary Education: A Case Study of a Professor’s Journey

Amanda M Gunning, Mercy College
Elena Nitecki, Mercy College; Meghan E Marrero, Mercy College; Brian T Baldwin, Kean University; Kristen Larsen, Mercy College Center for STEM Education

12:45pm - 4:15pm in The App - Session Poster

Abstract
While calls are made for increased STEM teaching in the elementary grades, it is unclear how existing elementary teacher preparation programs can change to meet this need. Through the lens of growth mindset, we explore the reflective case study of a veteran elementary education professor who has taken on the teaching of a STEM pedagogy course.

Format: Individual Poster Presentation
Impacting Elementary Science Education: Pre-Service Teacher Physical Sciences Instruction

Johannes Addido, University of Wyoming
Andrea Burrows, University of Wyoming

12:45pm - 4:15pm in The App - Session Poster

Abstract
This action research study is to find out if pre-service elementary physical sciences teachers developed conceptual understanding of pushes and pulls. Data analysis shows that none of the pre-service teachers displayed full conceptual understanding, 45.8% showed no conceptual understanding and 54.2% exhibited partial conceptual understanding.

Format: Individual Poster Presentation

What’s the Rule? Exploring Pre-Service Teachers’ Understandings of Buoyancy

James Minogue, North Carolina State University
Maddy Leen, North Carolina State University; Emily Jackson, North Carolina State University; Kern Qi, Davidson College; Tabitha Peck, Davidson College; David Borland, RENCI (Renaissance Computing Institute)

12:45pm - 4:15pm in The App - Session Poster

Abstract
This poster session chronicles research that explores the use of force-feedback haptic technology in the development of pre-service elementary school teachers’ specialized content knowledge of buoyancy.

Format: Individual Poster Presentation
A Multi-Disciplinary Approach in Creating a STEM Education Minor

Helen Douglass, The University of Tulsa

12:45pm - 4:15pm in The App - Session Poster

Abstract

Faculty members, industry partners and informal STEM educators came together to develop a STEM Education minor. Using Design Thinking principles, courses were developed and a course of study was prepared for students of all disciplines who are interested in STEM education in formal and informal settings.

Format: Individual Poster Presentation

Impact of Student Worldviews and Epistemic Orientation on Perception of Argument in Science Classrooms

Mark McDermott, University of Iowa
Darrin Ellsworth, Xavier Catholic High School

12:45pm - 4:15pm in The App - Session Poster

Abstract

Multiple factors impact student learning in immersive argument-based science learning environments. This study explores the relationship between two potential factors, student worldview and epistemic orientation, as well as the impact these factors have on student perception of argument in science.

Format: Individual Poster Presentation
Development and Testing of the Draw-a-Programmer Test (DAPT) to Explore Elementary Preservice Teachers’ Conceptions of Computational Thinking

Jacob A Hall, SUNY Cortland
Jeffrey D Radloff, SUNY Cortland

12:45pm - 4:15pm in The App - Session Poster

Abstract

This poster presentation outlines the development and use of an instrument to investigate teacher candidates' understandings of computer programmers. Results reveal stereotypical yet distinct understandings of programmers as separate from scientists and engineers that provide concrete entry points into fostering computational thinking skills.

Format: Individual Poster Presentation
Updates and Applications of the FAVSTE: A Framework for Analyzing Video in Science Teacher Education

Michelle Forsythe, Texas State University

Anna Arias, Kennesaw State University; Brett Criswell, West Chester University; Joshua Ellis, Florida International University; Lawrence Escalada, Northern Iowa University; Heather Johnson, Vanderbilt University; Amy Palmer, Vanderbilt University; Margaret Parker, Illinois State University

12:45pm – 4:15pm in The App - Session Poster

Abstract

This presentation synthesizes the ongoing work of a Collaborative of science teacher educators to refine and implement a new video analysis framework – the FAVSTE. We present an updated overview of the framework with accompanying models of use across varied instructional contexts in science teacher preparation.

Format: Individual Poster Presentation

STEM Education

Conceptualizing the Nature and Role of Failure in the Engineering Design Process

Benny Mart R Hiwatig, University of Minnesota

Gillian H Roehrig, University of Minnesota

12:45pm – 4:15pm in The App - Session Poster

Abstract

Failure, despite its intrinsic negative attribute, can beget positive outcomes especially in learning contexts. This paper aims to explore how ideas about failure fit the Engineering Design Process, and if so, how these can support the current teaching practices within the EDP framework and improve students’ learning experiences in STEM education.

Format: Individual Poster Presentation
Exploring How Teachers Engineer Equitable Science Learning: A Theoretical Framework Under Development

Sarah Boesdorfer, Illinois State University
Allison Antink Meyer, Illinois State University; Rebekka Darner, Illinois State University

12:45pm - 4:15pm in The App - Session Poster

Abstract
The NGSS calls upon teachers to provide equitable science instruction, integrated with engineering practices. In this poster, we share a theoretical framework under-development that posits that the inclusion of engineering in science instruction can serve as a mechanism to implement of culturally responsive secondary science instruction.

Format: Individual Poster Presentation

Preservice Science Teacher Preparation

Teaching Elementary Science Methods Online: Using Student Feedback to Prepare Pre-Service Teachers for the Uncertain Future of Science Teaching

Jessica L Chen, Teachers College, Columbia University

12:45pm - 4:15pm in The App - Session Poster

Abstract
The COVID-19 pandemic has presented new challenges and new opportunities for preparing elementary preservice teachers to teach science online and in-person. I share how I am redesigning a science method course for the online space that incorporates sharing and discourse, inquiry-based science, and ways to practice science teaching.

Format: Syllabus Sharing
Developing a Geospatial Technologies Focused Professional Development to Promote Interdisciplinary Approaches in STEM Education

Matt Reynolds, North Carolina State University
Soonhye Park, North Carolina State University; Eric Money, North Carolina State University; Kyle Bunds, North Carolina State University

12:45pm - 4:15pm in The App - Session Poster

Abstract

Geospatial technologies (GST) are widely viewed as a means of improving spatial thinking and problem-solving skills; however, teachers often lack the knowledge, skills, and confidence needed to integrate GST in their classroom. This study aimed to design a PD for teachers to develop the competency required to integrate GST in their classrooms.

Format: Individual Poster Presentation

An Exploratory Study of Middle School Students’ Motivation in Science Between Korea and the USA: Focused on STEM Education Program

Hyundong Lee, Daegu National University of Education
Hyonyong Lee, Kyungpook National University; Jaedon Jeon, Kyungpook National University

12:45pm - 4:15pm in The App - Session Poster

Abstract

This exploratory study is aimed at exploring the validity of the Science Motivation Questionnaire (SMQ) items, which were developed for university students, to measure the science motivation of middle school students and to analyze the gender and country differences among the factors of SMQ.

Format: Individual Poster Presentation
Nature of Science Meets Scientific Literacy Axiology

Chris Pavlovich, Montana State University

12:45pm - 4:15pm in The App - Session Poster

Abstract

The acquisition of scientific literacy is a multidimensional endeavor which has required complex changes in science education. This position poster groups scientific literacy and Nature of Science qualities into teacher and student dimensions as focus factors for science teachers.

Format: Individual Poster Presentation

Preservice Science Teacher Preparation

Bringing the Crosscutting Concepts to the Foreground of a Science Content Course for Elementary Education Majors: Initial Development

Robert B Marsteller, Wesley College

12:45pm - 4:15pm in The App - Session Poster

Abstract

This poster describes the initial stages of an effort to redesign an undergraduate science content course for elementary education majors to prioritize using and assessing crosscutting concepts as the foundation for scientific understanding.

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

**A Model to Develop Questioning and Discussion Techniques of Pre-Service Science Teachers**

*John Pecore*, University of West Florida  
*Tadlee Welty*, University of West Florida; *Minkyung Kim*, University of West Florida; *Melissa Demetriopoulos*, Institute for Biomedical Philosophy

12:45pm - 4:15pm in The App - Session **Poster**

**Abstract**

Effective questioning and discussion are fundamental yet challenging instructional skills for pre-service teachers to master. This presentation illustrates a model for providing pre-service teachers an online virtual learning simulation experience to practice teaching skills.

*Format: Individual Poster Presentation*

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**Science Teacher Professional Development**

**Professional Development for Postsecondary Science and Mathematics Faculty Developing Inclusive Course-Based Undergraduate Research Experiences**

*Rommel J. Miranda*, Towson University  
*Laura Gough*, Towson University; *Matthew Hemm*, Towson University; *Trudymae Atuobi*, Towson University; *Christopher Outiero*, Towson University; *Vanessa Beauchamp*, Towson University

12:45pm - 4:15pm in The App - Session **Poster**

**Abstract**

This HHMI-funded Inclusive Excellence PD Program presentation focuses on: 1) providing professional development for postsecondary science and mathematics faculty to promote effective inclusive teaching practices, and 2) reforming laboratory courses to incorporate authentic research experiences via course-based undergraduate research experiences.

*Format: Individual Poster Presentation*
Studying Global Climate Change and Human Impact Through Study Abroad Experiences

Tammy D Lee, East Carolina University
Bonnie Glass, East Carolina University

12:45pm - 4:15pm in The App - Session Poster

Abstract

Science education has unique options and opportunities for studying abroad. Our courses are designed experiences to equip both in-service and pre-service teachers with the science content knowledge and growth opportunities we feel only an immersive experience such as studying abroad can provide.

Format: Syllabus Sharing

The Effects of Computational Thinking Professional Development on STEM Teachers' Perceptions and Pedagogical Practices

Sarah A Haines, Towson University

12:45pm - 4:15pm in The App - Session Poster

Abstract

This study examined the impact of PD on the inclusion of CT activities in K-12 mathematics and science classrooms. Data analysis indicated that the PD was valuable and made a positive impact on the quality and quantity of CT activities teachers implemented in their classrooms.

Format: Individual Poster Presentation
An Exploration of the Perceptions of Science Teaching Orientations of 5th Grade Science Teachers in the Context of Specialized Science Instruction

Roberta M King, The George Washington University

1:15pm - 1:45pm in Apple - Session A

Abstract

Using a new conceptualization of PCK, the model of teacher professional knowledge and skill to include PCK (TPK&S) (Gess-Newsome, 2015), this study will seek to understand the perceptions elementary science teachers have of their orientations within the specific context of the specialist science classroom.

Format: Small Group Roundtables  Presider: Stephen Thompson

The Western Regional Noyce Alliance (WRNA) - Shifting Research and Evaluation Strategies in Response to COVID-19

Larry Horvath, San Francisco State University
Melissa Yisak, American Institutes for Research; Bridina Lemmer, American Institutes for Research; Sanlyn Buxner, Planetary Science Institute; Jennifer Nelson, San Francisco State University

1:15pm - 1:45pm in Apple - Session B

Abstract

San Francisco State University partnered with the American Institutes for Research and Planetary Science Institute to study the impact of the Western Regional Noyce Alliance on STEM teachers’ classroom practices, PCK, and identity. The evaluation team will host a round table session to discuss shifts in the study design in response to COVID-19.

Format: Small Group Roundtables  Presider: Stephen Thompson
Preparation Elementary School Teachers to Teach Science and
Incorporate Technology Into Their Classrooms: Lessons Learned
From Formal, Informal and Non-Formal Science Teacher Educators

Dieuwertje J Kast, University of Southern California

1:15pm - 1:45pm in Apple - Session C

Abstract
This study aimed to learn the best practices for teaching elementary school
teachers how to teach science and incorporate technology. This mixed-method
study surveyed and interviewed both science teacher educators from varying
educational contexts (formal, informal, non-formal) and elementary school
teachers.

Format: Small Group Roundtables  Presider: Stephen Thompson

Supporting Urban High School STEM Teachers to Be Successful

Judith Gouraige, Stony Brook

1:15pm - 1:45pm in Apple - Session D

Abstract
The effect of the teacher cannot be overstated in urban high school STEM
classes. Research indicates that many urban teachers are unpreapred to support
students for success. The reason is a lack of pedagogical knowlge in adressing
and remediating students needs in the math and literacy skills need to do college
preappratory STEM work.

Format: Small Group Roundtables  Presider: Stephen Thompson
We Were Taught That Everything Belongs to Us: Designing In-Service Science Teacher Education to Confront Notions of Science as White Property

Lenora M Crabtree, University of North Carolina Charlotte

1:15pm - 1:45pm in Cherry - Session A

Abstract

Science teachers' development of critical consciousness can be supported through intentionally designed instructional materials. Teacher education must attend to the role of science in the creation of notions of White Supremacy. Findings also reveal science practices can be leveraged to investigate systemic inequities including health disparities.


Does Cultural Proficiency Affect Retention in Alternatively Certified Teachers?

Alison L. Dossick, Virginia Commonwealth University

Elizabeth W Edmondson, Virginia Commonwealth University; Dwayne R Cormier, Virginia Commonwealth University

1:15pm - 1:45pm in Cherry - Session B

Abstract

Alternatively certified teachers tend to lack coursework and training in culturally relevant pedagogy within their accelerated program. Could this contribute to the high turnover of alternatively certified teachers? We examine whether there is a relationship between retention and cultural competence using the Cultural Proficiency Dialogic Protocol.

Iceberg of Culturally Relevant Science and Mathematics Pedagogy: a Model/Framework for Teacher Education

**Paula A Magee**, Indiana University Purdue University Indianapolis  
**Craig J Willey**, Indiana University Purdue University Indianapolis

1:15pm - 1:45pm in Cherry - Session C

**Abstract**

In this paper, we describe an operational framework that both supports the identification of culturally relevant pedagogical practices and the analysis of these practices within the context of culturally relevant science and mathematics classrooms.

**Format:** Individual Paper Presentation  
**Presider:** Lisa Martin-Hansen

What I Did – What I Learned: Discursive Resources Students Use to Communicate ‘Practice’ and ‘Content’

**Molly H Weinburgh**, Texas Christian University

**Cecilia Silva**, Texas Christian University; **Kathy H Smith**, Tarleton State University; **Callie Price**, Texas Christian University; **Daniella Biffi**, Texas Christian University; **Monica Amyett**, Texas Christian University; **Toni Domino**, Texas Christian University

1:15pm - 1:45pm in Chestnut

**Abstract**

In this session, we examine the discursive resources emergent multilingual learners (EMLs) used to communicate their knowledge of practice and content. EMLs, engaged in inquiry science stressing NGSS practices, kept a journal in which they used a summative writing task about ‘doing’ and a reflective writing task about ‘knowing’.

