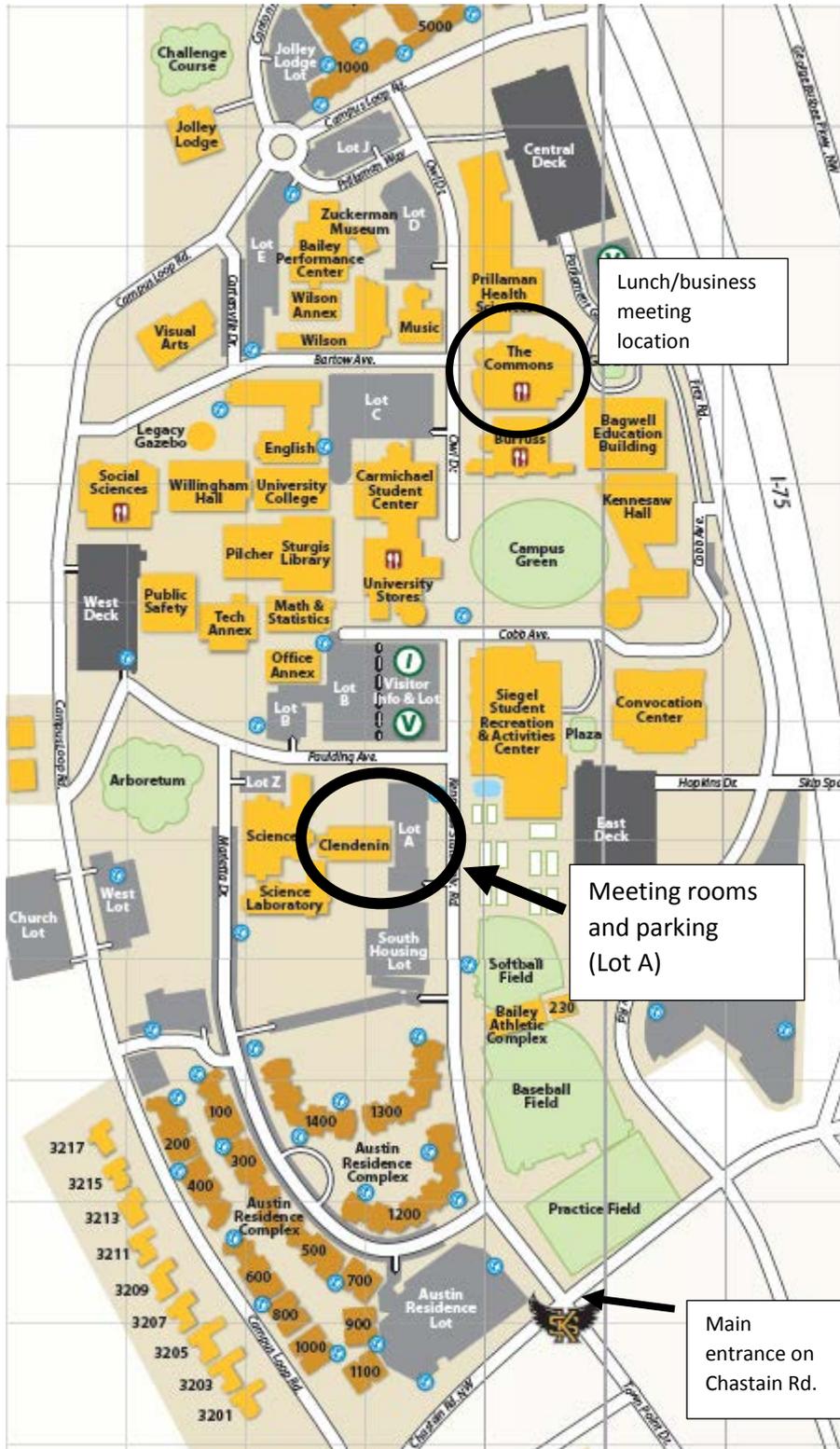# Program for the Southeastern Association for Science Teacher Education
2016 Annual Meeting

Conference theme: The role of science in today's society

Kennesaw, GA

October 21-22, 2016

Kennesaw State University Campus Map

Challenge Course

Jolley Lodge Lot 1000

5000

Lot J

Jolley Lodge

Central Deck

Zuckerman Museum

Lot D

Lot E

Bailey Performance Center

Wilson Annex

Prillaman Health S...

Music

Visual Arts

Wilson

Bartow Ave.

