Southwest Association for Science Teacher Education 2018 Conference

Jeannine Rainbolt College of Education
The University of Oklahoma
Norman, Oklahoma
October 12-13, 2018

Greetings and Welcome to the SW-ASTE 2018 Conference!

On behalf of the Southwest Association for Science Teacher Education (SW-ASTE) Board of Directors, I am pleased to welcome you to the SW-ASTE 2018 Conference.

The ASTE is a non-profit professional organization composed of over 800 members from countries around the globe whose mission is to promote excellence in science teacher education worldwide through scholarship and innovation. The SW-ASTE is one of eight ASTE regions that include the following states: Arkansas, Colorado, Kansas, New Mexico, Oklahoma, Texas, and Utah.

The ASTE community is welcoming and inclusive of anyone interested in the preparation of science teachers at all levels including: professors of science and/or education; professional developers and coordinators of science in K12 and informal settings; policy, curriculum, or teacher preparation program leaders; and graduate students in science education[1].

The ASTE strives to be the leading voice in the areas of research and policy development related to the enhancement of science teaching. At a time when there is much attention focused on teacher accountability and improving teacher quality, ASTE is poised to respond to these challenges through the innovative and cutting-edge efforts of our internationally renowned membership.[1]

This year's event brings over 50 in-service teachers, graduate students, and higher education staff and faculty together to discuss, learn, and network. With a diverse selection of 30 sessions, attendees will have the opportunity to learn new ways to advance science teacher education and subsequent teacher and student learning across all levels.

As program co-chairs, Kelly Feille and I hope that you have an enjoyable and productive conference and find time to explore what our campus, Norman, and surrounding area has to offer.

Sincerely,

Timothy A. Laubach
President, SW-ASTE

[1] www.theaste.org

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The Jeannine Rainbolt College of Education and the Department of Instructional Leadership and Academic Curriculum proudly support SW-ASTE

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SW-ASTE Thanks Our 2018 Conference Sponsors:

	Oklahoma Energy Resources Board
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Conference Hotel Information

https://hiltongardeninn3.hilton.com/en/hotels/oklahoma/hilton-garden-inn-norman-OKCNOGI/index.html

Hilton Garden Inn - Norman

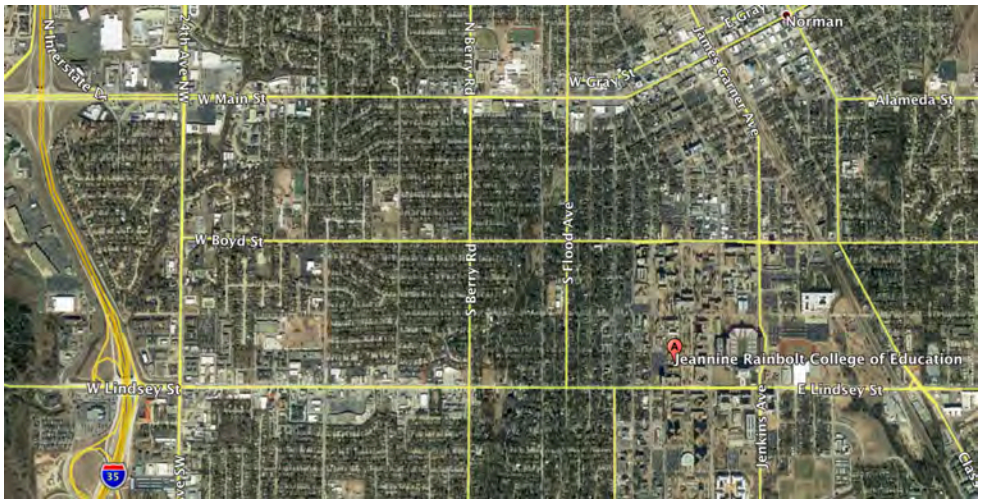
700 Copperfield Drive, Norman, Oklahoma, 73072,
TEL: +1-405-579-0100 FAX: +1-405-579-1414

At-a-Glance

- Norman hotel just minutes from University of Oklahoma campus
- Complimentary WiFi and 24-hour Business Center
- Outdoor pool, whirlpool and fitness center
- Great American Grill® restaurant for cooked-to-order breakfast and dinner
- Three flexible function rooms for over 180 people
- Close to great shopping, dining, and entertainment

Conference Location Map

University of Oklahoma
Jeannine Rainbolt College of Education
Ellsworth Collings Hall
801 Elm Avenue, Norman, OK 73069



Parking is free on the weekends in the lot displayed here.
Conference events will take place on the second floor.
There is elevator access.

GoogleEarth Pro

How to Connect to the "OUGuest" Wi-Fi

1. Turn on Wi-Fi on your device.
2. Select "OUGuest" network.
3. A registration screen will pop up or show when your internet browser is loaded.
4. Read the terms and accept them.
5. Your device is now registered and could take up to five minutes to work. If it does not work in ten minutes, then try restarting your device.