**Format:** Themed Paper Set
STEM Designed and Enacted: Understanding the Process of Design and Implementation of STEAM Curriculum in an Elementary School

Cassie Quigley, University of Pittsburgh
Dani Herro, Clemson University; Holly Plank, University of Pittsburgh

1:15pm - 1:45pm in Fir - Session A

Abstract
The purpose of this research is to understand the ways in which elementary teachers can both design and enact STEAM teaching practices in order to define specific curricular supports for STEAM education.

Format: Individual Paper Presentation  Presider: Lori Andersen

Supporting the Instruction of Engineering Practices: Limitations of "The Engineering Design Process"

Jacob Pleasants, Keene State College
Joanne K Olson, Texas A&M University

1:15pm - 1:45pm in Fir - Session B

Abstract
In this study, we investigate how elementary teachers structured engineering instruction and how they helped their students learn the practices of engineering. We found that when instruction was organized by a stepwise model of “the engineering design process,” teachers were unlikely to adequately promote students’ understanding of key practices.

Format: Individual Paper Presentation  Presider: Lori Andersen
Using Science Notebooks to Focus on the Student and the Teacher Perspective in an Elementary Science Methods Course

Ingrid Carter, Metropolitan State University of Denver
Valarie Akerson, Indiana University, Bloomington

1:15pm - 1:45pm in Magnolia - Session A

Abstract

In this study, we examined elementary teacher candidates’ use of and ideas about the science notebooks they created in a semester-long science and health methods course wherein the notebooks emphasized and made explicit two lenses: the student learner perspective and the teacher facilitator perspective.

Format: Individual Paper Presentation  Presider: Katie Green

Nature Journaling in 3D: Supporting Standards-Based Science Instruction With Preservice Teachers

Kelly Feille, University of Oklahoma
Stephanie Hathcock, Oklahoma State University

1:15pm - 1:45pm in Magnolia - Session B

Abstract

This presentation shares the innovative practice of incorporating nature journaling into elementary science methods courses as a means to engage learners in authentic, 3-dimensional science learning. We will describe the methods of the innovation and evidence of success.

Format: Individual Paper Presentation  Presider: Katie Green
A Three Year Study of Informal Science Field Experiences in Elementary Science Methods Course

Christina L McDaniel, Bradley University

Colton Wilder, Bradley University

1:15pm - 1:45pm in Magnolia - Session C

Abstract

Elementary preservice science teacher programs often lack field experiences with informal science education. This three year study explores the impact of practice with informal science education for preservice elementary science methods students in partnership with a local children's museum.

Format: Individual Paper Presentation  Presider: Katie Green

Break

1:45pm - 2:00pm

Format: General
Exploring Positionality of Science TAs Through Conceptualizations of Equity and Social Justice

Katherine Seol, Teachers College at Columbia University

Anna Ghurbanyan, Columbia University; Felicia Moore Mensah, Teachers College at Columbia University

2:00pm - 2:30pm in Dogwood - Session A

Abstract

This qualitative study examines the individual identities, perceptions, and experiences of nine teaching assistants around inequality, bias, and social justice in STEM education. Our aim is to examine areas of improvement as well as directions for future research in the pedagogical training and professional development of chemistry TAs.

Format: Individual Paper Presentation  Presider: Jennifer Oramous

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A Thematic Analysis of Preservice Elementary Teachers’ Definitions and Descriptions of Equity in Science Instruction

Pamela Harrell, University of North Texas

Karthigeyan Subramaniam, University of North Texas; Eun Young Lee, University of North Texas; Chris Long, University of North Texas; Nazia Khan, University of North Texas

2:00pm - 2:30pm in Dogwood - Session B

Abstract

This study investigated how pre-service elementary teachers (N = 380) perceived equity in science instruction prior to the commencement of the science teaching methods course. The study aimed to elicit and describe how they defined equity in science instruction and how they planned to incorporate equity into their future science teaching practices.

Format: Individual Paper Presentation  Presider: Jennifer Oramous
Conceptualizations of Disability in a Science Teacher Education Textbook

Teresa J. Shume, North Dakota State University

2:00pm - 2:30pm in Dogwood - Session C

Abstract

This critical discourse analysis used the medical and social models of disability to examine how disability is conceptualized in a well-established textbook for secondary science teacher education. Implications for strengthening equity and social justice dimensions of preservice science teacher preparation are discussed.

Format: Individual Paper Presentation  Presider: Jennifer Oramous

Curriculum, Pedagogy, and Assessment

Development and Pilot Testing of a 3D, Phenomenon-Based Curriculum Unit on Cell Biology for Middle School

Molly Malone, University of Utah

Ann E. Lambert, University of Utah; Jen C. Taylor, University of Utah; Kristin E. Fenker, University of Utah; Sheila A. Homburger, University of Utah; Dina Drits-Esser, University of Utah; Louisa A. Stark, University of Utah

2:00pm - 2:30pm in Elm - Session A

Abstract

We present a new three-dimensional unit on middle school cell biology and pilot test results. The unit is unique in highlighting interactions between pathogens and cells. Student test results showed statistically significant learning gains, progress toward a validated measurement instrument, and positive teacher feedback.

Format: Individual Paper Presentation  Presider: Daniel Carpenter
Exploring Genetics Through Genetic Disorders: Developing and Field Testing a 3D, Phenomenon-Based High School Curriculum Unit

Sheila A. Homburger, University of Utah

Molly Malone, University of Utah; Kristin E. Fenker, University of Utah; Dina Drits-Esser, University of Utah; Ann E. Lambert, University of Utah; Louisa A. Stark, University of Utah

2:00pm - 2:30pm in Elm - Session B

Abstract

We conducted a curriculum pilot and field test of a new NGSS-friendly high school genetics unit. Both the pilot test and field test, which used an RCT design, showed significant student learning gains and positive teacher feedback for the unit. We describe the results of curriculum testing and assessment design implications for 3D curriculum.

Format: Individual Paper Presentation  Presider: Daniel Carpenter
Assessing High School Biology Curriculum for the Depth of the Using Mathematics and Computational Thinking Practice

Amber M Cesare, The Pennsylvania State University

Kathleen M Hill, The Pennsylvania State University; Tiffany M Lewis, The Pennsylvania State University; Amy V Farris, The Pennsylvania State University; Courtney Nagle, The Pennsylvania State University

2:00pm - 2:30pm in Elm - Session C

Abstract
What does “using mathematics and computational thinking” look like in the biology classroom? We use data from a cohort of experienced biology teachers to examine their understanding of this practice and beliefs about learning science. We propose a tool that helps teachers and administrators assess classroom approximations of scientific practice.

Format: Individual Paper Presentation  Presider: Daniel Carpenter

Workshop: Resources for Supporting the Development of Elementary Teachers' Content Knowledge for Teaching About Matter

Deborah Hanuscin, Western Washington University

Emily Borda, Western Washington University; Josie Melton, Western Washington University; Jamie Mikeska, ETS

2:00pm - 3:00pm in Maple

Abstract The concept of matter is central to understanding many other scientific ideas, yet it is both complex to teach and difficult to learn. Come explore free instructional materials that can support the development of elementary teachers' content knowledge for teaching about matter that we developed as part of a collaborative NSF project.

Format: Workshop
**Workshop:** “One Student Does All the Work”: Rethinking Collaboration for Computational Thinking Settings

*Cassie F Quigley,* University of Pittsburgh  
*Holly Plank,* University of Pittsburgh; *Dani Herro,* Clemson University; *Aileen Owens,* South Fayette School District; *Tori Lojek,* Samantha Edkins, South Fayette School District

2:00pm - 3:00pm in Oak

**Abstract** We know collaboration is a critical skill for 21st-century learning, however, fostering productive collaboration is challenging. Ever worry that one student is doing all the work? Curious about how to assess if students are collaborating well? If so, this workshop will teach you how ensure students are productively solving problems together.

*Format:* Workshop

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**Teachers, Virtues and Professional Practice**

*Ian C Binns,* UNC Charlotte  
*Mark A. Bloom,* Dallas Baptist University; *Wayne Melville,* Lakehead University

2:00pm - 2:30pm in Palm - Session A

**Abstract**  
This presentation shares a chapter from Melville & Kerr (Eds.) Virtues as Integral to Science Education: Understanding the Intellectual, Moral, and Civic Value of Science and Scientific Inquiry. It argues for an emphasis on honesty, courage, and vulnerability within teacher preparation programs.

*Format:* Individual Paper Presentation  
*Presider:* James Nyanchuya
The Links Between the Virtues, Science, and Science Education

Mark A Bloom, Dallas Baptist University
Ian C Binns, University of North Caronline at Charlotte; Wayne Melville, Lakehead University

2:00pm - 2:30pm in Palm - Session B

Abstract

This presentation shares a chapter from Melville & Kerr (Eds.) Virtues as Integral to Science Education: Understanding the Intellectual, Moral, and Civic Value of Science and Scientific Inquiry. It identifies forces threatening citizens’ confidence in science and offers how teaching NOS aspects with Aristotelian virtues can mitigate these threats.

Format: Individual Paper Presentation  Presider: James Nyachwaya

Development of NOS PCK During a NOS Course

Jerrid Kruse, Drake University
Sarah Voss, Drake University; Isaiah Kent-Schneider, Drake University; Renald Daemicke, Drake University

2:00pm - 2:30pm in Palm - Session C

Abstract

To investigate development of NOS PCK, participants were assessed four times during a NOS course. Findings illustrate the importance of explicit-reflect instruction concerning NOS pedagogy as well as NOS content and the importance of NOS teaching experience for the development of NOS PCK. Implications for teacher education will be discussed.

Format: Individual Paper Presentation  Presider: James Nyachwaya
Online Professional Development for Elementary Science Teachers

Gillian Roehrig, University of Minnesota

Angelina Constantine, University of Minnesota; Farah Faruqi, University of Minnesota; Connie Hvidsten, BSCS; Amy Belcastro, BSCS; Karen Askinas, BSCS; Renee DeVaul, BSCS; Susan Kowalski, BSCS

2:00pm – 2:30pm in Pine

Abstract

This paper set explores the translation of a successful in-person PD for elementary science teachers to an online PD. Findings relate to the development of online PD that adheres to research-based design principles and how to support learning and build trust and rapport through the strategic use of both synchronous and asynchronous tools.

Format: Themed Paper Set

Preservice Science Teacher Preparation

Elementary Pre-Service Teachers’ Science Self-Efficacy Before and After an Online Inquiry-Focused Science Methods Course

Daniel J Bergman, Wichita State University

2:00pm – 2:30pm in Spruce – Session A

Abstract

A fully online science methods course (with home-based activities) was created as part of an elementary teacher licensure program for para-educators working full-time in schools. Pre-/post-surveys were collected to study participants’ science self-efficacy beliefs. Discussion will include findings and implications for both research and instruction.

Format: Individual Paper Presentation  Presider: Rebekka Darner
Exploring Growth and Fixed Mindsets in Pre-Service Teachers Enrolled in an Undergraduate Elementary Science Methods Course

Daniel M Alston, UNC Charlotte
Brandi L Copeland-Kamp, Clemson University

2:00pm - 2:30pm in Spruce - Session B

Abstract

This study examines how undergraduate pre-service elementary teachers exhibited their growth or fixed mindset after receiving grades on science inquiry lesson plans in an elementary science methods course.

Format: Individual Paper Presentation  Presider: Rebekka Darner

Science Teacher Education in the Time of COVID-19: A Document Analysis

Ayça K Fackler, The University of Georgia
Chelsea M Sexton, The University of Georgia

2:00pm - 2:30pm in Spruce - Session C

Abstract

During the spring semester of 2020, education shifted in unprecedented ways due to a global respiratory pandemic. Based on the results of a document analysis, this presentation will share the trends of many science teacher educators through a Facebook group, websites from professional organizations, and educator-created repositories.

Format: Individual Paper Presentation  Presider: Rebekka Darner
**Endeavor STEM Teaching Fellowship & Regeneron: Two Programs, One Experience**

*Rashida Robinson*, Teachers College, Columbia University  
*Felicia Mensah*, Teachers College, Columbia University; *Charlemys Erasme*, University of Massachusetts Dartmouth

2:30pm - 3:00pm in Apple - Session A

**Abstract**

In this study, we examine the experiences of 13 STEM Fellows who participated in a STEM Certificate Program and completed an internship at a biomedical/pharmaceutical company working with scientists in their laboratories. We were interested in understanding the experiences of the STEM Fellows and ways to improve this professional development.

*Format: Individual Paper Presentation*  *Presider: Gina Childers*

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**Using Epistemic Tools to Support Teacher PCK of Controversial Socio-Scientific Issues**

*Lynne M Zumno*, University of Utah  
*Sara Dozier*, Stanford University

2:30pm - 3:00pm in Apple - Session B

**Abstract**

We describe a PD designed to support teachers in using epistemic tools for teaching climate change. Also a research study, this work analyzes and interprets data collected as teachers participated in the experience. We offer clarity on the ways in which epistemic tools support teacher sensemaking of the socioscientific issue of climate change.

*Format: Individual Paper Presentation*  *Presider: Gina Childers*
Developing Teachers to Meet the Needs of Diverse Students Through After-School STEM Career Clubs

Margaret R. Blanchard, North Carolina State University
Kristie S. Gutierrez, Old Dominion University; Kylie J. Swanson, University of Colorado at Colorado Springs

2:30pm - 3:00pm in Apple - Session C

Abstract

This paper focuses on what we learned from designing and carrying out ongoing professional development with 24 teachers over three years to lead after-school STEM Clubs with diverse students at four rural, high needs middle schools in the southeastern US.

Format: Individual Paper Presentation  Presider: Gina Childers

Equity and Diversity

“Stop Saying What the Black Kids Can’t Do”: The Advocacy of Black Women Science Teachers

Sonia Howard, Gwinnett County Public Schools
Natalie King, Georgia State University

2:30pm - 3:00pm in Cherry - Session A

Abstract

We share research exploring the connections between the lived experiences of Black women science teachers within the STEM pipeline and their work to expand the possibilities for children of color through science. We also discuss how they uplift each other; newer science teachers of color; and the science education of children of color.