The Commons

Lunch/business meeting location

Legacy Gazebo

English

Lot C

Burruss

Bagwell Education Building

Social Sciences

Willingham Hall

University College

Carmichael Student Center

Kennesaw Hall

Pilcher

Sturgis Library

Campus Green

West Deck

Public Safety

Tech Annex

Math & Statistics

University Stores

Office Annex

Lot B

Visitor Info & Lot

Cobb Ave.

Lot B

Siegel Student Recreation & Activities Center

Plaza

Convocation Center

Arboretum

Lot Z

Paulding Ave.

Hopkins Dr.

Sko Spor

West Lot

Science

Clendenin

Lot A

East Deck

Meeting rooms and parking (Lot A)

Church Lot

Science Laboratory

South Housing Lot

Softball Field

Bailey Athletic Complex

230

3217

3215

3213

3211

3209

3207

3205

3203

3201

200

300

400

100

1400

1300

Austin Residence Complex

1200

Baseball Field

Practice Field

Austin Residence Complex

500

600

700

800

900

1000

1100

Austin Residence Lot

Main entrance on Chastain Rd.

Schedule of Events

8:00 – 10:00   Conference Registration Clendenin Atrium

9:00 – 10:00 am Session 1	
Time	**Presentations - Clendenin 1009**
9:00	***Learning at Arcadia Mill: The design and impact of a service-learning project on pre-service teachers*** Jennifer Mesa and Karen Evans, University of West Florida
9:20	***Telling Science Tales: Promoting Science and Literacy for Children Using Storytelling*** Randy Spaid and Loleta Sartin, Middle Georgia State University
9:40	***Uncommon Science in Common Places: Use of Authentic Learning Environments for Pre-service Teacher Preparation*** Sumitra Himangshu-Pennybacker, Middle Georgia State University

10:00 – 10:10am Break	

10:10 – 11:30 am Session 2	
Time	**Presentations - Clendenin 1009**
10:10	***Exploration of Pre-service elementary school teachers' conceptual understanding of interdisciplinary teaching*** Kitchka Petrova, Florida State University
10:30	***Introduction to Project Lead the Way (PLTW): An Engineering and Biomedical Science Program for Grades K-12*** Charles Eick, Auburn University
10:50	***Investigating Brokerage Roles in Secondary Science Teacher Networks as Professional Development*** Samuel Polizzi, Kennesaw State University and Gregory T. Rushton, Stony Brook University
11:10	***edTPA and Beyond! Defining and Supporting Academic Language*** Brendan Callahan and Mike Dias, Kennesaw State University

11:45 – 1:45   Luncheon, Business Meeting, Awards, Keynote
Held at the Commons, Kennesaw State University

Keynote Speaker: Carolyn Wallace, "Authenticity, multiple discourses and the "Third Space" revisited: Exploring the most significant concepts for research on scientific language use today"

2:00 – 3:30 pm Session 3	
Time	**Presentations - Clendenin 1009**
2:00	*Stress Matters: Supporting Pre-Service Teachers in Stress Management to Develop Confident Professional Identity* Tugce Gul, John Pecore, and Eric Greska, University of West Florida
2:20	*Meeting the demands of reform science teaching: Teachers' dilemma and the process of sense-making* Rose Pringle and Erin Poppert, University of Florida
2:40	*Critical Conceptualization of Computational Thinking: How Preservice Teachers Plan for a Culturally Relevant Pedagogy* Rouhollah Aghasaleh, Georgia State University
3:00	*Makey Makey* **workshop** Michael Dias and Brendan Callahan, Kennesaw State University

Thank you for attending SASTE 2016

We wish you a safe trip back home and a great academic year!

We look forward to seeing you in Pensacola Beach, FL next year for SASTE 2017

Abstracts

Learning at Arcadia Mill: The design and impact of a service-learning project on pre-service teachers
Jennifer Mesa and Karen Evans, University of West Florida
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In this service-learning project, we guided a group of eleven pre-service teachers (ten elementary education undergraduates, one secondary education graduate student) in the design, implementation, and evaluation of informal learning experiences for upper elementary students at Arcadia Mill Archeological Site. This project was offered as an optional experience for students in fall 2015. Most of the students were recruited from either the science or social studies methods courses taught by myself or my co-author. Arcadia Mill Archeological Site is the location of an antebellum water-powered industrial complex and a wetland ecosystem located in Milton, Florida. The site offers educational programs and tours for K-12 students from across three local school districts. Since the site is managed by a historic trust, the existing educational programming focused heavily on historical interpretation. Due to the adoption of new academic standards across the state, the education director of the site requested assistance in revising the educational programming for elementary students. This opportunity allowed our pre-service teachers to gain experience in creating and facilitating science and social studies learning experiences aligned with the new academic standards. Our students also developed their abilities to communicate with diverse audiences, ranging from the education director and his staff, elementary school teachers, and upper elementary students (~200) on field trips to the site. This presentation will share the design of the service-learning project and tentative findings about the impacts of this innovative experience on pre-service teachers' development and identity. Furthermore, input will be solicited from SASTE members regarding the design and research of similar projects.