2018 SW-ASTE Conference At-A-Glance

Friday, October 12

3:30pm-4:30pm	Pre-Conference Field Trip RSVP-Only	History of Science Collections, The University of Oklahoma
6:00pm-7:00pm	Pre-Conference Field Trip RSVP-Only	National Weather Center, The University of Oklahoma
7:00pm-9:00pm	Dinner RSVP-Only	National Weather Center Atrium, The University of Oklahoma

Saturday, October 13

8:00am - 8:30am	Registration	2nd Floor Hallway
8:30am - 8:55am	Breakout Session #1	Rooms 265, 270, 275
9:00am - 9:25am	Breakout Session #2	Rooms 265, 270, 275
9:30am - 9:55am	Breakout Session #3	Rooms 265, 270, 275
9:55am - 10:20am	Coffee and Snack Break	Room 237
10:20am - 10:45am	Breakout Session #4	Rooms 265, 270, 275
10:50 am - 11:15am	Breakout Session #5	Rooms 265, 270, 275
11:20am - 12:10pm	Breakout Session #6	Rooms 265, 270, 275
12:10pm - 1:10pm	Business Luncheon	Room 250
1:15pm - 1:40pm	Breakout Session #7	Rooms 265, 270, 275
1:45pm - 2:10pm	Breakout Session #8	Rooms 265, 270, 275
2:15pm - 2:40pm	Breakout Session #9	Rooms 265, 270, 275
2:45pm - 3:10pm	Breakout Session #10	Rooms 265, 270, 275
3:10pm - 3:30pm	Final Remarks and Closing	Room 250

Conference Schedule Overview

Saturday Morning, October 13			
	Room 265	**Room 270**	**Room 275**
Breakout Session #1 8:30am - 8:55am	**Research: Research** *Disneyfication and Disneyization of an Attraction at EPCOT* Cartmill	**Research: Innovations in Practice in K-12** *The Institutionalization of Global Collaboration: Teacher Concerns in Implementing Shared Data Practices* Myers	**Research: Research** *Assessing University Biology Students' Critical Thinking* Collier, Westmoreland
Breakout Session #2 9:00am - 9:25am	**Research: Innovations in Practice in K-12 Education** *Enhancing Elementary Student Teaching with STEM Professionals* Olson	**Research: Innovations in Practice in Higher Education** *The Impact of a Research-Based Master's Program on the Science Teacher and Science Classroom* Hofeld, Kidd	**Research: Research** *Determining Motivating Factors for STEM Using Robotics* Davis
Breakout Session #3 9:30am - 9:55am	**Research: Research** *Preservice Teachers' Concept of Lunar Phases: How Understanding Misconceptions Directs Teaching Practice* Gossen, Hathcock, Ivey	**Research: Research** *Exploring the Affordances of Emergent Instructional Technology (HMD-Based Virtual Reality) on Students' Interest in and Understanding of Secondary Biology Instruction* Munshower	**Research: Research** *Science Educators' Environmental Literacy Through the Lens of a Wetland Academy* Nesmith, Coleman
9:55am - 10:20am	**BREAK - Room 237 - Sponsored by Bank of Oklahoma and ITC Great Plains**		
Breakout Session #4 10:20am - 10:45am	**Research: Research** *Investigating Scientific Curiosity in Young Learners: A Multiple Case Study* Stewart	**Research: Research** *The Process of Becoming: Identity Challenges for African-American Female Science and Mathematics Pre-Service Teachers* Sparks	**Research: Innovations in Practice in K-12 Education** *Helping Teachers Share the "Marvel"-ous Nature of Science* Bergman
Breakout Session #5 10:50am - 11:15am	**Partnerships: Innovations in Practice in Higher Education** *Layered Partnerships: Internal and External Collaboration* Schisler, Stegall	**Research: Research** *The Face of a Scientist: A Pilot Study Measuring In-Group Bias for Age, Gender and Race on a Latina STEM Program* Silveus	**Research: Research** *An Exploratory Case Study of a High School Student's Fieldwork and Lab Experiences with Diatoms on Turtles* Wu, Weinburgh
Breakout Session #6 11:20am - 12:10pm	**Hands-On Workshop: Innovations in Practice in K-12 Education** *Engaging Pre-Service Teachers in an Inquiry Science Lesson Using a Hand-Held Digital Microscope* Muhitch, Westmoreland	**Panel Discussion: Innovations in Practice in K-12 Education** *Global Collaboration in the STEM Classroom: What Works* Hobbs, Dyer, Crutcher	**Panel Discussion: Innovations in Practice in Higher Education** *Science Education in a STEM Environment: Implications for Science Teacher Development and Practice* McComas, Burgin, Wissehr, Olson

Conference Schedule Overview

Saturday Afternoon, October 13			
12:10pm - 1:10pm	**Business Luncheon - Room 250 - Sponsored by Oklahoma Energy Resources Board (OERB)**		
	Room 265	**Room 270**	**Room 275**
Breakout Session #7 1:15pm - 1:40pm	**Partnerships: Innovations in Practice in Higher Education** *Collaboration Strategies for Educators, Libraries and Museums* Magruder, Purkaple	**Research: Innovations in Practice in K-12 Education** *The T-STEM Blueprint as a Model for School Turnaround* Odell, Kennedy	**Research: Research** *Theory to Practice: A Two-Year Study of Pre-Service Teachers' Use of Learning Theory in the Science Classroom* Oramous, Burgin
Breakout Session #8 1:45pm - 2:10pm	**Research: Research** *Investigating Perceptions of Hands-on Science* Naizer, Long	**Research: Innovations in Practice in K-12 Education** *Project Based Summer Enrichment Programs to Increase Language Acquisition and STEM Achievement in Secondary ELLs* DeLozier	**Research: Innovations in Practice in K-12 Education** *Mentoring Teachers in Global Collaboration* Dyer
Breakout Session #9 2:15pm - 2:40pm	**Research: Research** *Dropout or Departure: Where are the Science Teachers* Weinburgh	**Research: Research** *Modeling Formative Assessment in Elementary Science Methods: Preservice Teachers' Perceptions and Understandings of Photosynthesis* Hathcock, Ivey, Gossen	**Research: Research** *Teaching the Equinox Through Music and Dance* Westerlund
Breakout Session #10 2:45pm - 3:10pm	**Research: Innovations in Practice in K-12 Education** *Inquiry in Elementary: How it Can Work* Crutcher	**Research: Research** *Teacher Certification Type and Instructional Practices* Nettles, Cartmill, Stewart, Pearce	**Research: Research** *Experiences of Preservice Teachers in a Portable Planetarium* Hartweg
3:15pm - 3:30pm	**Final Remarks and Closing - Room 250** **Door Prizes Provided by Vernier Software & Technology**		