Format: Individual Paper Presentation  Presider: Joshua Ellis
Addressing Race in the Elementary Science Classroom: Counter-Narratives of Five Black Teachers

Mario T Pickens, University of North Florida

2:30pm - 3:00pm in Cherry - Session B

Abstract

This qualitative, multi-case study employed a critical race theory (CRT) perspective to examine five African American teachers' instructional and pedagogical science practices to students who share similar cultural and racial backgrounds. The findings have implications for how narratives are constructed around Black elementary science teachers.

Format: Individual Paper Presentation  Presider: Joshua Ellis

Reimagining Teacher Preparation and Out-of-School Time STEM Programs During COVID-19: A Community Cultural Wealth Model

Natalie S King, Georgia State University

Vanessa Grady, Georgia State University; Laura Pena, Georgia State University; Christine D. Thomas, Georgia State University

2:30pm - 3:00pm in Cherry - Session C

Abstract

This study explored the contributions of teachers participating in a virtual STEM camp designed to provide equitable STEM opportunities. Findings revealed how organizers leveraged community cultural wealth to increase access while also providing autonomy for teachers to develop digital literacy by learning best practices for online instruction.

Format: Individual Paper Presentation  Presider: Joshua Ellis
Designing Formative Assessments That Align With Science Teacher Identity: Challenges and Successes in Preservice and Induction

Kristen V Larson, Teachers College, Columbia University
Felicia M Mensah, Teachers College, Columbia University; Jessica F Riccio, Teachers College, Columbia University

2:30pm - 3:00pm in Fir - Session A

Abstract

This presentation summarizes a case study of early-career science teachers and their formative assessments. The study explores how early-career science teachers are challenged or supported in representing their goals and identities through formative assessment design. This work considers implications for teacher education and induction programs.

“How Do We Show We Are Credible?”: Understanding the Contributions of Varied Experiences and Perceived Expectations Towards Developing a Professional Identity as a Teacher Educator

Meredith Park Rogers, Indiana University - Bloomington

Dionne Cross Francis, University of North Carolina; Claire Ceslijarev, Indiana University - Bloomington; Alex Gerber, Indiana University - Bloomington; Andrea Phillips, Indiana University - Bloomington; Qiu Zhong, Indiana University - Bloomington

2:30pm - 3:00pm in Fir - Session B

Abstract

This co-inquiry examines the notion of credibility as it relates to teacher educators professional identity. Employing self-study methodology, we explore how our range of experiences and expectations may support or challenge how we sense achieving credibility in our teaching, and thus the development of our identities as science teacher educators.

How Can Science Teacher Educators Best Prepare Students to Teach Engineering Practices?

Kristie S. Gutierrez, Old Dominion University
Orlando Ayala, Old Dominion University; Jennifer Kidd, Old Dominion University; Stacie Ringleb, Old Dominion University; Krishna Kaipa, Old Dominion University; Pilar Pazos, Old Dominion University

2:30pm - 3:00pm in Magnolia - Session A

Abstract

Science teacher educators must develop effective ways in which to prepare elementary preservice teachers to confidently and competently teach engineering content. This study provides models and supporting data for four unique methods of infusion of engineering skills and practices into an elementary science methods course.

Format: Individual Paper Presentation  Presider: Robert Marsteller

Developing and Empirically Grounding the Draw-an-Engineering Teacher Test

Tina Vo, University of Nevada, Las Vegas
Rebekah Hammack, Montana State University

2:30pm - 3:00pm in Magnolia - Session B

Abstract

The development and use of a Draw-An-Engineering-Teacher-Test could provide pre and in-service teachers with opportunities to capture their mental images and reflect on what they believe engineering does or can look like in their classrooms; providing space for pivotal discussions around what engineering education might look like in the classroom.

Format: Individual Paper Presentation  Presider: Robert Marsteller
Elementary Preservice Teachers’ Nature of Science Rationale

Melanie E Kinskey, Sam Houston State University

2:30pm – 3:00pm in Magnolia - Session C

Abstract

This study explored how engaging in explicit, reflective nature of science during a methods course, followed by conducting student views of science interviews during field experiences developed elementary preservice teachers’ rationale for intentional nature of science instruction.

Format: Individual Paper Presentation  Presider: Robert Marsteller

Break

3:00pm – 3:15pm
Persistence, Grit, and Perseverance in STEM Education

Richard L Lamb, East Carolina University Neurocognition Science Laboratory
Douglas Hoston, East Carolina University Neurocognition Science Laboratory; Leonard Annetta, East Carolina University; Denise Bessler, East Carolina University; Alison Crowe, East Carolina University

3:15pm - 3:45pm in Dogwood – Session A

Abstract

Historically underrepresented students in STEM often experience biopsychosocial pressures in the form of academic pressures (AP) and social pressures (SP) which can result in the development of latent trauma and cumulative stress impacting their success in STEM discipline courses and careers.


Elementary Students Beliefs About Engineering Careers: Implications for Instruction and Future Research

Whitney N McCoy, University of Virginia
Jennifer L Maeng, University of Virginia; Amanda L Gonczi, Michigan Technological University; Robert M Handler, Michigan Technological University

3:15pm - 3:45pm in Dogwood – Session B

Abstract

This descriptive, exploratory study examined elementary students beliefs about engineering careers and whether they can be an engineer. Results indicated students had a limited understanding of the versatility of a career in engineering and more than half believed they were not capable of being engineers.

What Are the Most Common Factors Secondary Students Consider When Making Decisions Across Multiple Socioscientific Issue Topics

Dawnne M LePretre, Illinois Institute of Technology
Norman G Lederman, Illinois Institute of Technology

3:15pm - 3:45pm in Dogwood - Session C

Abstract

Students need to be able to balance subject matter knowledge, personal values, & societal norms in decisions making on SSI. Students in grades 10-12 were recruited from 10 regular science classrooms to made decisions across six SSI topics (n=468). Students considered both general/common and specific/unique factors making decisions about each topic.


Exploring Science Teacher Learning About the Crosscutting Concepts

Patrick J Enderle, Georgia State University
Scott D Cohen, Georgia State University

3:15pm - 3:45pm in Elm - Session A

Abstract

This presentation will provide results concerning trends in secondary science teachers’ learning and lesson planning concerning the crosscutting concepts. The teachers were enrolled in a graduate level course that focused on unpacking the seven concepts identified in the NGSS and developing plans to teach using them.

Format: Individual Paper Presentation  Presider: Preethi Titu
Gender Differences in Classroom Experiences Shaping Physics Self-Efficacy
Marta R. Stoeckel, University of Minnesota
3:15pm - 3:45pm in Elm - Session B

Abstract
This mixed-methods study examined classroom experiences students saw as important in shaping their self-efficacy in an AP Physics 1 course. Students saw guided inquiry labs, peer interactions, and assessment feedback as important, with gender differences apparent in the ways students discussed peer interactions and assessment feedback.

Format: Individual Paper Presentation  Presider: Preethi Titu

How Pre-Service and In-Service Elementary Teachers Engage Student Avatars in Scientific Argumentation Within a Simulated Classroom Environment
Jamie N Mikeska, ETS
Pamela S Lotero-Perdue, Towson University
3:15pm - 3:45pm in Elm - Session C

Abstract
We report on study findings examining the extent to which pre-service and in-service elementary teachers engage student avatars in scientific argumentation within a simulated classroom environment and the teaching moves that the teachers used to foster scientific argumentation.

Format: Individual Paper Presentation  Presider: Preethi Titu
**Workshop: Methods for Methods - Elementary**

Debi L Hanuscin, Western Washington University

Valarie Akerson, Indiana University; Christina L. McDaniel, Bradley University; Aimee Hollander, Nicholls State University; Tina Vo, University of Nevada-Las Vegas; Nazan Bautista, University of Miami-Ohio; Sumreen Asim, Indiana University Southeast; Erin Mistry, University of Florida

3:15pm - 4:15pm in Maple

**Abstract** This workshop is designed for science teacher educators to share tools and resources to support elementary preservice teachers. Come learn from your peers and discover how you can contribute to and curate our collective knowledge of 'methods for methods'. *Participants are asked to bring a syllabus, activity, assignment, or resource to share.*

*Format: Workshop*

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**Workshop: Improving Student Writing Outcomes in the Science Classroom Using a Genre-Based Approach**

Chris McGrail, University of Massachusetts Amherst

Ally Hunter, University of Massachusetts Amherst

3:15pm - 4:15pm in Oak

**Abstract** As science educators we can be at a loss for how to enact meaningful writing instruction in the classroom. Many of us assign writing but feel that we are not effectively “teaching” writing. Participants will be introduced to genre-based pedagogy, a framework for writing, and activities that are supported by this pedagogical approach.

*Format: Workshop*
Teaching During COVID-19: Reflections of First-Year Science Teachers

Jeanna R. Wieselmann, Southern Methodist University
Elizabeth A. Crotty, University of Wisconsin - Eau Claire

3:15pm - 3:45pm in Palm - Session A

Abstract

Spring of 2020 brought about unprecedented challenges for people around the world, including teachers who faced extended school closures due to the COVID-19 pandemic. This study explores the transition to online instruction among Teach for America corps members who were in their first year of science teaching for students in grades 5-12.

Format: Individual Paper Presentation  Presider: Natalie King

Resilience in the Face of the COVID-19 Pandemic: Knowledge and Practices of School Science Coordinators in the Asian Context

Harleen Singh, University of Georgia
Yuxi Huang, University of Georgia; Hong Thi Hoa Tran, University of Georgia; Hatice Ozen, University of Georgia; Elana Worth, University of Georgia; Shelby Watson, University of Mississippi; Julie Anne Luft, University of Georgia; Brooke Ann Whitworth, Clemson University

3:15pm - 3:45pm in Palm - Session B

Abstract

This study investigates the knowledge and practices of school science coordinators of five Asian countries, that have helped them support science teachers transition to and teach using the distance learning platform during the COVID-19 pandemic, and the new knowledge and practices they have developed during this time.

Format: Individual Paper Presentation  Presider: Natalie King
STEM Teaching Amid COVID-19 Uncertainty: Promoting Student Engagement in a Time of Crisis and Trauma

Michael Dias, Kennesaw State University
Belinda P. Edwards, Kennesaw State University; Tiffany A Roman, Kennesaw State University; Laurie Brantley-Dias, Kennesaw State University

3:15pm - 3:45pm in Palm - Session C

**Abstract**

Guided by trauma-informed teaching practices and learner engagement conceptual frameworks, induction-phase STEM teachers engaged in a professional development course to support transition from emergency remote teaching of Spring 2020 to improved online teaching practices implemented during Fall 2020. Teacher interviews and artifacts are examined.

**Format:** Individual Paper Presentation  **Presider:** Natalie King

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Ethnoscience and Environmental Education

School Gardening: Teaching Sustainability Through Hearts-On, Hands-On, Minds-on Learning

Rita Hagvik, The University of North Carolina at Pembroke
Kathy Cabe Trundle, Utah State University; Irina Falls, University of North Carolina at Pembroke

3:15pm - 3:45pm in Pine

**Abstract**

First view the video presentation, then we will discuss the hearts-on, hands-on, and minds-on learning model and apply it to sustainable gardens in schools. Empirical studies on gardening-based learning and a model with resources on how to use sustainable gardens to teach STEM will be shared and discussed virtually in groups.

**Format:** Exploratory Session
**Workshop: Supporting Scientific Argumentation in the Classroom**

*Eric J Greenwald*, University of California’s Lawrence Hall of Science  
*Megan Goss*, University of California’s Lawrence Hall of Science; *Christina Morales*, University of California’s Lawrence Hall of Science; *Bryan Henderson*, Arizona State University; *April Holton*, Arizona State University

3:15pm - 4:15pm in Redbud

**Abstract**

DiALoG is a freely available digital resource to help teachers recognize, formatively assess, and tailor instruction to support 8 important aspects of oral argumentation. In this session, we share research findings from DiALoG and provide hands-on experiences to help teachers monitor and support oral scientific argumentation in their classrooms.

*Format: Workshop*

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**Preservice Science Teacher Preparation**

**Introducing a Core Practices Instructional Framework for Science Teacher Preparation**

*Ron E. Gray*, Northern Arizona University

3:15pm - 3:45pm in Spruce - Session A

**Abstract**

In this paper, I will introduce a novel instructional framework for secondary science teacher education programs. The framework pulls from practice-based teacher education work in English language arts, mathematics, and science education to create a cohesive framework that extends beyond methods courses to an entire teacher education program.

*Format: Individual Paper Presentation  Presider: Catherine Quinlan*
Developing a Common Vision for Supporting Coherence in Three Preservice Science Teacher Education Programs

Abraham S Lo, BSCS Science Learning

Connie Hvidsten, BSCS Science Learning; Betty Sten nett, BSCS Science Learning; Karen Askinas, BSCS Science Learning

3:15pm - 3:45pm in Spruce - Session B

Abstract

This paper shares the successes and challenges of bringing together education and science faculty and mentor teachers to develop a common vision using a research-based conceptual framework and implement a university-based plan to enhance the coherence of the secondary science preservice science teacher learner experience at three universities.

Format: Individual Paper Presentation  Presider: Catherine Quinlan

Supporting Candidates’ Learning With a System of Resources for Mentor-Candidate Collaboration

Karin Lohwasser, UCSB

Soo-Yean Shim, University of Washington; Caroline Long, University of Washington; Mark Windschitl, University of Washington

3:15pm - 3:45pm in Spruce - Session C

Abstract

Student teaching can be a productive journey with effective mentoring, but too often preservice teachers (PSTs) experience it without the support that makes it most meaningful. We share findings from two research projects and the resulting resources that promote productive collaboration between mentors and PSTs in their field placement classrooms.

Format: Individual Paper Presentation  Presider: Catherine Quinlan
Progress Towards Determining the Status of Three-Dimensional Ability by Rural Science Educators

Camille T Stegman, Nevada State Science Teachers Association
Catherine Connolly, Northwestern Regional Professional Development Program; David T Crowther, University of Nevada - Reno

3:45pm - 4:15pm in Apple - Session A

Abstract
This presentation will discuss progress on a Next Generation Science Standards (NGSS) (NRC, 2013) survey instrument that gathers data about rural science educators’ command of the three-dimensions found in the Framework for K-12 Science Education (NRC, 2012) and their practical use of the NGSS.

