Welcome to Gatlinburg, Tennessee for the
2016 Mid-Atlantic ASTE Conference
Region of The Association for Science Teacher Education

Thursday, September 22, 2016

4:00 – 7:00 PM Registration

7:00 – 8:00 PM Special Session with Scott Townsend & Jennifer Perkins, Eastern Kentucky University

Meeting Room: Daisy

Lessons Learned from Designing Online Courses in Science Education: Insights Shared from a Science Educator and Instructional Designer

Universities are continually promoting the design of courses that are hybrid or fully online. Also, more and more tenure-track job postings in science education call for the ability to teach in a virtual environment (hybrid and 100% online). In this session, a professor of science education and an instructional design partner share their experiences and lessons learned when designing three online courses in science education, one of which received both a Blackboard Catalyst Teaching Award and a Directors' Choice for Course of Distinction. They will also share the various types of technologies used when creating the courses such as journals, blogs, wikis, discussion boards, Scribd, ScreenCast-O-Matic, Google Docs, Screencr, user-created YouTube accounts, Snagit, and several more. Despite the 100% online requirement, they still found ways for student learning to be “hands-on, minds-on.” Course materials, along with temporary access to course sites, will be shared. Bring your laptop!
2016 MAASTE Conference Schedule Overview

Thursday, September 22, 2016:

4:00 - 7:00 PM Registration
7:00 - 8:00 PM Special Session: Lessons Learned from Designing Online Courses in Science Education: Insights Shared from a Science Educator and Instructional Designer

Schedules 1-9 will be in the Rose Room
(3 sessions per hour)

Friday, September 23, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:00 - 9:00 AM</td>
<td>Registration</td>
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<tr>
<td>7:00 - 9:00 AM</td>
<td>Breakfast (In Lobby)</td>
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<tr>
<td>9:00 - 10:00</td>
<td>Session 1</td>
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<tr>
<td>10:00 - 10:20</td>
<td>Mid-morning Break</td>
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<tr>
<td>10:20 - 11:20</td>
<td>Session 2</td>
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<tr>
<td>11:20 - 11:30</td>
<td>Session Break</td>
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<tr>
<td>11:30 - 12:30</td>
<td>Session 3</td>
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<tr>
<td>12:30 - 1:30</td>
<td>Lunch</td>
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<td>1:30 - 2:30</td>
<td>Session 4</td>
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<td>2:30 - 2:40</td>
<td>Session Break</td>
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<tr>
<td>2:40 - 3:40</td>
<td>Session 5</td>
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<td>3:40 - 4:00</td>
<td>Mid-afternoon Break/ Set up Posters</td>
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<tr>
<td>4:00 - 5:30</td>
<td>Session 6/ Posters</td>
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<td>6:00 - 8:00</td>
<td>Dinner</td>
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<td>8:00 - 10:00</td>
<td>MAASTE Annual Celebration</td>
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Saturday, September 24, 2016

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<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tr>
<td>6:00 - 9:00 AM</td>
<td>Registration</td>
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<tr>
<td>7:00 - 9:00 AM</td>
<td>Breakfast</td>
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<tr>
<td>9:00 - 10:00</td>
<td>Session 7</td>
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<tr>
<td>10:00 - 10:20</td>
<td>Mid-morning Break</td>
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<td>10:20 - 11:20</td>
<td>Session 8</td>
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<td>11:20 - 11:30</td>
<td>Session Break</td>
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<td>11:30 - 12:30</td>
<td>Session 9</td>
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<tr>
<td>12:30 - 1:30</td>
<td>Lunch</td>
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1:30 – 2:30 MAASTE Business meeting; Close of conference