Breakout Session #1 - 8:30am - 8:55am	
Room 265	**Research: Research** *Disneyfication and Disneyization of an Attraction at EPCOT* Cassandra Cartmill, Texas Christian University With people using more tools outside of the classroom to learning science, it is necessary that researchers understand the nature by which to convey science messages. Disney has merged informal science learning with the entertaining experience in aspects of their theme parks to meet the needs and desires of their guests. According to Bryman (1999), the Disneyfication of ideas takes place when a person or company shrinks these ideas down to the bare minimum and twists them with their own imaginations to their desired output. Disney has done this with its storytelling, but the Disneyfication of science in The Seas with Nemo and Friends, a marine biology attraction at Walt Disney World's EPCOT, should be investigated. This study looked not only at the science information conveyed to Disney's guests at this attraction, but also the Disneyfication and Disneyization within the attraction according to Bryman's (1999) four categories: theming, dedifferentiation of consumption, merchandising, and emotional labor. It was found that 78% of the information was presented in a written manner or in a physical manner, allowing guests to interact with the station. Additionally, 86% of the information presented was deemed easy to understand by the average guest. The attraction in its entirety was themed to Disney Pixar's animated films, Finding Nemo and Finding Dory. Disney's attention to detail in this attraction was appealing yet highly Disneyized. It was determined that this informal science education setting provided guests a multimodal learning experience that condenses scientific information and highlights what guests can do to positively impact the marine environment, while still providing guests with Disney memories.
Room 270	**Research: Innovations in Practice in K-12** *The Institutionalization of Global Collaboration: Teacher Concerns in Implementing Shared Data Practices* Kimberly Myers, Texas Tech University The purpose of this ongoing research plan of action was to institutionalize global collaboration throughout the Biology department at a secondary school in south Texas. This institutionalization project sought to expand global collaboration across the entire grade level. In doing so, the teachers collaborated with one another to develop and implement a shared data global collaboration project throughout the Biology department. The research questions for this study were: 1. What concerns do teachers have when implementing global collaboration projects across a grade level? and 2. What is the likelihood of teachers to implement more engaged collaborative types of global collaboration projects after being involved in shared data practices? The Concerns-Based Approach Model (CBAM) was utilized as the framework that helped guide the study and better address the research questions. Evidence was measured qualitatively utilizing data from pre- and post-focus group meetings, weekly PLC meetings, and other documentation. The results of the study showed that as teachers engage in professional development opportunities and collaborative experiences, they begin shifting from more self-oriented concerns to more task- and student-oriented concerns. The results of this study suggest opportunities for expanding global collaboration practices across school campuses and districts to enhance 21st-century practices and improve student outcomes in the classroom.
Room 275	**Research: Research** *Assessing University Biology Students' Critical Thinking* Jayme Collier, Texas Woman's University; Sandra Westmoreland, Texas Woman's University Research was conducted to measure the effectiveness of new course assessments to increase post-semester exam scores and critical thinking abilities of undergraduate students enrolled in a large lecture Principles of Biology course. New complex problem scenarios were designed to reinforce biological topics studied with Team-Based Learning (TBL) and to promote development of higher order thinking skills. The new problem scenarios were introduced in unit exams following a unit of study with TBL. Research results showed significant increases in student post-semester test scores for specific TBL-aligned questions when compared to previous semester student scores. This result validated the hypothesis that student content knowledge scores would increase due to new TBL-aligned problem scenario assessments.

Breakout Session #2 - 9:00am - 9:25am	
Room 265	**Research: Innovations in Practice in K-12 Education** *Enhancing Elementary Student Teaching With STEM Professionals* Joanne Olson, Texas A&M University Support is needed for both inservice and preservice teachers to teach elementary science and engineering, particularly when engineering is in the science curriculum. We placed student teachers with a cooperating teacher and an engineering graduate student to form a teaching triad for a full semester experience. The professional development components and student teaching structure will be shared, along with results of multiple studies conducted on classroom practices, student learning, triad functionality, and NOS/NOE issues.
Room 270	**Research: Innovations in Practice in Higher Education** *The Impact of a Research-Based Master's Program on the Science Teacher and Science Classroom* Jennifer Hofeld, University of Central Oklahoma; Aaron Kidd, University of Central Oklahoma Traditionally, PK-12 science education has been an attempt to pour great numbers of facts into students who are expected to retain and regurgitate them. However, research has shown this to be ineffective in producing students who are good consumers of scientific information and who are prepared to enter STEM careers. A Framework for K-12 Science Education, published in published by the National Research Council in 2012, suggests that the most effective model for science education includes scientific practices, crosscutting concepts, and core ideas. Indeed, science education is shifting away from a focus on facts toward a three-dimensional view of science. With this in mind, professors at the University of Central Oklahoma have developed a dual-track program of study for a master's in biology that is focused on education. Through the course of the program, students will complete coursework and, more importantly, research in both biology and education. Many, if not most, science teachers enter the classroom with little first-hand research experience which makes it very difficult to lead students in the authentic scientific experiences they need to really learn what science is. After only the first year in the program, my attitude toward teaching science and my capacity to do it well has changed dramatically. This presentation will share highlights from the program as well as the ways it has already impacted my teaching and my professional life.
Room 275	**Research: Research** *Determining Motivating Factors for STEM Using Robotics* Natalie Davis, Texas Tech University; Donald Prier, Texas Tech University For many years, educators have expressed an interest in how to assess, predict and influence the number of students who choose to pursue and complete studies in STEM fields once they enter higher education. While the number of overall students has increased (Eagan et al., 2017), it has been observed that the number of African-American students entering STEM fields has decreased over the same time period. In light of the fact that these students have been heavily targeted and exposed to STEM immersion activities, such as robotics, there is much confusion as to why these students are losing interest and failing to persist in pursuing STEM areas in higher education. By examining questions related to intrinsic student motivation, our goal is to determine what factors contribute to the high attrition rate among African-American students in STEM fields in post-secondary studies. The authors hope to determine what specific interventions are needed to ensure that these students remain engaged and motivated to continue in their pursuit of STEM higher education degrees and ultimately STEM careers.