Format: Individual Paper Presentation Presider: Tamara Peffer

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Beyond the City Lights: Resiliency of Secondary Science Teachers in Rural Schools.

Beverly DeVore-Wedding, Adams State University

3:45pm - 4:15pm in Apple - Session B

Abstract
Why do nationally recognized secondary science teachers remain in rural schools with lower salaries and increased responsibilities beyond teaching content stay in those schools? Using a lens of resiliency, similarities were identified in PAEMST rural science teachers overcome adversity and thrived in their rural schools and communities.

Format: Individual Paper Presentation Presider: Tamara Peffer
The Long-Term Effects of a Teacher Professional Development: Gains Re-Examined After Three Years

Joanna Philippoff, University of Hawaii at Manoa

3:45pm - 4:15pm in Apple - Session C

Abstract

In this case study of the long-term effects of a year-long teacher professional development (PD) program, although teachers showed gains over the PD, results were mixed three years later. This paper reiterates the need for sustained support to sustain change over time and has implications for interpreting the results of PD.

Format: Individual Paper Presentation  Presider: Tamara Peffer

STEM Learning Experiences as a Foundation for Career Choice

Drew Gossen, Oklahoma State University

Toni Ivey, Oklahoma State University; Stephanie Hathcock, Oklahoma State University

3:45pm - 4:15pm in Cherry - Session A

Abstract

This mixed-methods study examines the learning experiences that students have prior to college that are influential in the development of the beliefs and motivations to choose to pursue a STEM career. The session will describe in- and out-of-school experiences that made a difference in students' beliefs and choices.

Format: Individual Paper Presentation  Presider: Lauren Madden
What Is a STEM Career?: STEM Teachers’ Conceptions of STEM Careers

Shannon L. Navy, Kent State University
Anna Gjurkovitsch, Kent State University; Jennifer Heisler, Kent State University; Jeffrey Papa, Kent State University

3:45pm - 4:15pm in Cherry - Session B

Abstract

STEM careers are important in society. However, little is known about teachers’ conceptions of STEM careers and if and/or how they integrate this into instruction. To contribute to the knowledge in this area, this study investigated practicing STEM teachers’ knowledge of STEM careers and perceptions of including STEM careers in the curriculum.

Format: Individual Paper Presentation  Presider: Lauren Madden
Preliminary Exploratory Factor Analysis of a STEM Observation Instrument

Joshua A Ellis, Florida International University
Emily A Dare, Florida International University; Mark D Rouleau, Michigan Technological University; Elizabeth Ring-Whalen, St. Catherine University; Benny Mart Hiwatom, University of Minnesota; Khomson Keritithamkul, University of Minnesota; Feng Li, Florida International University; Corbin Rice, University of Minnesota; Farah Faruqi, University of Minnesota; Preethi Titu, Kennesaw State University; Gillian Roehrig, University of Minnesota

3:45pm - 4:15pm in Cherry - Session C

Abstract

This work describes a 10-item observation instrument designed to measure the quality of K-12 integrated STEM education. Exploratory factor analysis was performed on instrument scores from 136 classroom videos to identify latent factors and assess internal consistency of the instrument. This analysis revealed a simple two-factor solution.

Format: Individual Paper Presentation  Presider: Lauren Madden
EarthCaching With Pre-Service Elementary Teachers: Using Field-Based Earth Science Experiences in a Science Content Course

Sharon Locke, Southern Illinois University Edwardsville
Georgia Bracey, Southern Illinois University Edwardsville; Katrina LaCombe, Southern Illinois University Edwardsville

3:45pm - 4:15pm in Chestnut

Abstract
Explore how EarthCaching can augment geoscience education by integrating field-based experiences (face-to-face and virtual) into science content courses for pre-service elementary teachers. Participate in an EarthCache and learn how this experience can impact the attitudes, learning, and intentions of pre-service elementary teachers.

Format: Exploratory Session

Educational Technology

Describing the Affordances of Emerging Technologies for Diverse Learners: an Embedded Case Study of Science Learning With 3D, Haptic, vr Among Students With ADHD

Rebecca Hite, Texas Tech University
Gina Childers, Texas Tech University; Gail Jones, North Carolina State University

3:45pm - 4:15pm in Fir - Session A

Abstract
Three dimensional (3D), haptic, and virtual reality (VR) technologies provide novel opportunities for secondary students to investigate scientific phenomena. This case study sought to address a dearth in the literature on neurodivergent students’ experiences, with emerging technologies, for learning science (cardiac anatomy and physiology).

Format: Individual Paper Presentation  President: Khadoja Fouad
Investigating Engagement and Flow With a Placed-Based Immersive Virtual Reality Game

Alec Bodzin, Lehigh University
Robson Araujo Junior, Lehigh University; Thomas Hammond, Lehigh University; David Anastasio, Lehigh University

3:45pm - 4:15pm in Fir - Session B

Abstract

An immersive Virtual Reality game to learn about features in the local watershed was designed, developed, and implemented in an urban high school. Students experienced a flow state during game play and almost all users (98.1%) had positive attitudes towards using the game.

Format: Individual Paper Presentation  Presider: Khadoja Fouad

Preservice Science Teacher Preparation

Developing Institutional Capacity to Support Early Career Social Justice Science Teachers

Jarod Kawasaki, California State University, Dominguez Hills
Sandy Chang, University of California, Los Angeles

3:45pm - 4:15pm in Magnolia - Session A

Abstract

We report on interviews conducted with 23 early career science teachers to identify the challenges of working in schools that serve students from working class communities of color. Our goal was to identify these challenges in order to design intentional learning opportunities to support their continued development as social justice educators.

Format: Individual Paper Presentation  Presider: Phillip Short
Stronger Together: Preservice Elementary Teachers' Experiences of an Interdisciplinary Science and Social Studies Methods Course

Vanessa A Klein, University of Maine Cooperative Extension
Evan M Mooney

3:45pm - 4:15pm in Magnolia - Session B

Abstract
This study explored how interdisciplinary science and social studies methods courses influenced students’ thinking about content and pedagogy. Findings revealed that students struggled with interdisciplinary interpretations initially but developed sophisticated conceptions of science and social studies through positive experiences of the courses.

Format: Individual Paper Presentation  Presider: Phillip Short

Routes to Goal Satisfaction: What Resources Do Recent Graduates of a STEM Teacher Education Program Draw Upon to Satisfy Their Goals for Student Learning?

Todd L Hutner, The University of Alabama

3:45pm - 4:15pm in Magnolia - Session C

Abstract
Drawing on a goal-driven theoretical framework, the purpose of this research is to more fully understand the resources that recent graduates of an integrated STEM education teacher education program draw upon to help satisfy their goals for student learning.

Format: Individual Paper Presentation  Presider: Phillip Short
Small Colleges and Programs Forum
4:15pm - 5:00pm in Dogwood

Format: General

Technology Forum
4:15pm - 5:00pm in Elm

Format: General

Graduate Student Forum
4:15pm - 5:00pm in Fir

Format: General

Inclusive Education Forum
4:15pm - 5:00pm in Oak

Format: General

Environmental Education Forum
4:15pm - 5:00pm in Oak

Format: General
Scientist/Science Educators Collaborations Forum
4:15pm - 5:00pm in Palm

*Format:* General

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Policy and Government Relations Forum
4:15pm - 5:00pm in Pine

*Format:* General

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Seniors as Resources for Science Education Forum
4:15pm - 5:00pm in Pine

*Format:* General

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Women in Science Education Forum
4:15pm - 5:00pm in Spruce

*Format:* General

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Communications Committee Meeting
9:00am - 10:00am in Dogwood

*Format:* General
Professional Development Committee Meeting
9:00am - 10:00am in Elm

Format: General

Conference Planning Committee Meeting
9:00am - 10:00am in Maple

Format: General

Elections Committee Meeting
9:00am - 10:00am in Oak

Format: General

Membership/Participation Committee Meeting
9:00am - 10:00am in Palm

Format: General

Publications Committee Meeting
9:00am - 10:00am in Pine

Format: General
Awards Committee Meeting
9:00am - 10:00am in Spruce

Format: General

Break
10:00am - 10:15am

Format: General

Fireside Chat With 2021 Awardees
10:15am - 11:00am in Redbud

Format: General

Lunch on Your Own
11:00am - 12:00pm

Format: General

Graduate Student Workshop: Preparing for the Workforce
11:00am - 12:00pm in Fir

Format: General
Examining Pre-Service Science Teaching Methods Courses to Better Understand the On-Going Challenges With Improving Teachers’ Understanding of NOS

Ryan Summers, University of North Dakota
Jeanne L. Brunner, University of Massachusetts Amherst

12:00pm - 12:30pm in Dogwood - Session A

Abstract
Motivated by well-documented concerns about teachers’ understanding of nature of science (NOS), we invested methods courses for pre-service teachers. Our goal was to determine the extent these courses prepared teachers to address NOS in K-12 settings. We compiled syllabi, consulted other materials from methods courses, and analyzed the contents.


Impact of Historical Science Stories on Post-Secondary Biology Students' NOS Understanding and Attitudes Toward Science

Michael P Clough, Texas A&M University
Benjamin C Herman, Texas A&M University; Alex J Sobotka, Texas A&M University; Alister R Olson, Texas A&M University

12:00pm - 12:30pm in Dogwood - Session B

Abstract
The study reported here determined the impact of five historical stories on students in a large introductory post-secondary majors biology course. The short stories had meaningful positive impacts on students’ understanding of the NOS, interest in science careers, and interest in science content.

Pedagogical Content Knowledge for Nature of Science Development Among Science Education Doctoral Students

Andrea Phillips, Indiana University

Jessica McClain, Indiana University; Shukufe Rahman, Indiana University; Claire Cesljarev, Indiana University; Qiu Zhong, Indiana University; Conghui Liu, Indiana University; Tulana Ariyaratne, Indiana University; Valarie Akerson, Indiana University

12:00pm - 12:30pm in Dogwood - Session C

Abstract

This research examined the development of pedagogical content knowledge (PCK) for the Nature of Science (NOS) among science education doctoral students who are becoming teacher educators. Findings discuss development of aspects of PCK for NOS during class discussions of a course focused on NOS.


Curriculum, Pedagogy, and Assessment

Fri, January 15

A Study of Student-to-Student Conversations in Secondary School Physical Science Classroom

Jennifer F Oramous, University of Arkansas

12:00pm - 12:30pm in Elm - Session A

Abstract

This qualitative exploratory case study will define productive conversation and then analyze student conversations in physical science classrooms to determine what aspects and patterns of student-student conversation play a critical role in students’ ability to co-construct knowledge.

Format: Individual Paper Presentation  Presider: Dawnne LePretre
Green Chemistry Infusion in the Basic Chemistry Laboratory Manual
- Desi, University of Sripwijaya
Bety Lesmini, University of Sripwijaya; Iceng Hidayat, University of Sripwijaya
12:00pm - 12:30pm in Elm - Session B

Abstract
This study aims at describing the characteristics of the developed green chemistry lab manual, suggestions offered by experts and students regarding manual, and students' performance during experiments. Findings show that this manual is feasible and effective to guide students carrying out chemistry experiments and enhance their psychomotor skills.

Format: Individual Paper Presentation  Presider: Dawnne LePretre

Instructional Time and Sense-Making in Elementary Classrooms
Joanne K. Olson, Texas A&M University
Jacob Pleasants, Keene State College
12:00pm - 12:30pm in Elm - Session C

Abstract
Lesson length is a predictor of the quality of sense-making opportunities that elementary teachers provide to students. This study examined elementary science lessons and how instructional time is allocated to various instructional phases, and teachers' decision-making based on time issues.

Format: Individual Paper Presentation  Presider: Dawnne LePretre
Workshop: Integrated STEM: Payload to Classroom Undergraduate Experience  
*Trina J Kilty, University of Wyoming*  
*Phil T Bergmaier, University of Wyoming*

12:00pm - 1:00pm in Maple

**Abstract** We solicit feedback for future optimization in developing authentic, integrated STEM projects for K-12 students. We collected data from sensors on a high-altitude balloon and transformed our project to lessons and activities delivered to a K-12 audience. We collaboratively explore how to share an integrated STEM experience with K-12 audiences.

**Format:** Workshop

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Workshop: Using Discussion Frames and Focused Transcript Coding to Support Pre-Service Teachers' Facilitation of Argumentation Discussions in Science

*Pamela S. Lotterro-Perdue, Towson University*

*Jamie N. Mikeska, ETS; Carla Finkelstein, Towson University*

12:00pm - 1:00pm in Oak

**Abstract** Participants will learn to use two types of tools—discussion frames and focused transcript coding—to support pre-service teachers (PSTs) as they learn to lead high-quality argumentation discussions in science. These tools were designed to help PSTs prepare for, facilitate, and then reflect upon those discussions.

**Format:** Workshop
Program Attributes for Science and Mathematics Teacher Leadership Development

Christine R Lotter, University of South Carolina
Brett Criswell, West Chester University; Jan Yow, University of South Carolina; Anna E Hutchinson, University of Cincinnati; Jill Schaefer, University of Kentucky; Paula Adams, Clemson University; Greg T Rushton, Middle Tennessee State University; Sally Ahrens, University of Nebraska–Lincoln

12:00pm - 12:30pm in Palm - Session A

Abstract
This study investigated the structure of eight funded grant programs that focused on developing or supporting science or mathematics teacher leaders. Through an analysis of the programs’ teacher leadership criteria, outcomes, and experiences, we present common structural components and implications for effective teacher leader development.

Supporting District Science Coordinators: Designing Professional Learning Modules

Yuxi Huang, University of Georgia
Harleen Singh, University of Georgia; Hatice Ozen-Tasdemir, University of Georgia; Shelby A. Watson, University of Mississippi; Brooke A. Whitworth, Clemson University; Julie A. Luft, University of Georgia

12:00pm - 12:30pm in Palm - Session B

Abstract

We developed four online professional learning modules—equitable 3D teaching, professional learning, coherent curriculum, and instructional technology and online learning to support district science coordinators. These modules were developed as part of a professional development program to advance their knowledge and practices.