Telling Science Tales: Promoting Science and Literacy for Children Using Storytelling
Randy Spaid and Loleta Sartin, Middle Georgia State University
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Writing a story has much potential to engage third and fourth grade children learning about habitats and ecosystems, and promotes ELA literacy. During this investigation, a higher education science educator and literacy expert partnered with classroom teachers in a local school to support and enhance science inquiry activities and promote critical thinking. Teacher candidates from the university mentored small groups of children at the school and assisted with hands-on projects. In addition, they facilitated the composition and artwork for a science story. This offered a powerful pedagogical tool for supporting scientific literacy and habits of mind.   In this session, The Language Experience Approach (LEA) will be described and illustrated with projects created by the children. LEA is a literacy development method used for supporting reading development and fluency in diverse classrooms by combining all four language skills: listening, speaking, reading, and writing. The LEA lessons developed for this investigation were centered-around a learner-generated text with familiar vocabulary and ideas that appeared to be more meaningful and accessible than narrative found in pre-prepared books from the school library. The LEA science storytelling process began with hands-on activities the class did together - building a bottle biology terrarium, growing FAST plants, and raising Tenebrio. To create the text, the teacher candidates and children in small groups, verbally recreated the shared experiences. As students took turns volunteering information in the discussions, the students' words were transcribed and organized by the teachers to create the text. The children read the story aloud and discussed it with permission to make any corrections or additions to the story. Then the children decided what artwork was needed,

subsequently illustrating the story. The final story was revised to meet grade level literary conventions, a glossary was created, and the story was read aloud.

Uncommon Science in Common Places: Use of Authentic Learning Environments for Pre-service Teacher Preparation

Sumitra Himangshu-Pennybacker, Middle Georgia State University
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How do we make science real? In order to answer this question, a field experience was designed using the interior design of the Hay House, a historical structure built in the mid-19th century, as a focal point, and from thence to provide a platform for pre-service students to carefully observe and analyze, the implication of science in everyday life. Pre-service students in a pre-major physical science class were directed to "observe, question, and interpret what you see, and think about how you would incorporate this experience to engage children in science". Through peer-interaction and immediate feedback from their guides and instructor these students explored the physical science principles that made these innovations unique in the mid-1800s. In doing so, they were simultaneously exposed to a contextual awareness of how such innovations while making the lives of the members of the household comfortable also demarcated the socio-economic divide within this historical context. Identifying and communicating scientific ideas in the absence of a social/historical context leaves students with a superficial understanding of the relevance of science in everyday life. Whereas, learning about the physical science principles fundamental to the design and building of a historical building becomes a social and a creative act, involving real-world experiences filtered through scientific understandings translated into new teaching possibilities. The curriculum design incorporated the architecture of the Hay House in alignment with the Georgia Standards for P-12 Physical Science. For example, the circulation of heated air through paneled doors and hot water in the bathroom provide an early example of the applications of the principles of convection and conduction of heat, which align to GSE S3P1: Students will investigate how heat is produced and the effects of heating and cooling, and will understand a change in temperature indicates a change in heat. Another example was the application of mechanical advantage using simple machines (GSE Grades 1-12). For our students being able to identify simple machines such as the spiral staircase - an elegant example of an incline, the French Lift or the weighted windows as pulleys gave them a sense of historic adventure and investigation. These align well with GSE S4P3: Students will demonstrate the relationship between the application of a force and the resulting change in position and motion on an object - (a). Identify simple machines and explain their uses (lever, pulley, wedge, inclined plane, screw, wheel and axle). This presentation will focus on the inter-disciplinary understandings that emerged from being introduced to scientific understanding through a socio-historic lens.