Breakout Session #3 - 9:30am - 9:55am	
Room 265	**Research: Research** *Preservice Teachers' Concept of Lunar Phases: How Understanding Misconceptions Directs Teaching Practice* Drew Gossen, Oklahoma State University; Stephanie Hathcock, Oklahoma State University; Toni Ivey, Oklahoma State University Elementary preservice teachers (EPST) often struggle with confidence in teaching science because they don't see themselves as science specialists (Appleton, 2013) and may not have taken the coursework necessary for their understanding (Harlow, Swanson, & Otero, 2014). EPSTs in a science methods course demonstrated their content knowledge of lunar phases by diagramming and describing what causes the moon to change shape over time. Once confronted with the idea that students often have misconceptions about scientific ideas, even ones that are commonly observed, the EPSTs took part in a unit of instruction about lunar phases. Learning experiences included observation of the moon over an entire lunar cycle, modeling activities, and assessing elementary students' conceptions of lunar phases. At the end of the instructional unit, EPSTs again diagrammed the cause of lunar phases. They also analyzed a model of lunar phases, created an instructional unit, and reflected on their learning. This study focuses on the learning experiences of the EPSTs, how their content knowledge developed, and what was most influential in the development of knowledge. In this session, we will present our findings and discuss how these experiences are meaningful for teacher preparation.
Room 270	**Research: Research** *Exploring the Affordances of Emergent Instructional Technology (HMD-Based Virtual Reality) on Students' Interest in and Understanding of Secondary Biology Instruction* Paul Munshower, McMurry University Virtual reality is designed to be both realistic and interactive to create compelling learning environments for the user. Through the use of quality graphic images, touch feedback, simulated movements and auditory stimuli, VR enables students to learn science in dynamic new ways: visualizing abstract science concepts in 3-D (Merchant et al., 2013); practicing procedural skills (Ruthenbeck & Reynolds, 2015); and interacting directly with scientific phenomena (Sampaio, Ferreira, Rosário, & Martins, 2010). This research hopes to add to the growing body of literature in VR and formal science learning (see Jones et al., 2016), especially in students' perceptions of their own learning, including measuring their interest, motivation and identity as scientists (Hite, 2016).
Room 275	**Research: Research** *Science Educators' Environmental Literacy Through the Lens of a Wetland Academy* Suzanne Nesmith, Baylor University; Erin Coleman, Baylor University One major goal of environmental education (EE) is to develop environmental literate citizens who are aware of and concerned about the environment and its associated problems. Environmental education should be integrated within the entire system of formal education at all levels to provide the necessary knowledge, understanding, values, and skills needed for participation in devising solutions to environmental questions, yet educators often struggle with successfully integrating EE curriculum, both within and outside the classroom (Barnett et al., 2006; Shepardson et al., 2002; Simmons & Young, 1993; UNESCO-UNEP, 1976). One avenue that has been explored relative to EE attitudes, curriculum design, and instructional practices is teacher professional development. To address these areas, an onsite wetland EE professional development experience for science educators was coordinated and facilitated by a group of scientists and science educators. This session will include an overview of the PD experience and the impact of the PD on participants' environmental literacy as revealed through the educators' environmental efficacy, teaching practices, and implementation of EE community service experiences.

Room 237	**Coffee and Snack Break - 9:55am - 10:20am** **Sponsored by Bank of Oklahoma and ITC Great Plains**