When Collaboration Goes Awry: A Failure Analysis of Teaching Triads

Iliana E. De La Cruz, Texas A&M University
Jacob Pleasants, Keene State College; Wiley Lincoln, Texas A&M University; Joanne K. Olson, Texas A&M University

12:00pm - 12:30pm in Palm - Session C

Abstract

In this study, we investigate what common sources of conflict arose in co-teaching triads with a cooperating teacher, student teacher, and engineer throughout a semester long collaboration as part of a four year project. We found that problems of the interpersonal nature elicited patterns of dysfunction, derailing team efforts toward project goals.

Video Analysis in Preservice Science Teacher Education: A Reflection on Its Homeostatic Effect During Challenges to Clinical Fieldwork in a Viral Pandemic

Jessica F. Riccio, Ed.D., Teachers College Columbia University
Kristen V. Larson, Ed.D., Teachers College Columbia University; Lorna V. Otero, Teachers College Columbia University; Ibrahim Dincer, Teachers College Columbia University; Maggie Olney, Teachers College Columbia University

12:00pm - 12:30pm in Pine

Abstract

Our presentation illustrates the whole to part ratio in planning for preservice teacher preparation. Using backwards planning with evidence from instantaneous policy shifts and unforeseen crises we will share three contexts of video analysis during student teaching that worked to fulfill clinical fieldwork for licensure.

Format: Exploratory Session

Compare Synchronous and Asynchronous Interaction for Online Science Teacher Preparation

Jianlan Wang, Texas Tech University
Yuanhua Wang, West Virginia University

12:00pm - 12:30pm in Spruce - Session A

Abstract

Online teacher education is an important alternative in response to the current situation of coronavirus pandemic. In this study, we examine synchronous and asynchronous interactions. The findings support the importance synchronicity as an important indicator of the effectiveness of interaction for online science teacher education.

Format: Individual Paper Presentation  Presider: Richard Lamb
Opportunities and Challenges of an Online Elementary Science Methods Course

*Danielle E Dani*, Ohio University
*Nidaa Makki*, University of Akron; *Andrea Anderson*, Ohio University

12:00pm - 12:30pm in Spruce - Session B

**Abstract**

Online science methods courses have become a reality. This presentation addresses myths about online, inquiry-based science methods courses by describing opportunities and challenges of teaching preservice and inservice elementary teachers about three-dimensional science learning. Examples and materials from two public universities are provided.

*Format:* Individual Paper Presentation  *Presider:* Richard Lamb

Impact of Distance Delivery on 3-Dimensional Instruction for University Students Preparing to Become Teachers.

*Max L. Longhurst*, Utah State University
*Kimberly H. Lott*, Utah State University; *Brenda Bennett*, Utah State University

12:00pm - 12:30pm in Spruce - Session C

**Abstract**

The worldwide pandemic has fundamentally changed the landscape of instructional delivery. Consequently, this session will explore how distance delivery methods have impacted the instructional practice of preservice teachers who were trained in 3-Dimensional science instruction through a face-to-face methods course format.

*Format:* Individual Paper Presentation  *Presider:* Richard Lamb
Practicing Teachers’ Conceptual Models of Science Phenomena: Correspondences Between Science Discipline and Model Robustness

**Benjamin K Campbell**, Longwood University

**Ryan S Nixon**, Brigham Young University

12:30pm – 1:00pm in Apple – Session A

**Abstract**

We present research into practicing teachers’ conceptualization of science phenomena. Study participants produced written models to explain discipline-specific concepts, after being asked to consider a concept from their standard curriculum. The models produced were evaluated both according to explanation and along two axes of robustness.

**Format**: Individual Paper Presentation  **Presider**: Michelle Forsythe

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Supporting the Integration of Computational Thinking and Science Through Professional Development and Co-Design

**Amanda N Peel**, Northwestern University

**Jacob Kelter**, Northwestern University; **Michael Horn**, Northwestern University; **Uri Wilensky**, Northwestern University

12:30pm – 1:00pm in Apple – Session B

**Abstract**

This qualitative research investigates how the design of a professional development program led to teacher learning about computational thinking (CT) and CT tools, how to integrate CT with science and math, and increased confidence in designing lessons with CT and teaching CT. Results and implications for teacher education will be discussed.

**Format**: Individual Paper Presentation  **Presider**: Michelle Forsythe
PD for Inquiry-Based Space-Science Lessons Integrated With 3D Learning Focusing on Cross-Cutting Concepts

Soon C Lee, Kennesaw State University

12:30pm - 1:00pm in Apple - Session C

Abstract

The workshop program for middle school classrooms aimed to assist middle school science teachers in integrating inquiry-based lessons with Next Generation Science Standards (NGSS) 3D Learning approach focusing on the Crosscutting Concepts (CCs). The sample lesson activities, projects, phenomena are utilized using the NASA Education Resources.

Format: Individual Paper Presentation  Presider: Michelle Forsythe

Citizen Science for Social Good: Engaging Underrepresented Youth in Pollinator Conservation

Rita Hagevik, The University of North Carolina at Pembroke

Kaitlin Campbell, The University of North Carolina at Pembroke

12:30pm - 1:00pm in Cherry - Session A

Abstract

In this study we describe how to involve underrepresented youth in citizen science projects around pollinator conservation with the goal of promoting social good. We found that five citizen science projects on a University campus that engaged 130 youth had a positive impact on youth engagement in STEM, in environmental stewardship, and justice.

Format: Individual Paper Presentation  Presider: Vanessa Klein
Climate Change, Marine Science and the NGSS: Planning Professional Development

*Lauren Madden*, The College of New Jersey

*Louise Ammentorp*, The College of New Jersey; *Nathan Magee*, The College of New Jersey; *Graceanne Taylor*, Save Barnegat Bay

12:30pm - 1:00pm in Cherry - Session B

**Abstract**

Climate change and marine science are often unfamiliar topics for K-8 teachers. The NGSS provide many opportunities to address them, but teachers are sometimes uncomfortable with their use. We used a focus group and survey of current and future teachers to describe the current state of baseline knowledge in these topics and offer plans for PD.

*Format: Individual Paper Presentation*   *Presider: Vanessa Klein*

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Exploring the Use of Pragmatism in Research Methodology to Create STEM Curricula That Is Culturally Representative of African American Gullah Geechee

*Catherine L Quinlan*, Howard University

12:30pm - 1:00pm in Cherry - Session C

**Abstract**

This presentation explores the use of pragmatic research approaches to create a culturally representative STEM curriculum. This is part of a research project funded by NSF to create a culturally representative STEM curriculum using the lived experiences and narratives of African American Gullah Geechee peoples of the U.S. coastal southern regions.

*Format: Individual Paper Presentation*   *Presider: Vanessa Klein*
Meet the JSTE Editors

12:30pm - 1:00pm in Chestnut

Format: General

Educational Technology

Fri, January 15

Learning to Use Flipgrid for Student Engagement and Formative Assessment: Lessons From an Elementary Preservice Teacher

Sharfun Islam Nancy, University of South Florida
Karl G Jung, University of South Florida

12:30pm - 1:00pm in Fir - Session A

Abstract

This presentation examines one preservice elementary science teacher’s exploration of the technology tool, Flipgrid, as she learned how to use it in a third-grade classroom to support student engagement and formative assessment purposes.

Format: Individual Paper Presentation  Presider: Dieuwertje Kast
A Self-Study of Science Teacher Education Through the COVID-19 Virtual Community of Practice

Allan Feldman, University of South Florida
Jawaher A Alsultan, University of South Florida

12:30pm – 1:00pm in Fir – Session B

Abstract
This self-study focused on the problematic role of science teacher educators when engaging science teachers in a virtual community of practice to support online teaching due to the COVID-19 pandemic. Findings include the development of online trust, new facilitation knowledge, and teacher products.

Format: Individual Paper Presentation  Presider: Dieuwertje Kast

Exploring Shifts and Interactions Between Teacher and Student Attitudes During Maker Projects in Science

Douglas Ball, Utah State University
Colby Tofel-Grehl, Utah State University; Kristin Searle, Utah State University

12:30pm – 1:00pm in Fir – Session C

Abstract
This paper shares findings from a study exploring science teacher engagement with Maker technologies within science classrooms from professional development to enactment. This paper explores the interaction between one teacher’s negative attitude and his students ability to overcome it. Students persisted despite teacher discouragement to succeed.

Format: Individual Paper Presentation  Presider: Dieuwertje Kast
Pre-Service Elementary Teachers’ First-Time Science Teaching Experiences: A Phenomenological Study

Karthigeyan Subramaniam, University of North Texas
Sumreen Asim, Indiana University Southeast

12:30pm – 1:00pm in Magnolia – Session A

Abstract

This phenomenological study details 22 preservice elementary teachers’ experiences of teaching science for the first time in a methods course. The research question was: What is the essence of preservice elementary teachers' new lived experiences as they transition from teacher candidates to teacher candidates teaching science for the first time?

Format: Individual Paper Presentation  Presider: Tammy Lee

Learning From Contrasts: Productive Reflection by a Preservice Science Teacher Inspired by Multiple Field Placements

Hong H. Tran, University of Georgia
Daniel K. Capps, University of Georgia

12:30pm – 1:00pm in Magnolia – Session B

Abstract

This empirical study describes the case of a preservice science teacher (PST) learning about how the degree of structure impacts science learning environments. Using journal entries from one PST who observed and taught in three classrooms we show how reflecting on contrasts across placements and having an opportunity to teach supported this growth.

Format: Individual Paper Presentation  Presider: Tammy Lee
Supporting Secondary Science Preservice Teachers’ by Exploring Their Science Teaching Identities

Regina P McCurdy, University of Central Florida

12:30pm - 1:00pm in Magnolia - Session C

Abstract

This study explores five preservice secondary science teachers’ factors that led them to become science teachers. Their strong science identities were exhibited throughout their internships, and the reflections of their teaching practices were integral in developing their science teacher identities.

Format: Individual Paper Presentation  Presider: Tammy Lee

Break

1:00pm - 1:15pm

Format: General
Latinx Preservice Teachers’ Experiences and Positions With Translanguaging Pedagogy in Science Classes

Noushin Nouri, University of Texas RGV

1:15pm - 1:45pm in Dogwood - Session A

Abstract

Latinxs are among the most underrepresented groups in STEM fields. It is crucial to find and implement strategies that help this population to be more successful in science classes. This research aimed to capture Latinx science preservice teachers’ current experience and their position regarding translanguagin pedagogy.

Format: Individual Paper Presentation  Presider: Melanie Reap
Promoting Science Among English Language Learners: An Exploration of Meaning Making Process in a High School Science Classroom

Rebecca Robertson Konz, University of Minnesota
Felicia D. Leammukda, University of Minnesota; Preethi Titu, University of Minnesota; Gillian Roehrig, University of Minnesota

1:15pm - 1:45pm in Dogwood - Session B

Abstract

This case study looks at language practices in science education for EL students. We investigate how home language use might be leveraged to promote conceptual understanding by focusing on student language choice. Insights about how students are negotiating meaning lead to implications for science teaching practice.

Format: Individual Paper Presentation  Presider: Melanie Reap
RIEL Biology: Promoting Culturally and Linguistically Responsive Education in Biology

**Karl G Jung**, University of South Florida
**Julie C Brown**, University of Florida; **E. Christine Davis**, University of Florida; **Mark B Pacheco**, University of Florida

1:15pm - 1:45pm in Dogwood - Session C

**Abstract**

This presentation highlights a new instructional framework for providing culturally and linguistically responsive instruction in biology classrooms and provides attendees with a discussion of how high school biology teachers are learning to implement the RIEL Biology framework in their classrooms.

**Format:** Small Group Roundtables  **Presider:** Melanie Reap

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Curriculum, Pedagogy, and Assessment

Pandemic Science Methods Instruction: What Do Pre-Service Elementary Science Teachers Explore and Learn From Outdoor Excursion?

**Sherri L Brown**, University of Louisville

1:15pm - 1:45pm in Elm - Session A

**Abstract**

As pre-service teachers, elementary science methods students (n=15) captured and shared electronically an outdoor exploration during an international pandemic. Initial themes from methods students' personal outdoor explorations, along with their follow-up research, indicate they gained content knowledge and awareness of their local surroundings.

**Format:** Small Group Roundtables  **Presider:** David Steele
Development of a 3D, Phenomenon-Based Item Cluster Assessment for Cell Biology

Ann E Lambert, University of Utah
Dina Drits-Esser, University of Utah; Louisa A. Stark, University of Utah

1:15pm - 1:45pm in Elm - Session B

Abstract

We will present the conception and development of a new, multiple-choice, Next Generation Science Standards (NGSS) compatible, three-dimensional, summative assessment created as part of an NGSS-friendly curriculum unit on middle school cell biology.

Format: Small Group Roundtables  Presider: David Steele

Teachers’ Feelings of Awe: An Examination of the Role of Awe in Science Instruction and Student Learning

Sarah J Carrier, NC State University
M. Gail Jones, NC State University; Julianna Nieuwsma, NC State University; Kathryn Rendee, NC State University; Emma Refvem, NC State University

1:15pm - 1:45pm in Elm - Session C

Abstract

Science in the natural world has elicited human feelings of awe and wonder as we try to understand the magnificent and the mysterious. By identifying teachers’ feelings of awe, we can support their inclusion of awe in science instruction. We share initial research on teachers’ impressions of awe in science and discussion instruction potential.

Format: Small Group Roundtables  Presider: David Steele
**Workshop:** Facilitating Discourse and Integration of NGSS in Science Methods Courses With the ASET Toolkit  

*Corinne Lardy, California State University Sacramento*

*Donna Ross*, San Diego State University; *Meredith Vaughn*, San Diego State University; *Larry Horvath*, San Francisco State University; *Lisa Martin-Hansen*, California State University Long Beach; *Susan Gomez Zwief*, California State University Long Beach

1:15pm – 2:15pm in Oak

**Abstract** This workshop will introduce participants to the ASET Toolkit, a set of tools to facilitate discourse in order to support preservice teachers' understanding of NGSS. We will present activities and helpful strategies using the tools that have been tested in science methods courses across universities and additional contexts over the past five years.