Hiking and Recreation Time in the Smokies
### Session One

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tr>
<td>9:00 – 9:20</td>
<td><strong>iSTEM- Integrated STEM Instructional Leadership Program for Inservice Teachers Grades PreK-6</strong>&lt;br&gt;&lt;br&gt;<strong>Presenters:</strong> Sarah Haines; Pamela Lottero- Perdue; Robert Blake; Christine Roland; Virginia Anderson, Towson University</td>
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<td>Towson University has developed a new program for in-service teachers in grades Pre K-6 – what we refer to as the &quot;iSTEM Leadership Program&quot;. The first group of pilot teachers has just completed the sequence of courses. Program completers will develop an understanding of STEM subject content and practices, integrated STEM (iSTEM) instructional approaches, and skills and habits of mind essential to effective engagement in iSTEM. Further, they will be able to critically analyze and evaluate existing iSTEM curricula and design or redesign high quality iSTEM curricula; plan, teach, assess and reflect upon iSTEM lessons or units taught to students; and plan, deliver, assess and reflect upon iSTEM professional learning experiences for other teachers or administrators. The program engages its participants in instruction that supports state standards relevant to iSTEM and individual STEM subject areas; is inquiry-, problem-, and project-based; is highly collaborative and interactive; and is connected to the schools and districts in which the participants work.</td>
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<td>9:20 – 9:40</td>
<td><strong>Culturally- Responsive STEM Education: A Place for Art and Social Justice</strong>&lt;br&gt;&lt;br&gt;<strong>Presenter:</strong> Sheron Mark, University of Louisville</td>
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<td>It is an equity and national interest issue for all people to be STEM (science, technology, engineering, and mathematics) literate (President's Council of Advisors on Science and Technology, 2010); however, non-dominant youth, namely low-income, Black, Latino, and indigenous American youth, are underrepresented amongst high-performing STEM students (National Science Board, 2014). Furthermore, non-dominant youth marginalized in STEM are also often marginalized in the larger contexts of their schools and in society (Tate, 2001). To respond to these challenges, this research aimed to implement a culturally-responsive model of social justice–STEM education focused on art to grow non-dominant youth’s capabilities in the practice of STEM thinking and grow their sense of belonging in school by engaging them in sociocultural reflection and critique. The model has been implemented in one middle and one high school. This presentation focuses on lessons learned from implementation, initial impact, and implications for professional development and co-planning.</td>
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<td>9:40 – 10:00</td>
<td><strong>How Do Middle School Students Benefit from Attending STEM Career Clubs?</strong>&lt;br&gt;&lt;br&gt;<strong>Presenters:</strong> Margaret Blanchard; Kristie S. Gutierrez; Kylie S. Hoyle; Lauren Harper; Jason L. Painter; N. Scott Ragan, North Carolina State University</td>
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<td>This 18 month mixed methods study investigates the experiences of middle school students from four rural, high poverty middle schools participating in STEM Career Clubs (STEMCCs) as part of an ongoing NSF-funded project. Participants completed surveys about STEM interests/career intentions and STEM club perceptions (n=172), and content questions after each club meeting. A subset of students (n=112) were interviewed with questions and analyses guided by the Expectancy-Value Theory of Achievement Motivation. Analyses of the STEMCC Survey indicate that students had positive experiences associated with STEMCC, believe it is important, and perceive the STEMCC staff is caring. Students who attended club meetings regularly demonstrated higher performance on content questions than students who attended sporadically. In interviews, students described an interactive learning environment where they felt included, and which they felt allowed them to learn STEM content and obtain skills that they are not generally exposed to in the regular school day.</td>
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### Session Two

#### 10:20 – 10:40

**Preparing College/Career Readiness through Integrating Science Learning with Literacy in Grades 6-12**  
*Presenters: Chih-Che Tai; Karin Keith; Laura Robertson, East Tennessee State University*

With the increasing globalization, and the increasing need for a scientifically literate population, it is essential that secondary school (Grades 6-12) students not only receive meaningful science and literacy instruction, but also see the seamless nature of how each informs the other. A LEA-IHE-Business partnership initiative was interested in two research perspectives: How does cross-discipline instruction benefit and enrich each subject discipline? How does integration of science learning with literacy in G6-12 impact college/career readiness?  
This opportunity provides a chance for 120 Grade 6-12 Science and ELA teachers from ten school districts to join with ELA and Science faculty and STEM professionals to form a strong professional learning community focused on the integration of Science-ELA. The purposes of this presentation are: 1.) to describe the project that paired secondary school science and ELA teachers for the purposes of developing integrated lessons; and 2.) to report preliminary findings about this project.

#### 10:40 – 11:00

**Longitudinal Weather and Climate Change Conceptions of Middle and High-School Students**  
*Presenters: Tina Cartwright, Marshall University; Deb Hemler, Fairmont State University; Paula Magee, Indiana University-Purdue University Indianapolis*

Climate change is a pervasive global topic but how much of this discussion has accurately translated into students’ conceptions? And how do their conceptions change over time between middle-school and high-school? A comparison was made between the same middle and high school students in central Appalachian United States from 2011 to 2015. Students completed an on-line questionnaire with questions about weather, climate and climate change when they were in 7th/8th grade in 2011 and again when they were in 11th/12th grades in 2015. Additionally, a portion of the students participated in an interview to further uncover their thinking about weather, climate and climate change.  
This presentation will focus on the interview data and the student responses to the open-ended questions regarding the greenhouse effect and climate change.