Breakout Session #4 - 10:20am - 10:45am	
Room 265	**Research: Research** *Investigating Scientific Curiosity in Young Learners: A Multiple Case Study* Morgan Stewart, Midlothian ISD The purpose of this qualitative, multiple case study research was to understand scientific curiosity in young learners (children between the ages of five and seven years) which is a population often neglected in qualitative curiosity research. Situated learning theory provided the theoretical framework since curiosity is viewed as an independent and personal endeavor in which knowledge is constructed on an individual level. This study focused on three research questions: (1) what are young learners curious about that may possibly influence future science learning and education, (2) when a natural phenomenon captivates a young learner's scientific curiosity, what actions follow, and (3) what are characteristics of experiences young learners bring with them from outside of their schooling that may influence scientific curiosity. Three young children and their parents participated in the study for a maximum of ten interactions. Data collection methods included initial semi-structured interviews of both the children and the parents, field notes, observations, and photographs taken by the researcher, adult participant, and/or child participant. The findings showed that several observable behaviors of curiosity in previous studies with younger and older participants were also apparent in this study's participants: exploration/discovery, questioning, and sustained interest. In addition to the anticipated findings, several unforeseen findings appeared during the data analysis process. These unforeseen factors affecting curiosity included technology, interruptions and diversions, curiosity of other family members, and fear of natural phenomenon. The findings have implications for early childhood and elementary teaching practices, learning environments, and designing lessons in elementary classrooms.
Room 270	**Research: Research** *The Process of Becoming: Identity Challenges for African-American Female Science and Mathematics Pre-Service Teachers* David Sparks, The University of Texas at Arlington A group of three African-American female students majoring in a field of Science, Technology, Engineering, or Mathematics (STEM) participated in a qualitative research study to share their experiences in STEM, reasons for choice of major, obstacles and challenges, instances of racism and sexism, and their identities as a STEM student. The results showed that the students were not discouraged by their underrepresentation, were confident in their abilities, and expressed a wide variation in their identities of race, gender, and field of study. The study sought to answer the following research questions: (1) When discussing their choice of and development as a science or mathematics teacher, what do African-American female students consider to be important considerations when adapting to a field in which they are underrepresented? (2) How do African-American female STEM students rank the importance of their identities when given the choice of (1) race, (2) gender, and (3) STEM student and how does this relate to their choice of, development, and success as a STEM major? The session will focus on the results of the research and its implication for the recruitment and retention of African-American female students in STEM majors. Intersectional adaptation theory (Sparks, 2018) will be used as a theoretical framework to better understand the experiences of underrepresented students in STEM, including the value they ascribe to peers, mentors, faculty, and role models who match their unique intersectional identity. This is important because the students never recalled studying Black female role models, including Black female scientists and mathematicians, during their years in high school. Future research will explore how identity is formed in all students of color, not only Black females. An interactive discussion of future research directions and implications for best practices to support diverse populations will follow.
Room 275	**Research: Innovations in Practice in K-12 Education** *Helping Teachers Share the "Marvel"-ous Nature of Science* Daniel Bergman, Wichita State University The Nature of Science (NOS) remains an overlooked and untaught aspect of science in many classrooms. Teachers who do plan for NOS content often relegate it to implicit instruction via experiments ("doing science") or use of historical examples (Lederman, Lederman, & Antink, 2013). In superhero comic book stories, science is a critical element found among many origins and adventures. The presence of science also arises in several recent superhero movies, including those in the "Marvel Cinematic Universe" (MCU) – Iron Man, Ant-Man, Black Panther, Doctor Strange, and more. This session presents ways to help teachers explicitly address NOS themes using selected scenes from MCU films. Specific prompts and questions for discussion and assessment are provided with video clips, along with alignment to Science and Engineering Practices and Crosscutting Concepts of the Next Generation Science Standards, or NGSS (NRC, 2013). Example topics include science as a human endeavor involving different cultures; science as a way of knowing based on empirical evidence; assumptions of order and consistency in natural systems; evaluating anomalies in data; scientific vocabulary (theory, law, hypothesis); and others. Connections to subject-specific content are also discussed, with a focus toward middle and high school science curriculum.

Breakout Session #5 - 10:50am - 11:15am	
Room 265	**Partnerships: Innovations in Practice in Higher Education** *Layered Partnerships: Internal and External Collaboration* Laura Schisler, Missouri Southern State University; Jenny Stegall, Missouri Southern State University Several of our Teacher Education faculty, including elementary science methods, have partnered together to offer an off-campus experience for our classes. This team approach by methods faculty is coupled with a partnership with staff on the off-campus informal education location, George Washington Carver National Monument. Discussion includes how the partnership with George Washington Carver National Monument started, how our department's elementary methods faculty partnered together, what the partnership and experience look like for our classes, lessons learned from these partnerships, and ideas for future partnerships.
Room 270	**Research: Research** *The Face of a Scientist: A Pilot Study Measuring In-Group Bias for Age, Gender and Race on a Latina STEM Program* Allison Silveus, Texas Christian University The U.S. Department of Commerce Economics and Statistics Administration (ESA) (2011), report multiple factors including lack of female role models and gender stereotyping as contributing factors to the discrepancy between numbers of men and women in STEM fields. To explore the role of exemplars, this pilot study conducted during the summer of 2018 exposed a series of exemplars in STEM to Latinas (N=20) in the 9th-12th grade from multiple ISDS across the DFW metroplex for a two-week period. Prior to exposure of the STEM program, the researcher tested in-group bias for age, gender and race using a face tool followed by a post-test. Preliminary results indicate an increase in identifying with one's own in-group after exposure to exemplars in an in-group only STEM program. Implications for this research indicate that short term exposure to exemplars can positively impact how Latinas identify with their own in group (Hispanic Females Young, HFY) as it pertains to science identity. Further questions about long term science identity and if science identity has an element of plasticity are areas of further exploration.
Room 275	**Research: Research** *An Exploratory Case Study of a High School Student's Fieldwork and Lab Experiences With Diatoms on Turtles* Shelly Wu, Texas Christian University; Molly Weinburgh, Texas Christian University Research apprenticeships can provide high school students with a better understanding of scientific knowledge, practices, and influence their views towards science. To enhance such experiences for high school students, a local university and high school are collaborating on the Trinity River Turtle Survey. From this survey, the first author is mentoring a high school student named Emily (pseudonym) who is conducting research on microscopic algae called diatoms, documenting the diatoms that live on turtles. The purpose of our exploratory study is to investigate Emily's field and lab work experiences. Mentoring, data collection (field notes, interviews, and Emily's science notebook), and coding is on-going. The results reveal that: 1) Authentic field and lab work experiences provide Emily with opportunities to engage in long-term projects that she can be "intimate with" compared to learning in school, which is often constrained by time. 2) Positive views towards doing scientific research and career aspirations in science. 3) Science is complex in the use of tools, processes, and reading scientific literature. 4) Emily uses academic language to explain her conceptual understanding and environmental awareness of diatoms. The findings suggest that Emily is entering the scientific community through her involvement in field and lab work, which could be explained by Lave and Wenger's theory of legitimate peripheral participation. Limitations to this study include not being generalizable and the research team's bias in data interpretation. Implications suggest providing opportunities for students and the general public to participate in authentic science to promote environmental awareness.