*Format: Workshop*

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**Science Teacher Professional Development**

**Fri. January 15**

**Integrated Chemistry and Earth Science Curriculum Implementation Through the Lens of Teacher-Centered Systemic Reform**

*Kevin Fleming, The George Washington University*

*Jonathon Grooms*, The George Washington University; *Alan R Berkowitz*, Cary Institute of Ecosystem Studies

1:15pm – 1:45pm in Palm – Session A

**Abstract**

This study explores changes in high school teachers’ perceptions during early implementation of a new integrated chemistry and Earth science curriculum. Applying the Teacher-centered Systemic Reform model situates teachers as change agents and recipients of change efforts. Findings suggest a comingling of uncertainty and perseverance among reform.

*Format: Individual Paper Presentation  Presider: William Veal*
Reconstruction Site: Exploring Physics Teacher Self-Efficacy Within a Socially Just Curriculum Rebuild

Richard P Hechter, University of Manitoba

1:15pm - 1:45pm in Palm - Session B

Abstract

The world is moving towards one that stands united against hate and othering. This presentation will share insights from a mixed-methods research project within a PD program that explored physics teacher self-efficacy in teaching a revised physics curriculum enriched with elements of social justice, equity, and cultural awareness.


Fostering Educators’ Environmental Efficacy, Literacy, and Practices Through a Field-Based Professional Development Experience

Suzanne M Nesmith, Baylor University

Chris Wynveen, Baylor University

1:15pm - 1:45pm in Palm - Session C

Abstract

This study explores the impact of an onsite wetland professional development experience on P-12 science teachers’ environmental efficacy, literacy, and practices. Based on the findings, implications for professional development experiences and the implementation of classroom- and community-based environmental practices are discussed.

Learning to Teach Science Through the Use of Representations: The Role of Professional Development in Supporting Elementary Teachers With This Practice

*Mercedes Park Rogers*, Indiana University - Bloomington

*Celeste Nicholas*, Indiana University - Bloomington; *Andrea Phillips*, Indiana University - Bloomington; *Yiu Zhong*, Indiana University - Bloomington; *Alex Gerber*, Indiana University - Bloomington; *Joshua Danish*, Indiana University - Bloomington; *Dionne Cross Francis*, University of North Carolina; *Cindy Hmelo-Silver*, Indiana University - Bloomington

1:15pm - 1:45pm in Pine

**Abstract**

In this session, we will present work from three studies that describe the work of elementary classroom teachers and teacher educators collaborating to learn about the benefits and challenges with teaching children how to use, create, share, and revise representations that support their explanations of science phenomena.

*Format:* Themed Paper Set
Professional Noticing as a Tool for Developing a Shared Vision of Pedagogical Practice in Science

Rebecca M Krall, University of Kentucky
Samantha Ring, University of Kentucky; Brett Criswell, West Chester University

1:15pm - 1:45pm in Spruce - Session A

Abstract
This qualitative case study explored the development of four secondary science teacher candidates’ professional noticing skills as they progressed through a three-semester MAT in STEM education where video cases were used to develop their professional noticing skills and a shared vision of pedagogical practice in science.

Format: Individual Paper Presentation  Presider: Margaret Blanchard

Making Room for Caitlin: Using Simulations to Prepare Preservice Science Teachers to Respond to Competing Tensions in a Classroom

Kara D Krinks, Lipscomb University

1:15pm - 1:45pm in Spruce - Session B

Abstract
This session details the use of simulations in a science education course to focus on the dual challenges of “making room” in a science class for a student’s religious beliefs while pressing for her to engage in the nature of science. Discussion will include how to use simulations as a pedagogical tool in science teacher education.

Format: Individual Paper Presentation  Presider: Margaret Blanchard
Engaging Science Teacher Candidates Through the Use of Peer Carding

Nate Carnes, University of South Carolina

1:15 pm - 1:45 pm in Spruce - Session C

Abstract

instructional strategy to engage preservice teachers as active learners throughout a middle-level science methods course with implications for other science education courses. This presentation chronicles the modification and implementation of an innovative

Format: Individual Paper Presentation  Presider: Margaret Blanchard

Science Teacher Professional Development

Understanding Teacher Professional Identity Development: An Exploration of Secondary Science Teacher Beliefs and Practices Through Reflective Practice

Preethi Titu, Kennesaw State University
Gillian Roehrig, University of Minnesota; Josh Ellis, Florida International University

1:45 pm - 2:15 pm in Apple - Session A

Abstract

Given that it is critical for teachers to be reflective on their practice that facilitates their continued growth during the induction period, this study used a framework of evolving teacher identity to understand teachers’ professional identity development by exploring their beliefs and practices through reflective practice.

Format: Individual Paper Presentation  Presider: Kristen Larson
Designing Geospatial Inquiry and Geospatial Technology Skills Professional Learning and Development for Secondary Teachers

Brooke A Whitworth, Clemson University

Lori Rubino-Hare, Northern Arizona University; Nena Bloom, Northern Arizona University; Eric Nolan, Northern Arizona University; Francis Boateng, University of Mississippi; Mark Manone, Northern Arizona University

1:45pm - 2:15pm in Apple - Session B

Abstract

The purpose was to identify what components of Teacher Workshops prepared teachers to implement Geospatial Inquiry, to determine how well teachers were prepared to teach with geospatial technology performance skills, and to examine the relationships between facilitator and workshop implementation factors and teacher characteristics.

Format: Individual Paper Presentation  Presider: Kristen Larson

Examining Secondary Master Teachers' Tensions With Transitioning to Remote STEM Instruction

Jeffrey Radloff, SUNY Cortland

Dominick Fantacome, SUNY Cortland; Angela Pagano, SUNY Cortland

1:45pm - 2:15pm in Apple - Session C

Abstract

We examined secondary master teachers’ tensions with transitioning to remote STEM instruction without related teacher professional development. Teachers identified multiple intersecting pedagogical, political, conceptual, and cultural challenges related to this shift. Implications for STEM teacher education and research are discussed.

Format: Individual Paper Presentation  Presider: Kristen Larson
Equity and Diversity

**Intersectionality and the Bicultural Experiences of Nigerian-American Female STEM Students: A Case Study**

*David M. Sparks*, *University of Texas at Arlington*

1:45pm - 2:15pm in Cherry - Session A

**Abstract**

Three Nigerian-American female students attending a diverse urban university participated in face-to-face interviews and a focus group about their experiences as STEM majors. Analyses uncovered their misconceptions about native-born African-American students and biases related to their exceptionality as a STEM student with recent African heritage.

**Format:** Individual Paper Presentation  **Presider:** Lindsay Lightner

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Ethnoscience and Environmental Education

**Making Space: Exploring the Affordances of Making for LGBTQ+ Rural Youth**

*Colby Tofel-Grehl*, *Utah State University*

*Kristin Searle*, *Utah State University; David Feldon*, *Utah State University; Beth MacDonald*, *Utah State University; Andrea Hawkman*, *Utah State University; Mario Suarez*, *Utah State University; Liam Fischback*, *Utah State University; Katie Lundell*, *Utah State University*

1:45pm - 2:15pm in Cherry - Session B

**Abstract**

Little work exists that explores the affordances of STEM andMaker technologies for supporting engagement and identity development for LGBTQ+ youth. This paper shares findings from a one week making camp for LGBTQ+ youth. Findings indicate shifts in identity around both STEM and gender for youth as well as articulations of a sense of belonging.

**Format:** Individual Paper Presentation  **Presider:** Lindsay Lightner
Investigating the Influence of Mixed Reality on Elementary School Students’ Science Reading Performance

Leonard A Annetta, East Carolina University
Denise M Bressler, East Carolina University; Ashley Holder, Fayetteville State University; Alexis Dunekak, East Carolina University

1:45pm - 2:15pm in Chestnut

Abstract

This study explored whether reading elementary science text through mixed reality promotes students’ reading performance. Low-proficiency readers performed equal to or better than other readers on the reading assessment; their interviews revealed that they enjoyed reading with mixed reality because of its auditory benefits and learning potential.

Format: Exploratory Session

Practice-Based Approaches to Elementary Science Teacher Preparation: Examination of a Responsive Teaching Cycle in Science

Stephen L Thompson, University of South Carolina

1:45pm - 2:15pm in Fir - Session A

Abstract

This research examined a Responsive Teaching Cycle for Science model of elementary science teacher preparation. Results indicate significant positive changes in preservice teachers’ (N=138) personal science teaching efficacy and science teaching outcome expectancy. Aspects of practice teaching viewed as being most impactful will also be shared.

Preparing Teachers Online: Navigating Online Teaching for the First Time

Brent Gilles, University of West Georgia

1:45pm - 2:15pm in Fir - Session B

Abstract

Recently, faculty everywhere were thrust into the position of online teacher because of Covid-19, but a move to online began more than a decade ago at University’s across the country. The purpose of this self-study was to investigate my experience developing and implementing a hybrid course after only receiving training to teach face-to-face.


What to Teach on My Science Methods Course: Experiences of Prospective Science Teacher Educators When Designing Science Methods Courses

Jose M. Pavez, University of Georgia

1:45pm - 2:15pm in Fir - Session C

Abstract

The purpose of this study is to identify the emphasis and challenges of prospective science teacher educators (PSTE) when designing science methods courses (SMC). Preliminary findings show that PSTE have diverse emphasis on their SMC syllabus, and the main challenges they face are deciding the contents and sequence of the course.

The Disappearance of Natural History and Live Organism Study From Biology Teacher Education

Cole J. Entress, Teachers College - Columbia University

1:45pm - 2:15pm in Magnolia - Session A

Abstract

Natural history—the direct observation of organisms and their natural environments—was once central to both biology and biology teacher education. This paper examines the disappearance of natural history (and organism study more generally) from biology methods courses and asks whether it deserves renewed attention from science teacher educators.

Format: Individual Paper Presentation  Presider: Kate Walker

Connecting Biology to Dance: Exploring How Pre-Service Elementary Teachers Apply Evolution to Their Lives and Future Careers

Rachel Sparks, Illinois State University
Marissa Hettinger, Illinois State University; Rebekka Darner, Illinois State University

1:45pm - 2:15pm in Magnolia - Session B

Abstract

Elementary educators are expected to teach evolutionary ideas as early as 3rd grade yet receive little evolution instruction. This presentation describes case studies from an introductory biology course that utilizes inclusive and equitable pedagogy to foster conceptual change regarding evolution in pre-service elementary teachers.

Format: Individual Paper Presentation  Presider: Kate Walker
“[S]he Is, Like, Exactly Who I Want to Be in Life”: High School Students’ Experiences With Teaching and Their Decisions to Teach Science

William J. Davis, Southern Utah University

1:45pm - 2:15pm in Magnolia - Session C

Abstract

The purpose of this exploratory multiple case narrative inquiry is to examine three high school students’ experiences with teachers and teaching, specifically students interested in teaching secondary science. This paper will discuss the relationship between described experiences and decisions to pursue science teaching.

Format: Individual Paper Presentation  President: Kate Walker

Break

2:15pm - 2:30pm

Format: General
Science at the Center: A Preschool Science Lesson for Teacher Educators

Julianne Wenner, Boise State University
Sara Raven, Texas A & M University

2:30pm - 3:00pm in Dogwood - Session A

Abstract

Children are natural scientists who should be given opportunities to engage in science and engineering practices. Nevertheless, many preschools limit science. This study explores one teacher's pedagogical stance that led to rigorous science learning. Lessons learned could be operationalized and transferred into teacher preparation programs.

Format: Individual Paper Presentation  Presider: Brent Giles

How Do Educators Engage Toddlers in STEM-Related Learning Experiences?

Christine D Tippett, University of Ottawa
Roxana Yanez Gonzalez, University of Ottawa; Todd M Milford, University of Victoria

2:30pm - 3:00pm in Dogwood - Session B

Abstract

We examine how educators support toddlers (18-30 months) in STEM-related learning experiences. We made 16 visits to a daycare centre, observing 2 educators and 9 participating toddlers in a variety of settings. Results suggest three categories of interactions: verbal prompts and support, environmental supports, and behaviour guidance.

Format: Individual Paper Presentation  Presider: Brent Gilles
Why Are Rabbits Not Rodents? Student-Scientist-Teacher Partnerships as a Model for Early Childhood Classrooms to Experience the NGSS Practices

Donna L. Farland-Smith, The Ohio State University
Sarah McClusky, Ohio Northern University

2:30pm - 3:00pm in Dogwood - Session C

Abstract

The purpose of this research was to assess student-scientist-teacher interactions in an early childhood setting. The opportunity for students to interact with an expert in field of science improved students’ academic and discipline-specific vocabulary while increasing students’ awareness and interests in science. All NGSS practices were present.

Format: Individual Paper Presentation  Presider: Brent Giles

Enhancing Science Classrooms: Using Life-Science Based Kits to Increase Student Comprehension and Interest.

Ryan Jackson, Utah State University
Max L Longhurst, Utah State University; Tyson B Barnes, Utah State University; David B Hall, Utah State University; Andrew J Walters, Utah State University; Amanda Moravek, Utah State University; Clark Riddle

2:30pm - 3:00pm in Elm - Session A

Abstract

Life-science educational kits designed to promote three-dimensional science are a unique and timely instructional method. We present how our kits meet educational standards, teach biological principles like bacterial transformation and CRISPR-based tools, and can be implemented under various social distancing requirements.

Format: Individual Paper Presentation  Presider: Elana Worth
**ArcGIS Story Maps: Blended Learning Opportunities to Bring Technology Into the Classroom**

**Sarah Nuss**, William & Mary/VIMS  
**Stephanie Letourneau**

2:30pm - 3:00pm in Elm - Session B

**Abstract**

Despite challenges with the implementation of technology in the classroom, teachers are utilizing digital learning to aid classroom instruction. Esri’s ArcGIS Story Map is a tool that allows users to explore a topic through images, videos, interactive maps, and text. The pilot study compared translating science through traditional versus digital.

*Format: Individual Paper Presentation  Presider: Elana Worth*

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**Undergraduate Utilization of Virtual Reality in Conducting Student Designed Scientific Research**

**Kate Walker**, University of Arkansas

2:30pm - 3:00pm in Elm - Session C

**Abstract**

The inquiry teaching model I have implemented utilizes virtual reality to teach research design and practices in physiology. The focus will be on how to teach research and conduct scientific studies in a laboratory course. This teaching model and technology use is appropriate for high school or undergraduate science courses.