#### 11:00 – 11:20

**Experiential Education in Undergraduate Biology Non-Majors Lab**  
*Presenters: Melissa Michael; Linda Fuselier, University of Louisville*

In order to keep up with the global market, more Americans need to be trained in STEM fields. Additionally, several people groups within America are vastly unrepresented within the sciences. This research study stems from my own experiences as a female in science education, namely that it wasn’t until my Master’s degree that I realized that my encounters with nature was me doing science and being a scientist. So through a special section of BIOL 104, I was able to develop experiential education curriculum and lab experiments through a semester long science project on Maple tree tapping with undergraduate non-biology majors (n = 28). Through science notebooks and art (student work samples), interviews, my own teaching journal and lesson plans, this research study shows the progression of my students including women and minorities in their understanding of science through the natural world around them.
This study aims to investigate the views held by elementary students about engineering and technology. Students from three elementary schools in the Midwest (N=257, grade PK - 5) completed two pre-/post-test assessments targeting their understanding of engineering and technology. The treatment process included at least one unit of Engineering is Elementary (EiE) developed by the Museum of Science in Boston, MA. Using Related-Samples Wilcoxon Signed Rank Test, the analysis of the test indicates that there is significant difference at the 0.05 confidence interval between the pre-test and post-test scores. The implementation of the EiE units in elementary classrooms has changed the students’ views of engineering and technology. It was also found that in terms of engineering, the students’ view shifted from a person who fixes things to a person who creates things, while in terms of technology, it shifted from electronic things to something that helps people.

Findings will be presented from a self-study of the instruction in an elementary science methods class during the spring 2016 semester. The study investigated the match between my beliefs and practices in my teaching context. Working with a critical friend, I used reflective notes, student work samples, and transcripts of conversations with a colleague to critically reflect on my teaching. Themes emerging from the study include the tension/balance I experienced between the time available and my need to include both science content and key pedagogical ideas in the course. Additional themes include the importance of story-telling and community-building in the class. In addition to the findings, I will include a description of the process that I used during and after the semester. I feel that my experiences can provide one approach that could be used by others interested in examining their teaching in a detailed manner.

This study was designed to understand 125 Science Olympiad (SO) coaches' volunteer motivation. This study investigated coaches’ perceptions of their school’s involvement with SO and influence on the schools’ students and culture. This study also asks SO elementary teacher-coaches to determine if involvement had any impact on their teaching practices, confidence in teaching science, or science content knowledge. Participants completed the Coach Motivation Questionnaire [CMQ]; (McLean, Mallett, & Newcombe, 2012) and two open-ended sections. The CMQ showed coaches are motivated strongly by intrinsic motivators. Coaches reported; support from other teachers and administration, belief that SO leads to other success, more STEM integration at their school since starting the SO team and that students are extremely excited about participation in SO. Coaches also reported feelings of inspiration and increased confidence in STEM content that they believe transferred into their own teaching practices and including more SO related activities in their lessons.
### Session Four

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<th>Time</th>
<th>Presentation</th>
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<tr>
<td>1:30 − 1:50</td>
<td><strong>The EiE-Ohio Project: Building 21st Century Learners in High Needs Elementary School</strong>&lt;br&gt;Presenters: Karen E. Irving; Kathy Malone; Vinta A. Tiarani; Trudy Giasi; Rachel Kajfez, The Ohio State University</td>
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<td>The EiE-Ohio: Building 21st Century Learners project is a collaboration between the Columbus City Schools and the Colleges of Education, Arts &amp; Sciences and Engineering at Ohio State University to introduce STEM integrated engineering units to high need elementary schools. The project includes training for three elementary teachers and one graduate student to implement the Engineering is Elementary (EiE) units designed with support from the National Science Foundation and the Science Museum of Boston. The second element of the project includes Summer Institutes I and II during which the teacher leaders, project leaders, and graduate students introduce the curriculum to elementary teachers at the participating schools. The third element of the project includes after-school and follow-up sessions to continue the professional learning community and to provide opportunities to share and critique video of classroom implementation. Findings from the first year implementation at three schools (STEM, STEAM, and ARTS) are presented.</td>
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<td>1:50 − 2:10</td>
<td><strong>Science Teaching Orientations: How Do Pre-Service Elementary Teachers’ Orientations Change Over the Course of a Semester-Long Science Methods Class?</strong>&lt;br&gt;Presenters: William Thornburgh; Sherri Brown, University of Louisville</td>
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<td>Pre-service elementary teachers enrolled in a one-semester science methods class (n = 131) were given a 10 question pre-test at the beginning of the semester to evaluate their pedagogical preferences toward various real-world teaching situations. These teaching vignettes act to classify pre-service teachers into one of four pedagogical approaches to teaching science: open inquiry, guided inquiry, active direct, or didactic direct instruction. The questions were selected out of a pool of vignettes and were intentionally chosen because they paralleled topics covered during the methods course. At the conclusion of the semester, students were given a 10 question post-test composed of the same ten questions in randomized order. The results indicated that students’ attitudes gravitated away from direct instruction and toward an inquiry approach to teaching science.</td>
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<td>2:10 − 2:30</td>
<td><strong>Engineering Multi-Units for Preservice Elementary Teachers</strong>&lt;br&gt;Presenter: Matthew Perkins Coppola, Indiana University-Purdue University Fort Wayne</td>
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<td>Elementary education majors enrolled in science methods were introduced to the engineering design process (EDP) through engineering mini-units. Preservice teachers first participated in an EDP challenge involving the construction of life vests for dolls, then designed and taught a two-day engineering design lesson in their field placements. Surveys of teachers at the end of the semester indicated that preservice teachers increased their confidence in teaching EDP and possibly impacted their mentor teachers’ opinions and understanding of EDP. This presentation focuses on the experience of the preservice teachers during the life vest challenge and the joys and concerns of teaching the lesson during field placements.</td>
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### Session Five