Breakout Session #6 - 11:20am - 12:10pm	
Room 265	**Hands-On Workshop: Innovations in Practice in K-12 Education** *Engaging Pre-Service Teachers in an Inquiry Science Lesson Using a Hand-Held Digital Microscope* Sandra Muhitch, Texas Woman's University; Sandra Westmoreland, Texas Woman's University In this hands on workshop, participants will learn to use the zPIX 300 Zoom Digital Microscope to teach an inquiry science lesson about the life cycle of insects to pre-service teachers. This lesson will be aligned with the Texas Essential Knowledge and Skills (TEKS), which are part of the required curriculum for Texas public schools. At the conclusion of the workshop, participants will be able to ask well-defined questions and to use appropriate equipment and technology to describe the differences between insect complete and incomplete metamorphoses. A culture of rice weevils which contain live samples of the different metamorphic stages will be used; participants will view the samples using the hand-held digital microscope and identify the three stages of insect development by comparing them to manipulative models and pictures of other insect life cycles. Participants will be able to successfully identify and document the metamorphic stages of the rice weevil, including the larvae within grains of rice, the pupa, and the adult. Participants will learn how to use the digital microscope to make science lessons more engaging and to promote inquiry. The participants will get the opportunity to share their thoughts about the experience and make any suggestions on other ways this tool can be incorporated in future lessons. Participants will get first-hand experience about the effectiveness of the microscope in this workshop. They will also get to experiment with capturing digital photos and videos. Participants will get to see how valuable the zPIX Zoom Digital Microscope can be in the classroom. They will also realize how younger students will have the opportunity to use a microscope for the first time while enhancing inquiry learning experience using technology. Participants will evaluate the benefits of this affordable tool and the ease of adapting it to a variety of different lessons.
Room 270	**Panel Discussion: Innovations in Practice in K-12 Education** *Global Collaboration in the STEM Classroom: What Works* Elizabeth Hobbs, Texas Tech University; Kelly Dyer, Texas Tech University; Matthew Crutcher, Texas Tech University Science teachers will discuss the advantages of global collaboration to create students who are global citizens. Programs, partnerships and technology use will be discussed. Teachers will explore the road blocks that can come with global collaboration and how to avoid them. Links to citizen science and open data bases will be discussed.
Room 275	**Panel Discussion: Innovations in Practice in Higher Education** *Science Education in a STEM Environment: Implications for Science Teacher Development and Practice* William McComas, University of Arkansas; Stephen Burgin, University of Arkansas; Cathy Wissehr, University of Arkansas; Joanne Olson, Texas A&M University The “STEM” label in policy, curriculum, standards and professional conversations has grown from a murmur to a deafening roar – particularly in the U.S., even reaching what some have called “STEM-mania” (Sanders, 2009, p.20). What STEM (or STEAM) education means, what it looks like, and how or even if science education should be framed as STEM education is a timely and important conversation. This interactive panel discussion will 1) examine in detail various definitions of STEM and the position of science implied by those definitions, 2) examine the pros and cons for these various definitions as they support, include and even help to define "science" and 3) encourage consideration and understanding of implications for teacher preparation and classroom implementation of STEM as a venue for teaching science concepts. We will discuss the origins of STEM label, extensions to it such as STEAM and STREAM, the rationales held by those who advocate particular STEM approaches, research findings with respect to various STEM approaches, STEM in the Next Generation Science Standards and even the question of whether the four elements of STEM even belong together philosophically and pedagogically. Finally, we will consider the implications of a STEM reference to both the teaching of science and to the profession of science education, inservice and preservice science teacher preparation. These goals will be met through brief presentations from scholars with a range of perspectives on the utility of the STEM label followed by an interactive discussion/ Q&A with audience members.

Room 250	**Business Luncheon - 12:10pm - 1:10pm** Pick up food in Room 237 **Sponsored by Oklahoma Energy Resources Board (OERB)**