*Format: Individual Paper Presentation  Presider: Elana Worth*
A Maker Rubric for STEM Learning Environments

Shelly R. Rodriguez, The University of Texas, Austin
Shaunna Smith, The University of Hawai‘i - Manoa

2:30pm - 3:00pm in Elm - Session D

Abstract
Making, as an educational approach, is a way to learn through the creation of meaningful products. We introduce a maker-centered lesson rubric and showcase its use in STEM learning environments. Included is a discussion of the theoretical frameworks that informed rubric development as well as a review of uses with secondary STEM teachers.

Format: Small Group Roundtables  Presider: Elana Worth

Workshop: Productive Use of Video for Rich Teacher Learning

Connie Hvidsten, BSCS Science Learning
Betty Stennett, BSCS Science Learning; Abraham Lo, BSCS Science Learning; Susan Gomez Zwief, BSCS Science Learning

2:30pm - 3:30pm in Maple

Abstract
Participants will consider strategies for planning and leading video analysis activities that support rich conversations and deep teacher learning. Attendees will be introduced to a suite of tools and resources for implementing videocase-based learning experiences including an online collection of K-12 science classroom videos and transcripts.

Format: Workshop
**Workshop:** Too Anxious to Test: Exploring Student Knowledge in Creative Social Environments  
*Cherilyn Porter,* Bryan ISD/Texas A&M  
*Monica Hernandez Valencia,* Texas A&M  
2:30pm - 3:30pm in Oak

**Abstract** Participants will explore the limitations and opportunities afforded by various social media applications and their use as a creative tool. This will involve creating media accounts, an orientation over their features, their place in society, and how to relate the activity to an aesthetic curriculum. Prompt design and student examples will be provi

*Format: Workshop*

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Science Teacher Professional Development  
**Fri, January 15**

**Supporting Elementary Teachers’ Growth as Teachers of STEM**  
*Amanda M Gunning,* Mercy College  
*Elena Nitecki,* Mercy College; *Meghan E Marrero,* Mercy College; *Latanya T Brandon,* SUNY New Paltz; *Kristen Larsen,* Mercy College Center for STEM Education  
2:30pm - 3:00pm in Palm - Session A

**Abstract**  
In this qualitative case study, six elementary teachers participate in two graduate-level courses on STEM pedagogy. Findings illustrate how the teachers were able to develop an increased self-efficacy for teaching integrated STEM units and lessons through Bandura’s four modes of self-efficacy development (1997).

*Format: Individual Paper Presentation  Presider: William Veal*
Valuing Teachers as Professionals: A Responsive Professional Development Network Model for Elementary Teachers

Alison K Mercier, University of Wyoming
Heidi B Carlone, University of North Carolina at Greensboro

2:30pm - 3:00pm in Palm - Session B

Abstract
This paper presents a model for an elementary teacher professional development network highlighting responsive professional development that centers teachers as professionals. We explore network's evolution organized around three values and design principles and the ways in which the values resonate with teachers.

Format: Individual Paper Presentation  Presider: Kellie Feille

Investigating Inservice Elementary Teachers' Nature of Science Implementation

Hallie S. Edgerly, Drake University
Jerrid W. Kruse, Drake University; Jesse L. Wilcox, Simpson College

2:30pm - 3:00pm in Palm - Session C

Abstract
This study explores elementary teachers’ NOS instruction while participating in a year-long PD and how their NOS PCK relates to their teaching. Our findings indicate NOS teaching effective and NOS PCK are related to one another and that teachers tend to implement NOS when they find it synonymous with effective teaching.

Format: Individual Paper Presentation  Presider: Kellie Feille
Creativity in STEM the Neglected 21st Century Skill

Elizabeth (Betsy) J.R. Stretch, University Of Minnesota
Gillian H. Roehrig, University Of Minnesota

2:30pm - 3:30pm in Redbud

Abstract

Creativity is a neglected 21st Century skill. How creativity is used in STEM and how students develop creativity is influential in building STEM education. In this exploratory session we will participate in a creativity strategy designed for a STEM experience and discuss how to activate creativity in every student.

Format: Exploratory Session

Examining Preservice Elementary Teachers' Growth Through an Instructional Coaching Partnership

Amanda D Tompkins, University of South Florida
Karl G Jung, University of South Florida

2:30pm - 3:00pm in Spruce - Session A

Abstract

Proficiency in pedagogical and content knowledge is required to successfully implement the practices of science and support student content learning. This presentation investigates the benefits of science focused instructional coaching partnerships on preservice elementary teaching practices and how these changes were supported by the partnership.

Format: Individual Paper Presentation  President: Julie Contino
Increasing Hispanics in the Educator Workforce: A Science Methods Intervention to Improve Passing Rates on an EC-6 Science Certification Examination

Christopher S Long, University of North Texas
Pamela Esprivalo Harrell, University of North Texas; Karthigeyan Subramaniam, University of North Texas

2:30pm - 3:00pm in Spruce - Session B

Abstract

For years the teacher pipeline has shown teachers of color are in high demand and short supply. Teacher preparation providers must support teachers of color, with experiences that retain and certify them, so they may enter the workforce as expeditiously as possible. An intervention for Hispanic elementary teachers is examined.

Format: Individual Paper Presentation  Presider: Julie Contino

Secondary Science PSTs’ Instructional Planning for Language- and Literacy-Integrated Science

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

2:30pm - 3:00pm in Spruce - Session C

Abstract

This study investigates how secondary science preservice teachers (PSTs) plan for science instruction in linguistically diverse classrooms after participation in two language- and literacy-integrated science methods courses. Results indicate variation in the extent and ways in which PSTs integrated targeted practices. Implications are discussed.

Format: Individual Paper Presentation  Presider: Julie Contino
A Collaboration for Remote Recruiting Across Multiple STEM Teacher Preparation Programs

Mary Urquhart, The University of Texas, Dallas
Katie Donaldson, The University of Texas, Dallas; Shelly R. Rodriguez, The University of Texas, Austin

3:00pm - 3:30pm in Apple - Session A

Abstract
A national recruitment working group was established in late spring 2020 in response to impacts from COVID-19. Resulting collected strategies for remote recruiting of STEM majors into the teaching profession will be shared along with a new focus on broadening participation and a model for multi-institute problem solving collaborations.

Format: Small Group Roundtables  Presider: Judith Morrison

Teaching Digital Literacies Through an Online Science Investigation for Elementary and Early Childhood Preservice Teachers

Megan R Hines, Salisbury University
Jeni Davis, Salisbury University

3:00pm - 3:30pm in Apple - Session B

Abstract
The purpose of this presentation is to make available lessons developed to explicitly teach digital literacies in elementary and early childhood science methods courses in both a face-to-face and online environment, and share findings from our study which focused on how preservice teachers reflected on their experiences using digital literacies.

Format: Small Group Roundtables  Presider: Judith Morrison
A Multiple Case Study: Insights Into Integrated STEM Teacher Preparation Programs

Joleen L. Henning, Drake University
Jerrid Kruse, Drake University

3:00pm - 3:30pm in Cherry - Session A

Abstract

The current status of STEM preservice teacher development in the state of Iowa will be presented. Findings focus on how teacher prep faculty are teaching and running STEM endorsement programs e.g., what decisions were made, why those decisions were made, how those decisions were implemented and the results of those decisions.

Format: Individual Paper Presentation  Presider: Leiflyn Gamborg
**Roject VECTOR: Virtual Education Communities- Teaching Online With Inclusive Resources: Disrupting Inequities in STEM Classrooms by Co-Constructing a Model for Inclusive Digital Pedagogies**

*Amanda L. Mazin, PhD* Teachers College Columbia University

*Jessica F. Riccio, EdD* Teachers College Columbia University; *Kristen V. Larson, EdD* Teachers College Columbia University

3:00pm - 3:30pm in Cherry - Session **B**

**Abstract**

COVID-19 has infected our classrooms leaving them atypical learning spaces. We can transform these viruses into vectors to do good, to deliver essential “material” classrooms disrupted by the digital divide. In Project Vector, partnered with special education, we teach digital STEM methods for all and describe our early findings.

*Format: Individual Paper Presentation*  
*Presider: Leiflyn Gamborg*

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**Embracing STEM Culture: Characteristics of STEM Hub Sites**

*Katie Laux*, Hillsborough County Public Schools

3:00pm - 3:30pm in Cherry - Session **C**

**Abstract**

The purpose of this study was to explore teacher and administrator perspectives on STEM education to determine the extent to which they are demonstrating characteristics of STEM in their schools. Findings indicate that teachers and administrators have positive views towards STEM and that characteristics of STEM are represented in different ways.

*Format: Individual Paper Presentation*  
*Presider: Leiflyn Gamborg*
Thinking About Thinking: College Students’ Epistemological Beliefs About Sources of Knowledge

Kathryn Green, University of Georgia
Lisa Borgerding, Kent State University

3:00pm - 3:30pm in Fir - Session A

Abstract

This study explores the results of an activity which investigates how college students think about sources of knowledge. Biology students placed scientific and non-scientific questions in sources of knowledge they would look to for answers. Results showed students often think of sources of knowledge with little epistemological sophistication.

Format: Individual Paper Presentation  Presider: Matthew Perkins Coppola

Drawing a Science Teacher Test: What We Know and Do Not Know

Jon Pedersen, University of South Carolina
Nate Carnes, University of South Carolina; Kevin Finson, Bradley University; Julie Thomas, University of Nebraska-Lincoln

3:00pm - 3:30pm in Fir - Session B

Abstract

The purpose of this paper is to review studies that used the DASTT-C instrument, as well as its relationship to other affective or conceptual models. In addition, the authors provide a discussion relative to future DASTT-C studies to advance improvements in science teaching.

Format: Individual Paper Presentation  Presider: Matthew Perkins Coppola
Partnering With University Science Faculty to Bring a Picture of Authenticity Into the High School Classroom Through Video

Stephen R Burgin, University of Arkansas
M. Hassan Beyzavi, University of Arkansas

3:00pm - 3:30pm in Fir - Session C

Abstract
In this presentation, we report on the findings of using a video showcasing authentic chemistry research techniques to introduce high school chemistry students and their teacher to the work of a university chemistry professor. Through this work, we found that the viewing of the video when the research chemist was present had the greatest impact.

Format: Individual Paper Presentation  Presider: Matthew Perkins Coppola

Preservice Science Teacher Preparation

A Call for Culturally Relevant Teacher Preparation Through Urban Teacher Residencies Situated in Race-Visible Pedagogies: The Beginning Conversation

Anna Ghurbanyan, Columbia University
Jessica F Riccio, Teachers College, Columbia University

3:00pm - 3:30pm in Magnolia - Session A

Abstract
To reduce turnover and improve teacher retention, we propose a teacher residency model that allows novice candidates to have conversations about race and racism and implement race-based pedagogies in collaboration with university faculty who would contribute to the educational quality with an intentional focus to develop race-visible pedagogies.

Format: Small Group Roundtables  Presider: Andrea Burrows
Using Trade Books to Develop PST’s NOS Understanding: An On-Going Action Research Study

Helen Meyer, University of Cincinnati
Lillian Sims, University of Cincinnati; Randy Gibson, University of Cincinnati

3:00pm - 3:30pm in Magnolia - Session B

Abstract

Our presentation shares two completed cycles and preparations for a third action research cycle using The Immortal Life of Henriette Lacks in a methods class. We detail refinements in focus between the first to second cycle; student outcomes in the second cycle; and preparations to model planning a PBL unit in the third cycle.

Format: Small Group Roundtables  Presider: Andrea Burrows

Teaching and Learning Science in the Midst of a Global Pandemic: Lessons Learned From a Red-Headed Duck Named COVID

Andrea S Foster, Sam Houston State University

3:00pm - 3:30pm in Magnolia - Session C

Abstract

In March of 2020, educators all over the world found themselves grappling with ways to turn their classrooms into virtual environments because of COVID-19. This introspective, self study explores how a science teacher educator found inspiration from a red-headed duck and waddled her way through the muddied waters of remote science instruction.

Format: Small Group Roundtables  Presider: Andrea Burrows
**Break**

3:30pm - 3:45pm

_Format: General_

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**3-Minute Thesis Competition**

3:45pm - 4:15pm in Cherry

_Format: General_

---

**Early Career Faculty**

4:15pm - 5:00pm in Apple

_Format: General_

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**Work-Life Balance**

4:15pm - 5:00pm in Chestnut

_Format: General_

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**Practicum Experiences in a Pandemic**

4:15pm - 5:00pm in Dogwood

_Format: General_
Anti-Racist Science Education
4:15pm - 5:00pm in Elm

Format: General

When I'm Not Teaching Science Teachers...
4:15pm - 5:00pm in Magnolia

Format: General

Equity Committee Meeting
4:15pm - 5:00pm in Maple

Format: General

Oversight Committee Meeting
4:15pm - 5:00pm in Oak

Format: General

Using New Technologies in a Pandemic
4:15pm - 5:00pm in Palm

Format: General
Elementary Science Methods Online
4:15pm - 5:00pm in Pine

Format: General

Secondary Science Methods Online
4:15pm - 5:00pm in Spruce

Format: General
## Presiders

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Lori Andersen</td>
<td>Katie Green</td>
<td>James Nyachwaya</td>
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<td>Margaret Blanchard</td>
<td>Sharfun Islam Nancy</td>
<td>Jennifer Oramous</td>
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<td>Stephen Burgin</td>
<td>Karl Jung</td>
<td>Femi Otulaja</td>
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<td>Andrea Burrows</td>
<td>Dieuwertje Kast</td>
<td>Tamara Peffer</td>
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<td>Nate Carnes</td>
<td>Natalie King</td>
<td>Matthew Perkins Coppola</td>
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<td>Daniel Carpenter</td>
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<td>Gina Childers</td>
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<td>Rebekka Darner</td>
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<td>Joshua Ellis</td>
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<td>Leiflyn Gamborg</td>
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<td>Anna Ghurbanyan</td>
<td>Judith Morrison</td>
<td>Kate Walker</td>
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<tr>
<td>Brent Gilles</td>
<td>Noushin Nouri</td>
<td>Elana Worth</td>
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Past Presidents