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<th>Time</th>
<th>Session Title</th>
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<td>2:40 – 3:00</td>
<td><strong>Place-based STEM Education Workshop in Malawi</strong>&lt;br&gt;&lt;br&gt;Presenter: George Glasson, Virginia Tech</td>
<td>A workshop in Malawi was conducted in 2015 with science educators and policy makers to develop a Post-graduate Certificate Program for science and agricultural teachers in STEM education. The workshop, funded by the U.S Agency for International Development, was planned in partnership with Lilongwe University of Agriculture and Natural Resources in Malawi to introduce place-based STEM pedagogies and plan a certificate program for secondary school science and agriculture teachers. Participants were introduced the U.S. Next Generation Science Standards (2013) and strategies for teachers to implement problem-solving and inquiry pedagogies in their classrooms. The importance of connecting STEM education to local community resources and fostering engagement opportunities for entrepreneurial and workforce ready skills was also explored. Using place-based STEM pedagogies, the workshop participants developed lesson plans on soil erosion, waste disposal, and irrigation. All the lessons connected to local environmental issues and engaged students in design activities to solve problems.</td>
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<td>3:00 – 3:20</td>
<td><strong>Elementary School Teachers Development of Technology Fluency through Engineering Applications</strong>&lt;br&gt;&lt;br&gt;Presenter: Jeffrey Carver, West Virginia University</td>
<td>Teachers in three elementary schools in one school district in a Mid-Atlantic State were provided professional development in the utilization of Engineering Design through Robotics to meet standards related to Scientific and Engineering Practices as outlined in the Next Generation Science Standards. Initially teachers showed extreme lack of confidence related specifically to computer coding. With hands-on experience in both engineering design of a structure as well as coding of robotic components to animate their structure, teachers gained confidence in their coding skills though their confidence levels to implement it with their students remained low. However, with assisted implementation in their classroom, the teachers all gained interest and confidence in further implementation in the future. This presentation will provide a description of the technology as well as present results of the surveys and interviews conducted.</td>
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<td>3:20 – 3:40</td>
<td><strong>Actualizing STEM Potential in the Mississippi Delta</strong>&lt;br&gt;&lt;br&gt;Presenters: Brenda Brand; Takumi Sato; Whitney Wright; Anza Mitchell, Virginia Tech</td>
<td>This NSF project is designed to better understand factors influencing the achievement of African American students in STEM disciplines and orientation to STEM majors. This four year longitudinal mixed methods research study involves African American high school students participating in a collaborative robotics/pre-engineering program. The design allows researchers to follow a group of students from freshman to their senior year, so that key factors influencing the students’ learning and achievement can be observed and documented during the peak years of decision making for college majors and careers. Quantitatively, this research employs pre and post measures to determine changes in students engineering self-efficacy and scientific identities. Qualitatively, field notes from observations and interviews with provide data on program elements determined effective in positively influencing the African American students' achievement of program objectives and decisions to pursue STEM careers. Students’ responses indicate favorable views toward specific elements of the robotics program.</td>
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Session Six: Posters – The Daisy Room

4:00 – 5:30

- **Incorporating Informal Science Education to Determine Students’ Perception of the Marine Environment**  
  *Presenter: Stanton G. Belford, Martin Methodist College*

  Students attending a rural college in southern United States were participants in two field trips relating to (1) a non-related course and (2) a marine biology course. Students from the first group (N=8) were introduced to marine environment, but they did not visit coral reefs, compared to the marine biology students (N=8) that visited reefs at Key Largo, Florida. Students recorded their experiences in a journal throughout the 6 day trip. Informal group interviews were used to determine what students wanted to achieve from the trip. Student perception was classified according to positive or negative experiences, misconceptions, and awareness of environmental issues, with a specific view on stewardship. The results highlight a positive change in perception of marine environments, with increased awareness of stewardship for coral reefs. In general, students in both groups highlighted a positive attitude in learning through their experience together with faculty in an informal setting.

- **Solenoids as an Instructional Tool for Integrated STEM Education Through the Derivation of Ampere’s Law**  
  *Presenters: Kimberly Corum; Joe Garofalo, Curry School of Education, University of Virginia*

  I will demonstrate the procedures for the “Deriving Ampere’s Law” task. Ampere’s Law relates the strength of the magnetic field produced by a solenoid to electrical current, coils of wire, and solenoid length. Ampere’s Law can be derived experimentally by systematically varying the different parameters of a solenoid. Solenoids can be found in a number of everyday technologies, such as telephones, speakers, motors, and guitar pickups. A total of nine rising-eighth-grade students successfully completed this task during an engineering academy in the summer of 2016. I will also share samples of these students’ work and their responses during debriefing interviews. This task addresses several learning objectives across the STEM disciplines, including electromagnetism, direct and inverse variation, and problem solving. This presentation will hopefully provide other science teacher educators with the necessary information to design and implement similar tasks in their own classrooms.