Breakout Session #7 - 1:15pm - 1:40pm	
Room 265	**Partnerships: Innovations in Practice in Higher Education** *Collaboration Strategies for Educators, Libraries, and Museums* Kerry Magruder, History of Science Collections, The University of Oklahoma; Brent Purkaple, History of Science Collections, The University of Oklahoma Museums and libraries value public engagement and outreach as vital, in the very core of their mission. This was the case for the Galileo's World exhibition of The University of Oklahoma Libraries, which launched in 2015. In this presentation, we will review various strategies adopted in our attempts to 'collaborate with educators in exhibit-based learning' (as our motto expresses it). We will relay what we have learned and pose some questions about how best to move forward given the challenges identified.
Room 270	**Research: Innovations in Practice in K-12 Education** *The T-STEM Blueprint as a Model for School Turnaround* Michael Odell, The University of Texas at Tyler; Teresa Kennedy, The University of Texas at Tyler The Texas STEM Academy initiative is designed to prepare students to thrive in the 21st Century economy by providing students a course of study that allows them to enter into STEM majors during their university experiences, and ultimately into STEM fields critical to the economy. "The cornerstone of T-STEM Academy learning is student engagement and exposure to innovation and design in STEM-focused instruction and learning that models real-world contexts" (Texas High School Project, 2010, p.2). Academies also serve as demonstration schools to inform math and science teaching and learning statewide. The initiative aims to align middle and high school curriculum with admission requirements of competitive colleges and the STEM qualifications for 21st century jobs (Texas Education Agency, 2018). Schools seeking T-STEM designation are required to apply and agree to implement the T-STEM Academy Design Blueprint (Texas Education Agency (2015, 2018). The Academies implement the T-STEM Design Blueprint, and use the T-STEM Rubric and Glossary, as a guidepost to build and sustain the academy. T-STEM schools are required to address seven benchmarks:: 1) mission-driven leadership; 2) school culture and design; 3) student outreach, recruitment, and retention; 4) teacher selection, development and retention; 5) curriculum, instruction, and assessment; 6) strategic alliances, and; 7) academy advancement and sustainability. Benchmark 5 outlines a series of curriculum, instruction, and assessment indicators considered essential for 21st century success. Achievement data in 2011 indicated T-STEM Academies outperform their peer schools in meeting college-readiness benchmarks. T-STEM academies scored at a 12 percent higher rate and achieved a 21 percent higher completion rate in dual credit and advanced placement courses (Texas Education Agency, 2018). As of August, 2018, there are 132 T-STEM academies operating in the State of Texas. The model is also being used as a school turnaround strategy.
Room 275	**Research: Research** *Theory to Practice: A Two-Year Study of Pre-Service Teachers' Use of Learning Theory in the Science Classroom* Jennifer Oramous, University of Arkansas; Stephen Burgin, University of Arkansas In this presentation, we will share results from a study with preservice secondary science teachers and their use of learning theory in the classroom. Using observations and student artifacts, we explored the use and types of learning theory used by our preservice science teachers during their spring internship for the last two years. The authors were involved in the observation and teaching of the students to varying degrees across the two years. The students were observed in their spring internship as part of the MAT program on our campus. They were aware of the research, but they signed the consent forms at the start of the year so most did not remember that we were observing for learning theory as well. The observations were part of the MAT requirements. From the observation notes, personal reflections of the students and other artifacts, we used a typological approach defined by Hatch (2002) to code the data. Constructivism and Behaviorism were observed more frequently than other theories in the both years. We will present our thoughts on why this could be as well as things we would like to change in the coming year as we continue the study. Suggestions for improvement in preservice secondary science teachers use of learning theory in the classroom will be included.

Breakout Session #8 - 1:45pm - 2:10pm	
Room 265	**Research: Research** *Investigating Perceptions of Hands-On Science* Gil Naizer, Texas A&M University - Commerce; Chris Long, University of North Texas This multi-year study investigated the perceptions of education graduate students in a science methods course. Participants answered the questions, "What is hands-on science?" and "What is not hands-on science" and then provided examples of memorable "hands-on science" lessons. Researchers examined the responses to determine if participant perceptions of hands-on science align to their application examples.
Room 270	**Research: Innovations in Practice in K-12 Education** *Project Based Summer Enrichment Programs to Increase Language Acquisition and STEM Achievement in Secondary ELLs* Rebecca DeLozier, Texas Tech University Schools worldwide are seeing increased enrollments of students whose first language differs from the language of instruction. Despite decades of research into instructional practices, classroom settings, and knowledge acquisition amongst English language learners (ELLs), data suggests that the academic achievement of non-native speakers lags behind that of native speakers in math and science. This session presents an overview of a project based summer enrichment program designed to increase language acquisition in secondary ELLs while providing experiential learning opportunities in STEM.
Room 275	**Research: Innovations in Practice in K-12 Education** *Mentoring Teachers in Global Collaboration* Kelly Dyer, Texas Tech University This project provides details about a mentorship model that was used to assist teachers in implementing a new pedagogical practice in their classrooms, a global collaboration project. In this project, teachers from Argentina and Texas worked together with a mentor to give their students a global collaboration experience. The students collected soil temperature data in each location and shared the data with one another on a learning management system. The teachers and the mentor are also engaged in global collaboration while facilitating the project for the students. The project brings to light the advantages of having a mentor to assist in facilitation of the global collaboration project. The participants also realized the importance of teachers having experience with global collaboration in order to facilitate it with their students.