Past ASTE Presidents

1932–34  S. Ralph Powers
1935–36  John C. Johnson
1936–38  W. L. Kikenberry
1938–40  E. Laurence Palmer
1940–41  Earl R. Glenn
1941–45  Anna M. Gemmill
1946–47  Victor L. Crowell
1947–48  Ellis Haworth
1948–49  H. Emmett Brown
1949–50  John Read
1950–51  George Haupt
1951–52  Robert Cooper
1952–53  Rose Lammel
1953–54  G. P. Cahoon
1954–55  Ned Bryan
1955–56  John Wells
1956–57  Robert Wickware
1957–58  June Lewis
1958–59  George Zimmer
1959–60  Harold Tannenbaum
1960–61  Herbert Schwartz
1961–62  Fletcher Watson
1962–63  Willard Jacobson
1963–64  R. Will Burnett
1964–65  Herbert Smith
1965–66  Ralph Lefler
1966–67  Edward Victor
1967-68  Sylvan Mickelson
1968-69  Stephen Winter
1969-70  Eugene Lee
1970-71  John Montean
1971-72  Paul Westmeyer
1972-73  Ronald D. Anderson
1973-74  Robert E. Yager
1974-75  David P. Butts
1975-76  Jacob Blankenship
1976-77  Patricia Blosser
1977-78  David H. Ost
1978-79  John Schaff
1979-80  Ertle Thompson
1980-81  Hans Anderson
1981-82  Jerry C. Horn
1982-83  James P. Barufaldi
1983-84  Ron W. Cleminson
1984-85  Thomas P. Evans
1985-86  Marvin Druger
1986-87  Robert K. James
1987-88  Joyce Swartney
1988-89  William C. Ritz
1989-90  Floyd Mattheis
1990-91  Gwendolyn Henderson
1991-92  Roger Olstad
1992-93  Catherine G. Yeotis
1993-94  Peter A. Rubba
1994-95  Norman Lederman
1995-96  Jim Ellis
1996-97  Paul Kuerbis
1997-98  Bill Baird
1998-99  Larry Flick
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<tr>
<th>Year</th>
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<tr>
<td>1999-2000</td>
<td>John Staver</td>
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<td>2000-01</td>
<td>Julie Gess-Newsome</td>
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<td>2001-02</td>
<td>Molly Weinburgh</td>
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<td>2002-03</td>
<td>John Penick</td>
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<td>2003-04</td>
<td>Herb Brunkhorst</td>
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<td>2004-05</td>
<td>Julie Luft</td>
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<td>2005-06</td>
<td>Patricia Simmons</td>
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<td>2006-07</td>
<td>Kathy Norman</td>
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<td>2007-08</td>
<td>Janice Koch</td>
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<td>Warren DiBiase</td>
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<td>Jon Pedersen</td>
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<td>2010-11</td>
<td>Meta Van Sickle</td>
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<td>2011-12</td>
<td>Randy Bell</td>
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<td>2012-13</td>
<td>John Tillotson</td>
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<td>2013-14</td>
<td>Kathy Cabe Trundle</td>
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<td>Joanne Olson</td>
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<td>Lisa Martin-Hansen</td>
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<td>2016-17</td>
<td>Malcolm Butler</td>
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<td>2017-18</td>
<td>Gillian Roehrig</td>
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<td>2018-19</td>
<td>Patricia Morrell</td>
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<td>2019-20</td>
<td>Valarie Akerson</td>
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<td>2020-21</td>
<td>Gilbert Naizer</td>
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Past Award Winners

Award I
Award II
Award III
Award IV
Award V
John C. Park NTLI Fellowship

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)
2019  Lisa Martin-Hansen, California State University, Long Beach (10+yrs); Jerrid Kruse, Drake University (<10yrs)
2020 Colby Tofel-Grehl, Utah State University (<10 yrs); Gillian Roehrig, University of Minnesota (>10yrs)

**Outstanding Mentor (Award II)**

1997  John Penick, University of Iowa
1998  Hans Anderson, Indiana University
1999  Norman Lederman, Oregon State University
2000  Robert K. James, Texas A & M University
2001  Robert E. Yager, University of Iowa
2002  Walter S. Smith, Ball State University
2003  Larry Enochs, Oregon State University
2004  Catherine Yeotis, Wichita State University
2005  Sandra Abell, University of Missouri–Columbia
2006  Tom Koballa, University of Georgia
2007  Kenneth Tobin, Graduate Center of the City University of New York
2008  Dana Zeidler, University of South Florida
2009  Lloyd Barrow, University of Missouri, Columbia
2010  Kathryn Scantlebury, University of Delaware
2011  Gerry Saunders, Unity College
2012  Alec Bodzin, Lehigh University
2013  Julie Luft, University of Georgia
2014  Gillian Roehrig, University of Minnesota
2015  Pat Obenauf, West Virginia University
2016  Randy Bell, Oregon State University
2017  Kent Crippen, University of Florida
2018  William McComas, University of Arkansas
2019  Deborah Hanuscin, Western Washington University
2020  Michael P. Clough, Texas A&M University

**Emeritus Awards/Outstanding Longtime Service to ASTE (Award III)**
N. Eldred Bingham, University of Florida
Milton O. Pella, University of Wisconsin
Pinchas Tamir, Hebrew University
Clarence Boeck, University of Minnesota
Fletcher Watson, Harvard University
Marvin Druger, Syracuse University
R. Will Burnett, University of Illinois
Fred Fox, Oregon State University
Nasrine Adibe, Dowling College
Gerald Craig, Teachers College Columbia University
Herbert Smith, Colorado State University
Roger Olstad, University of Washington
Alfred De Vito, Purdue University
Hans Anderson, Indiana University
Paul Dehart Hurd, Stanford University
Robert W. Howe, Ohio State University
Ronald K. Atwood, Univ. of Kentucky
Dorothy Gabel, Indiana University
Addison Lee, University of Texas
Willard Jacobson, Teachers College Columbia University
Donald W. McCurdy, University of Nebraska- Lincoln
Ralph Lefler, Purdue University
Harold Tannenbaum, Hunter College
Steven Winter, Tufts University
William C. Ritz, California State University, Long Beach
Edward Victor, Northwestern University
Stanley Helgeson, Ohio State University
Floyd E. Mattheis, East Carolina University
Kenneth J. Appleton, Central Queensland University
William E. Baird, Auburn University
Michael Cohen, Indiana University-Purdue University
Vincent Lunetta, Pennsylvania State University
Gerald Craig, Teachers College Columbia University
Herbert Smith, Colorado State University
Roger Olstad, University of Washington
Dana Zeidler, University of South Florida
Jon Pedersen, University of Nebraska–Lincoln
Kevin Finson, Bradley University
Molly Weinburgh, Texas Christian University
Malcolm Butler, University of Central Florida

Innovations in Teaching Science Teachers (Award IV)

1990  A Reflective Approach to Science Methods Courses for Preservice Elementary Teachers, Dorothy Rosenthal, California State University–Long Beach
1991  Enhancing Science and Mathematics Teaching, Kenneth Tobin, Nancy Davis, Kenneth Shaw, and Elizabeth Jakubowski, Florida State University
1992  The Learning Cycle as a Model for the Design of Science Teacher Preservice and Inservice Education, Peter Rubba, Pennsylvania State University
1993  Reconstructing Science Teacher Education Within Communities of Learners, Deborah Tippins, University of Georgia, Sharon Nichols, Florida State University, and Kenneth Tobin, Florida State University
1994  No Award Given
1995  Science for Early Adolescence Teachers (Science FEAT): A Program for Research and Learning, Samuel Spiegel, Angelo Collins, and Penny J. Gilmer, Florida State University
1997  Reconceptualizing the Elementary Science Methods Course Using Reflective Orientation, Sandra Abell and Lynn Bryan, Purdue University
1998  What Science Education Standards Say: Implications for Teacher Education, Penny Hammrich, Temple University
1999  No Award Given
2000 Professional Development Programs for Elementary Science Teachers: An Analysis of Teacher Self- Efficacy Beliefs and The Professional Development Model, Tracy J. Posnanski, University of Wisconsin- Milwaukee

2001 Empowering Teachers as Researchers and Inquirers, Anne M. (Amy) Cox-Petersen, California State University, Fullerton

2002 Being There and Not Being “There:” The Experience of Teaching an Elementary Science Education Course on the Internet, Janice Koch and Michael Barriere, Hofstra University

2003 Using a Card-sorting Task to Elicit and Clarify Science Teaching Orientations, Patricia Friedrichsen, University of Missouri-Columbia and Thomas Dana, Pennsylvania University

2004 An Inquiry-based Laboratory Lesson to Construct an Understanding of Earth’s Seasons, Paul Ashcraft, Clarion University and Susan Courson, Clarion University

2005 No Award given

2006 No Award given

2007 Using Historical Non-fiction and Literature Circles to Develop Elementary Teachers’ Nature of Science Understanding, Sharon E. Nichols, The University of Alabama & William Straits, California State University Long Beach

2008 A Case Study of Fifth Grade Teachers’ Changes in Methodology During a Two-Year Timeframe, Anita Martin and Brian Hand, University of Iowa

2009 Flexibly adaptive professional development in support of teaching science with geospatial technology, Nancy M. Trautmann, Cornell University & James G. MaKinster Hobart & William Smith Colleges

2010 Learning to Teach Science Through Collaboration: Coteaching and Cogenerative Dialogue in Elementary Science Methods Courses, Christina Siry, University of Luxembourg, Nicole Lowell, Elizabeth Zawatski, Manhattanville College

2011 Exploring Multiple Outcomes: Using Cogenerative Dialogues and Coteaching in a Middle School Science Classroom, Nicole K. Grimes, The Graduate Center, The City University of New York What about those left behind? A template for developing quality science lessons for English language learners, Susan Gomez-Zwief and William J. Straits, California State University, Long Beach
2012 Descriptive Inquiry in the Throes of Learning to Teach: Can Prospective Teachers Learn to Teach and Study their Teaching Closely? Michele Koomen and Jamie Mitchell, Gustavus Adolphus College,
2013 No Award Given
2014 Connecting to Our Community: Utilizing Photovoice as a Pedagogical Tool to Connect College Students to Science, Kristin Cook, Bellarmine University & Cassie Quigley, Clemson University
2015, If You Can’t Say Something Nice: A Design-Based Research Approach Investigating the Social Interactions of New Science and Math Teachers Using a Video Annotation Tool, Joshua Ellis, Tasneem Anwar, Justin McFadden, & Gillian Roehrig from the University of Minnesota STEM Education Center
2016, The Use of Journal Clubs in Science Teacher Education. Dr. Karen A. Tallman, Springfield College and Dr. Allan Feldman, University of South Florida
2017, Teachers’ classroom practices 2-5 years after having completed an intensive secondary science teacher education program. Michael Clough, Iowa State University; Joanne Olson, Iowa State University
2018, Collaborating to teach elementary science methods in the field with K-6 classroom teachers: Benefits for in-service and pre-service teachers. Matthew Vick, University of Wisconsin, Whitewater; Patricia Falk Mukwonago Area School District
2019, A Curriculum-linked Professional Development Approach to Support Teachers’ Adoption of Socio-Environmental Science Investigation Alec Bodzin, Lehigh University; Thomas Hammond, Lehigh University; Kate Popejoy, Popejoy STEM LLC; William Farina, Lehigh University, David Anastasia, Breena Holland, James Carrigan, Scott Rutzmoser, Dork Sahagian
2020, CyberSecurity and Technology: How do they Fit into a Science Classroom? Andrea C. Burrows and Mike Borowczak, University of Wyoming.

**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
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
2005  Culturalized Science Instruction: Exploring Its Influence upon Black and White Students’ Achievement, Eileen Parsons, North Carolina State University
2006  No Award given
2007  Narrative of Community: Visualizing Culturally Relevant Science Pedagogy Through the Identities of Black Middle School Teachers, M. Jenice Goldston and Sharon E. Nichols, The University of Alabama
Co-Winner: Paper 2 – Expanding the Ways in Which Urban Students Participate in Science Education: Rituals, Transactions, and Fundamental Interactions, Christopher Emdin, Teachers College, Columbia University
2009  Pathways to success in science: A phenomenological study examining the life experiences of African-American women in higher education, Claudette L. Giscombe
2010  Exploring Multiple Outcomes: Using Cogenerative Dialogues and Coteaching in a Middle School Science Classroom, Nicole K. Grimes, The Graduate Center, The City University of New York
2011 Synergistic Teaching of Science to English Language Learners: Comparative Analysis of the Strategies, Daniel J. Bergman, Wichita State University
2012 A Mixed Methods Study of Mid-Career Science Teachers: The Growth of Professional Empowerment, Amy Moreland and Mary Hobbs, both of University of Texas at Austin
2013 Teachers’ NOS Practices Two to Five Years after Having Completed an Intensive Science Education Program, Benjamin Herman, University of South Florida, Michael Clough, and Joanne Olson, both of Iowa State University
2014 Educational Turbulence: The Influence of Macro and Micro Policy on Science Education Reform, Carla Johnson, Purdue University
2015 Using our Heads and HARTSS (Humanities, ARTs, and Social Sciences): Developing Perspective-Taking Skills for Socioscientific Reasoning, Sami Kahn & Dana Zeidler, University of South Florida.
2016, No Award Given
2017, Prevalence and predictors of out-of-field in the first five years. Ryan Nixon, Brigham Young University; Richard J. Ross, University of Georgia; Julie A. Luft, University of Georgia
2018, No Award Given
2019, Supporting Elementary Teachers’ Enactment of Nature of Science Instruction: A Randomized Controlled Trial. Jennifer Maeng, University of Virginia; Randy Bell, Oregon State University; Tyler St. Clair, SUNY Potsdam; Amanda Gonczi, Michigan Technological University; Brooke Whitworth, University of Mississippi

Past winners of the John C. Park National Technology Leadership Initiative Fellowship

Park, J. C. (2003). Now that we have new technology tools, what is being built? Association for the Education of Teachers in Science (AETS), St. Louis MO. (North Carolina State University)
Irving, K. and Bell, R. (2004). *Educational technology use during secondary science student teaching: Three case studies.* Association for the Education of Teachers in Science (AETS), Nashville TN. (The Ohio State University, University of Virginia)

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)


CyberSecurity and Technology: How do they Fit into a Science Classroom? (2019). Andrea C. Burrows and Mike Borowczak, University of Wyoming.