- **Meeting Middle School Science Standards: Resources for Teaching Evolution and Natural Selection for Middle School Teachers**  
  *Presenter: Daniel Farcas, West Virginia University*

  A middle school science teacher will typically cover many areas of science within his/her annual curriculum, including earth science, physical science, and life science. It is virtually impossible to become an expert in all of these areas, at least not initially. The purpose of TIES is to inform interested middle school science teachers about the most up-to-date concepts of natural selection, common ancestry, and diversity in order for them to confidently cover the topics in their classrooms and fulfill their curriculum requirements.
### Session Six: Posters (Continued) – The Daisy Room
**4:00 – 5:30**

- **Bringing Science of Mind to [Science] Educators: Mindfulness in the Science Classroom**  
  *Presenters: Aimee Govett; Alison Barton, East Tennessee State University*
  
  Based on 30-plus years of research in brain-based learning, Social and Emotional Learning (SEL), prosocial competencies, 21st Century Skills, and mindfulness practices in psychiatry and psychology, we explore the application of mindfulness practices in secondary science methods classrooms. Mindfulness emphasizes inquiry, which is reflective of the nature of science, lending itself well to this educational setting. We will review the science behind the process and outcomes of mindfulness practices. Brain processes underlying mindfulness practices may resonate with biology, chemistry, physics and engineering majors, as they study neurotransmitters and the regions of the brain where stress, problem solving, and decision-making occur. We examine the effects of stress on learning and how to counteract those effects through regulating emotions and responses to stress and impulses. Our teacher candidates learn to implement and master these practices first so that they can create a safe, harmonious, classroom community for their students.

- **Science Teacher Perceptions of WV Geology Prior to ESS State Certification**  
  *Presenters: Deb Hemler; Sean W. Harwell, Fairmont State University*
  
  With the recent adoption of the Next Generation of Science Standards (NGSS), West Virginia reorganized its high school curriculum to include required Earth and space science in the ninth grade. Given the lack of Earth and space science certified teachers, a Math Science Partnership grant was submitted to assist general science certified teachers with enhancing their background knowledge of astronomy, meteorology, and geology concept. A pre-post concept test and concept mapping exercise were used to assess changes in understanding for each of these three areas of Earth science. This study looks at the geology preconceptions of middle and high school general science certified teachers prior to an intense two week residential professional development workshop focused on teaching NGSS and earth science and the modifications to their naïve conceptions about WV geology.

- **Improving Science Instruction through Nonfiction Texts in Inquiry Science**  
  *Presenters: Deborah Lan; Terry Shiverecker, The Ohio State University*
  
  The purpose of this Ohio State University study is to explore the effectiveness of the Nonfiction Texts in Inquiry-based Science (NFTI Science) professional development program. The NFTI Science professional development program prepares grades 3 – 5 teachers to use and develop inquiry-based and standards-aligned units that include carefully selected and strategically integrated children's science-themed nonfiction literature. We are investigating the effect of the program on participating teachers' science content knowledge, self-efficacy for teaching science, and instructional practices. The impact on participating teachers' students' content knowledge and motivations and attitudes towards science are also being investigated. This quasi-experimental study is using a pre/posttest design with a control group. This Mathematics and Science Partnership program is funded through the Ohio Department of Education. Preliminary results will be shared.

- **What's in a Gene? Undergraduates Ideas and Misconceptions about Gene Function.**  
  *Presenters: Justin LeVaughn; Rebecca Krall, University of Kentucky*
  
  The purpose of this study was to field-test a survey instrument measuring undergraduate biology majors’ understanding and reasoning of key genetics concepts and systems thinking in biology. Ninety-seven college freshmen at a large southeastern university were sampled in an introductory biology laboratory course required for all biology majors. The instrument was created based on tasks and concepts identified in the research literature. The instrument included 11 two-tiered tasks across four topic domains: Nature of genes, gene expression, molecular systems, and genetics behaviors. This study presents quantitative and quality data collected from 97 surveys, and 15 semi-structured interviews across all four domains. The findings suggest that biology freshmen possess a range of ideas and misconceptions regarding fundamental concepts in genetics. Overall, students’ answers indicated superficial understanding and reasoning of key gene concepts. Recommendations for assessing undergraduate genetics learning, as well as issues related to the instrument are also discussed.
Session Six: Posters (Continued) – The Daisy Room
4:00 – 5:30

- **Infusing and Sustaining Critical Thinking Pedagogy in Introductory Biology Courses**  
  *Presenters: Justin McFadden; Linda Fuselier; Melissa L. Michael, University of Louisville*
  