Breakout Session #9 - 2:15pm - 2:40pm	
Room 265	**Research: Research** *Dropout or Departure: Where are the Science Teachers* Molly Weinburgh, Texas Christian University A multiple case study design was used to problematize and deconstruct the idea of science teacher dropout. This design is appropriate because each case is an in-depth investigation into a particular situation bounded in time and place. In addition, a cross-case analysis allows for themes to emerge that are common to all cases. Data, included artifacts, reflections, interviews, focus groups, observations, and researcher notes, were collected from three participants. Data for Kathy, Barbara and Judith (pseudonyms) were coded individually in order to give a rich description of each. Themes that emerged within each case were combined to produce cross-case themes. The findings are presented by case. They produce a counter-narrative to the work of Darling-Hammond, Holtzman, Gatlin, and Heilig (2005) and Ingersoll (2012) on why teachers leave the profession.
Room 270	**Research: Research** *Modeling Formative Assessment in Elementary Science Methods: Preservice Teachers' Perceptions and Understandings of Photosynthesis* Stephanie Hathcock, Oklahoma State University; Toni Ivey, Oklahoma State University; Drew Gossen, Oklahoma State University In a science methods course for elementary education majors, preservice teachers (PSTs) undertook an in-depth study of photosynthesis. The instructors of the course explicitly modeled formative assessment strategies and metacognitive skills so that PSTs could focus on their growth over the course of the module. Instructors also focused on making connections between photosynthesis and ecosystems, beginning with a study of owl pellets. During the unit on photosynthesis, the PSTs completed pre/post testing of their content understandings of photosynthesis. Rather than placing a great deal of emphasis on the chemical equation, instruction focused on the ultimate applications of photosynthesis. For example, similar to video Minds of Their Own (Annenberg, 1997), PSTs were asked where the mass of the tree comes from. In conjunction with this content study, PSTs also read articles on formative assessment, gave formative assessments for elementary-aged students, and used formative assessment results to make recommendations for classroom instruction. At the end of the unit, PSTs scored their pre/post content tests using a key and then self-reflected on their gains, what they still needed to learn more about, and their views on the purpose and role of assessment in the classroom. The research study focuses around four questions: What gains in content did the PSTs make with regard to photosynthesis? What were PSTs' perceptions about their growth in knowledge and understanding regarding photosynthesis? What classroom applications did the PSTs make for teaching photosynthesis? And, what do PSTs perceive as the nature of assessment in the classroom? This presentation will discuss our findings and implications for teacher preparation and future research.
Room 275	**Research: Research** *Teaching the Equinox Through Music and Dance* Julie Westerlund, Texas State University We describe a method to teach the equinox and the seasons using 3-dimensional physical modeling with the inclusion of music and dance called the equinox dance. Using music and physical movement (dancing) to teach complex three-dimensional concepts such as Earth's annual movement and tilt around the sun engages students in multiple modalities and may decrease anxiety about learning science concepts (An, Ma, & Capraro, 2011, Tobias 1998, Crowther, 2012). This unique instructional strategy was implemented in two different university earth science courses designed for preservice teachers: Earth Science (ES) for future middle school teachers and General Science (GS) for future elementary teachers. The purpose of this study was to determine the effectiveness of the method. Students were surveyed after each equinox dance about their understanding of the equinox at two different time points in the semester. We asked students in an open-ended survey to describe the equinox in their own words and to draw a diagram of the equinox. After the second time of the dance on December 12th, approximately 63% (GS) to 66% (ES) of student descriptions were accurate but a lower percentage, 38% (GS) to 42% (ES), of student diagrams were accurate. We describe and provide student examples of persistent inaccuracies in student descriptions of the equinox and problems in the student drawings of the equinox.

Breakout Session #10 - 2:45pm - 3:10pm	
Room 265	**Research: Innovations in Practice in K-12 Education** *Inquiry in Elementary: How It Can Work* Matthew Crutcher, Texas Tech University Have you ever wondered if inquiry works at the elementary level? This discussion takes a look at how we incorporated inquiry into our lessons in elementary school. From science labs to project-based learning, we will examine strategies that worked well and strategies that did not.
Room 270	**Research: Research** *Teacher Certification Type and Instructional Practices* Jenesta Nettles, Texas Christian University; Cassandra Cartmill, Texas Christian University; Morgan Stewart, Midlothian (Texas) ISD; Erin Pearce, Tarleton State University Using an existing data set, of 1st-5th grade science teachers who chose to attend a university-based professional development program. A requirement of their applications was to show the need for pedagogical or content knowledge. This study explores the relationship between the teachers' observed instructional practices, written reflections, and oral interviews with their certification type (traditional or alternative/emergency). After finding that certification type was a significant predictor of a teacher's lesson sequencing and depth of questioning, the researchers investigate potential thematic differences in the reflection and interview data.
Room 275	**Research: Research** *Experiences of Preservice Teachers in a Portable Planetarium* Beau Hartweg, Tyler Junior College The purpose of this qualitative case study research was to understand the experiences of preservice teachers who participated in a live-interactive portable planetarium program that used a simulated immersive visual environment. To that end, the study used a Deweyan theoretical framework to specifically look at the ways preservice teachers participated in and interacted with the planetarium; how they described their experiences; what connections to outside events or experiences could they make after participating in the program; and in what ways were their experiences were educative, miseducative, or noneducative. Data collection methods included a pre-questionnaire, video recording of the planetarium program, written participant reflection responses, and interview questions. The findings showed that students interacted with the planetarium program in a variety of ways, including through questioning, kinesthetic activity, observation, making predictions, choosing the focus of content, and social communications with peers. Participant descriptions of their experiences included comments regarding novelty, technology, visuals, and physical space. The connections participants made between the planetarium lesson and outside events and experiences were largely unique to each person, and included personal family connections, real world observations, remembering related scenes from a movie, prior visits to planetariums, and classroom exposure. The data showed that the majority of experiences were educative, and were related to astronomy content, interactive activities, personal observations, sharing information, environmental responsibility, and future teaching practices. Some examples of miseducative experiences related to astronomy content emerged from the data, and there were no examples of noneducative experiences. The findings have implications for preservice teacher education and planetarium education communities.

Room 250	**Final Remarks and Closing - 3:10pm - 3:30pm** **Door Prizes Provided by Vernier Software & Technology**

Things to Do:

Norman

Sam Noble Museum
(off campus)
https://samnoblemuseum.ou.edu

Fred Jones Jr. Museum of Art
(on campus)
http://www.ou.edu/fjjma

Switzer Center
(on campus)
http://www.soonersports.com/

Oklahoma Memorial Union
(on campus)
http://www.ou.edu/union

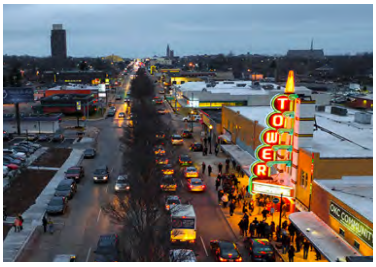
Campus Corner District
(off campus)
http://oucampuscorner.com

Downtown Norman
(off campus)
http://www.downtownnorman.com

Oklahoma City

Bricktown - Downtown OKC
http://welcometobricktown.com

Midtown OKC
http://midtownokc.com



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