  Biology GTAs teach over 1700 undergraduates each academic year and GTAs often have no or little teaching experience and no courses of pedagogy. Additionally, GTAs are often required to teach critical thinking and inquiry in the biology courses. Therefore, we saw the need for graduate level seminars where biology GTAs where introduced to Paul & Elder critical thinking framework (i2a) and participated in metacognitive reflection on applying i2a into the biology classrooms. Furthermore, the seminars also needed to include an increase in GTAs Pedagogical Content Knowledge (PCK) and Action Research (AR) in the classroom. The results of the first seminar were astounding. The GTAs (n = 11) left with an increase awareness of their own critical thinking ability, an increase in PCK, and were able to try out AR in their own biology classrooms. While this work is mostly qualitative in nature, the study is supported by some quantitative data.

- **Motivational Factors and Challenges that Affect the Recruitment and Retention of Undergraduate Geoscience and Preservice Secondary Geoscience Education Majors**  
  *Presenters: Rommel J. Miranda; Joel Moore; Ronald S. Hermann; Kyle P. Hurley; Kevin Wiechelt, Towson University*
  
  Funded by the National Science Foundation, this quantitative study investigates the motivational factors that influence entering undergraduate students to pursue geoscience as a major or preservice secondary geoscience teaching certification. This study also explores the hurdles and challenges continuing undergraduate geoscience majors and preservice secondary geoscience education majors face to make progress toward degree completion, and their interactions with the broader geoscience community. Twenty-seven undergraduate geoscience majors and preservice secondary geoscience education majors from a large mid-Atlantic university participated in the study. The findings suggest that greater collaboration is needed between high schools that teach geoscience courses, community colleges and 4-year universities. The findings further help to modify, create, or establish transfer pathways into geoscience majors, to publicize career opportunities in the geosciences and geoscience education, to increase the retention and recruitment of students into geoscience majors, and to inform geoscience and education departments in other institutions across the nation.

- **Supporting Scientific Literacy in Pre-service Teachers Through Interactive Science Note-booking**  
  *Presenters: Velta Napoleon-Fanis; Cindi Smith-Walters, Middle Tennessee State University*
  
  Because promoting scientific literacy has been a major goal of science education, improving the level of scientific literacy of pre-service teachers is of great importance. Realizing this significance, a science content course for pre-service teachers has incorporated interactive science notebooks. Interactive science note-booking was used to actively and critically engage pre-service teachers in meaningful interpretation of science text. As a result, this strategy was found to support pre-service teachers’ development, recognition, understanding, and correct usage of science concepts and theories. Responses from pre-service teachers about the interactive notebooks indicated appreciation for its service as an organized tool that stored the facts and information they needed to know, and also identified satisfaction with the notebook’s contribution to their genuine understanding of scientific concepts.

- **Deciding to Become a Secondary Science Teacher: A Teaching Exploration Course for Both Students and Faculty**  
  *Presenter: Stephanie B. Philipp, University of Louisville*
  
  In a pre-candidate course designed for middle and secondary prospective teachers, science education students explored the teaching profession through readings, discussions, activities, and fieldwork in public schools over a 15 week semester. This study will describe how the students’ perceptions of teaching science changed over the semester and will investigate the students’ process of deciding to become a science teacher. Description of the course design, data collection strategies, and plan for case study analysis will be presented. Implications for science teacher preparation will be discussed.
Session Six: Posters (Continued) – The Daisy Room
4:00 – 5:30

- Evaluating Preservice Science Teachers' Communication Skills through Informal Science Teaching Experiences
  Presenters: Wahyu Setioko; Karen E. Irving, The Ohio State University
  As learning to teach occurs across context, research suggests the potential of incorporating science teaching experience that goes beyond classroom settings into science teacher education programs. Informal science education settings provide a rich context and an authentic and powerful science teaching and learning experience for preservice teachers. This study investigates how preservice science teachers teach and communicate science concepts to visitors during the summer field placement at the Center for Science & Industry (COSI) as part of their M.Ed. Science Education program at The Ohio State University. Video recordings, field observations, individual interviews, and focus group discussion are conducted to examine the growth of preservice science teachers’ communication skills in science teaching throughout the experience as well as aspects that contribute to their improvements. The findings may have implications for the development of both the teacher’s ability in science teaching and the science teacher education program at OSU.

- Impact of a Biology Modeling Workshop on the Scientific Reasoning: An Analysis of In-Service Teachers’ Pre Test and Post Test Performance
  Presenters: Andria Stammen; Trudy Giasi; Courtney Irwin; Kristin Henkaline; Peter Lund; Karen Irving; Zakee Sabree; Kathy Malone, The Ohio State University
  The Modeling Biology Instruction: Leaders in Science and Engineering (MoBILiSE) Project is collaboration between the 17 LEAs, and the Colleges of Education, Evolution, Ecology and Organismal Biology, and Engineering Education departments. The project aims to train secondary level (6-12) life science teachers in the use of models and modeling instruction pedagogy as well as incorporating the use of bio-engineering projects. This modeling instruction pedagogy and the workshop activities are designed to increase not only biological content and pedagogical content knowledge but also scientific reasoning skills. The project also includes academic year follow-ups. Our presentation will describe the project and the specifics of the summer workshop experience. The research findings concentrate on the analysis of the pre and post test administered to measure the teachers’ scientific reasoning abilities.

- Applying Relational-Cultural Theory to Understand Science Teacher Induction: A Case Study of Relationships and Resilience
  Presenter: Angela Webb, Louisiana State University
  The benefits of induction for science teachers are well noted in the research literature, and comprehensive induction can be a key component in teacher retention. However, the association between induction support and teacher retention may not be one-dimensional. That is, participation in a formal and comprehensive induction program does not necessarily guarantee teacher retention. Rather, teachers' relationships during their induction into the teaching profession—with induction conceptualized as a process of socialization into the profession—may mediate their experiences, including resilience and commitment to teaching. This presentation explores the induction experiences of an alternatively licensed novice science teacher through the lens of Relational-Cultural Theory (RCT), which frames growth and development in and through relationships within sociocultural contexts. Specifically, I discuss the novice teacher’s resilience in her job and the ways in which such resilience is advanced through various relationships. Implications of RCT for science teacher induction will be discussed.
### Session Seven

#### 9:00 – 9:20
**Implementing a Curriculum Development Project for Secondary Preservice Teachers: Overview and Lessons Learned**  
*Presenter: Ronald Hermann, Towson University*

In the past individual students in my secondary science methods class developed 3-5 lesson unit plans. One major recurring deficiency with the unit plans was the lack of integration as each lesson is viewed as a standalone rather than one that is conceptually linked to the other lessons. In the Spring of 2016 I added a Curriculum Development Project in place of the unit plan. I selected one NGSS standard on climate change and all of the students in the class worked together to write one complete curriculum to address the standard over the course of the semester. The final product included: an overview of the unit, science content background for the lessons, daily lesson plans, worksheets/laboratory handouts for students, teacher pages with information for the teacher including correct answers, and pre- and post-assessments. I’ll share an overview of the assignment, grading rubrics, student artifacts and lessons learned.

#### 9:20 – 9:40
**Building Secondary Science Teacher Identity Early with a Community-Based Freshmen Outreach Course**  
*Presenters: Kerry Cresaun, James Madison University; Beth Day-Miller, Bridge Water Education Consulting*

While enrollment of science majors at JMU has increased over the past 5 years by 28%, enrollment of science majors pursuing secondary education (SEED) has decreased by 45%. Attrition is also a significant problem; in 2015, only 7 of the 55 students that declared SEED completed the program. A critical factor in attrition is the lack of teacher identity, as these students do not have education courses until junior year and science education courses until senior year. As part of a Noyce Capacity Building grant, we proposed a new science outreach course open to all first SEED students as a way to build teacher identity early. Over 15 weeks, the SEED students mentored high school students and worked with Spanish translators to collaboratively design and host a bi-lingual community science night. Description of the course and event, qualitative analysis of pre-post course interviews and future directions will be presented.

#### 9:40 – 10:00
**Science Inquiry and Academic English Language Development**  
*Presenters: Lisa Gross; Shanan Fitts, Appalachian State University*

This presentation focuses on our Science Inquiry and Academic English Language Development Project. University faculty and a group of elementary practitioners working with impoverished and culturally diverse populations have jointly addressed the challenges related to science teaching and learning at the intermediate grade levels. The goals of this program are to: 1) develop teachers’ confidence and comfort with science; 2) construct inquiry-based lessons that integrate research-verified literacy strategies for improved academic science language and knowledge; 3) support elementary classroom teachers and the ESL teacher in assessing diverse learners’ academic language across content areas and: 4) improve ELLs science engagement and academic science language. These goals are grounded in current research on science teaching, inquiry, and academic language development. Teachers’ instructional episodes provide the context for recording and analyzing ELL students’ engagement, questioning and communication of science. Data sources include teacher observation, student work samples, and science writing samples from journals.
Session Eight

10:20-10:40  Can Climate Change Knowledge and Beliefs Be Impacted Through a Short-Term After-School Intervention  
_Presenters: Kristie S. Gutierrez; Margaret R. Blanchard, North Carolina State University_

This study examines the climate change beliefs, content knowledge, and cultural worldviews of rural middle school students (n = 96) in the Southeastern US following participation in researcher-designed STEM Club activities. Pre- and post-intervention surveys were analyzed to assess the impact of the intervention and relationships between student beliefs, content knowledge, and worldviews. Initially, 70% percent of students believed that global warming is occurring. Students learned significantly more total climate change knowledge post-intervention, although their climate change beliefs did not change. Males’ scores improved significantly more on the content knowledge test as compared to females. Student worldviews were correlated to responses on the affective items of the survey but they did not predict students’ climate change content knowledge. This study indicates that significant gains in climate change content knowledge can be attained through short-term out-of-school interventions. However, in order to change beliefs, perhaps longer and more sustained interventions are needed.

10:40 – 11:00  Integrating the Arts into Science Teaching and Learning: A Review of Literature  
_Presenters: Katie Green; Kathy Trundle, North Carolina State University; Maria Shaheen, Primrose Schools_

One way to enhance young learners’ natural propensity for wonder and interest in science is to integrate arts into science learning. Combining arts with science builds on children’s interests in nature while allowing them the joy and pleasure of artistic expression. Although educators often discuss integrating the arts into science learning, empirical support is relatively recent. This literature review synthesizes previous empirical studies and theoretical literature published on arts integration, examines how the arts are integrated into science teaching, and explores the efficacy of arts integration for science learning.

11:00 - 11:20  Schools Out for Summer: The Benefits and Drawbacks of University Campus- Based Experiences for Learning to Teach  
_Presenters: Helen Meyer; Scott Gibbons, University of Cincinnati_

In this presentation we will share the results of interviews with pre-service science teachers and IT co-op interns who worked with a three week summer program for high school 9th through 11th graders. Program content for the pre-service teachers and high schools students was Information Technology. The IT interns served as small group instructors in the mornings, while the pre-service teachers served as leaders for small project groups in the afternoons. During the interviews we sought to understand what the pre-service teacher learned when working closely with students in a non-instructional role, and what IT interns learned about the process of teaching their content. We suggest, for both groups of college students, working in a less formal instructional setting enhanced their understanding of the learning process in ways that being in a formal classroom does not.
Saturday, September 24, 2016

11:20 – 11:30 AM 
Session Break

Session Nine

11:30 - 11:50
So Experience Changed Them: Or Did It?

*Presenters: Alicia Boards; Helen Meyer, University of Cincinnati*

We frequently hear, “experience is the best teacher” and in teacher education it is often stated that “teachers teach as they were taught.” Further, most research suggests their student teaching is the most influential portion of their pre-service program. In this study we sought to understand which aspects of pre-service math and science teachers’ identities changed and which stayed the same. To do this, we followed two cohorts of pre-service teachers from the start of the licensing program through their first two years (cohort 1) or first year (cohort 2) of full time teaching in a high needs school. Our analysis focused on a cluster of themes focused on identity development including: social context and environment; classroom environment; content knowledge; understanding teaching and learning; and high needs teaching. We then compared the individuals’ backgrounds to see how their teaching experiences impacted their views of teaching in high needs environments.

11:50 – 12:10
Making Sustainability Relevant to Today’s College Students

*Presenter: Darla French, University of Pikeville*

Sustainability literacy is a topic of increasing interest among a growing number of higher education institutions. Formal education programs and courses that address sustainability are becoming increasingly common, and the University of Pikeville, located in the coalfields of eastern Kentucky, is currently considering how best to implement curriculum related to this important topic. I am experimenting with integrating experiential learning into a course for non-science major undergraduate students that focuses on health and nutrition in the context of the food and agriculture industries. During our presentation, I will share with you some of the preliminary results of this endeavor, as well as the current structure of and future plans for our sustainability courses.

12:10- 12:30
Using Discourse in Science Classrooms: Gifted Education Case

*Presenter: Bugra B. Ulger, The Ohio State University*

Scientific discourse focuses on how to present scientific ideas and thoughts in a range of different audiences. It is used for explaining phenomena, observes, theories, analysis, hypothesis, generalizations with your own viewpoint (Gee, 2004; Lenke, 1998). Debating and communicating about the scientific knowledge is the essential point of scientific discourse. Using scientific discourse in a science classroom and engage students, develops students’ understandings and ways of knowing about scientific world (Roth, 2005; Scott, 1998, NRC, 2007). Also scientific discourse is a part of science and practices in the Next Generation Science Standards (NRC, 2013). In this document analysis, it is aimed to conclude using scientific discourse in classroom makes difference becoming scientific literate individuals and enhance scientific knowledge and curiosity of scientifically gifted students. Teacher has a critical role using scientific discourse keeping students focused on. Participating productively in scientific discourse is considered one way to achieve in science (NRC, 2007).
Saturday, September 24, 2016

12:30 – 1:30 PM  Lunch
Close of Conference
1:30 – 2:30 PM  MAASTE Business Meeting

Business Meeting Agenda:
- Overview of 2016 Conference
  - Aimee Govett (Co-Chair)
  - Paula Magee (Co-Chair)
  - Kerry Cresawn (Co-Chair)
  - Matthew Perkins (Co-Chair)
- Hosting and Plans for 2017 Mid-Atlantic Conference
- 2016 Mid-Atlantic ASTE Graduate Student Research Presentation Award
- Other Business

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