Exploration of Pre-service elementary school teachers' conceptual understanding of interdisciplinary teaching

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The project goal is to examine what is preservice elementary school teachers' conceptual understanding of interdisciplinary teaching and how they perceive its role for enhancing science instruction. The interdisciplinary approach to teaching science is valuable, because it facilitates students' learning of the scientific concepts in the broader context of other disciplines and issues. Our research questions are: How do elementary pre-service teachers conceptualize interdisciplinary teaching? How do they perceive the value of interdisciplinary teaching as an approach to enhance science instruction in elementary school? Preservice elementary school teachers attended a presentation on interdisciplinary teaching that included analysis of the lesson "Make Your Own Paper" (Project Learning Tree). They responded to

open-ended questions related to interdisciplinary teaching before and after the presentation. The presentations took place during their class "Teaching Science in Elementary School" in Fall, 2015 and Spring, 2016. At this moment we have data from two cohorts and the total number of participants was 47. Inductive analysis of the pre-service teachers' answers was performed to identify specific themes that cut across their answers. The preliminary findings indicate that pre-service elementary school teachers have limited understanding of interdisciplinary teaching, but find it useful to make the lessons engaging, to feel more comfortable introducing the science concepts and to teach more science in the elementary school classroom. The results of this study contribute to expanding the knowledge about pre-service elementary school teachers' conceptual understanding of interdisciplinary teaching and could potentially have an impact on higher education institutional policies that regulate the elementary education programs course work

Introduction to Project Lead the Way (PLTW): An Engineering and Biomedical Science Program for Grades K-12
Charles Eick, Auburn University
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Project Lead the Way (PLTW) is a non-profit organization that supports hands-on engineering and biomedical science education in grades K-12. PLTW has designed online curricula and university-based training to equip teachers to successfully implement a program in their schools. Launch is the elementary school component where grade level teachers choose up to four modules for student use with iPads and hands-on materials. Gateway is the middle grades component where elective teachers offer a series of introductory courses on engineering design, robotics, and medical forensics, among others. Students use the latest design software, VEX robotics kits, and DNA testing. The high school curriculum consists of a biomedical and engineering track of elective courses, where students move from introductory courses to capstone courses in each track. Dual credit in science is often offered for biomedical track.

Investigating Brokerage Roles in Secondary Science Teacher Networks as Professional Development
Samuel Polizzi, Kennesaw State University and Gregory T. Rushton, Stony Brook University
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The Noyce I-IMPACT project at Kennesaw State University is designed to move novice, career-changing teachers and experienced, master teachers along a trajectory toward teacher leadership in their chemistry and physics communities. A prominent feature of this program is for teachers to not only attend to the contexts within their classes, but also outside of their schools. We have investigated these local and extended relationships through the lens of Social Network Theory, and defined the networks using Social Network Analysis (SNA). Specifically, we have examined the extent to which teachers connect, or broker, between communities that would otherwise be disconnected, such as a state level professional and a teacher on their hall. We found that all teachers in the sample (n=19) reported serving in at least two distinct brokerage roles in a survey taken before professional development (PD). During PD we discussed brokerage roles in social networks and asked teachers to select the brokerage role that they most identified with. This role often conflicted with the survey data, suggesting that teachers instinctively identify with the dense connections in their networks, rather than the otherwise disconnected regions. Implications include that PD can explicate the pattern of connections that may be implicit in their teaching contexts. This knowledge may possibly provide a strategic advantage to the teacher. Similar strategies have been employed by providing SNA training to leaders during MBA programs.

edTPA and Beyond! Defining and Supporting Academic Language

Brendan Callahan and Michael Dias, Kennesaw State University
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Academic language is critical to learning, as it is the language used in schools to teach the various subject areas. There are different categories of academic language, such as discipline-general language and discipline-specific language. In addition, vocabulary, various language functions and demands must be considered. A driving force for the inclusion of academic language in K-12 education is edTPA, a portfolio-based assessment currently used in many states (including Georgia) as a prerequisite for teacher certification. In this presentation, we will discuss three aspects of academic language as defined by the edTPA exams for both middle grades and secondary science: Language Demands (Discourse, Vocabulary, and Syntax) and Language Functions needed for science and engineering practices. Additionally, supports for each aspect of academic language will be shared.

Stress Matters: Supporting Pre-Service Teachers in Stress Management to Develop Confident Professional Identity

Tugce Gul, John Pecore, and Eric Greska, University of West Florida
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Stress for pre-service teachers during field experiences can make them less effective and impede professional growth (Wadlington, Slaton, & Partridge, 1998). The immersive virtual environment technology supports teacher practice in pedagogy and content with the benefit of facilitating teacher development without potentially harmful effects on students (Dieker, Hynes, Stapleton, & Hughes, 2007). In 2016, the Teach-to-Avatar (pseudonym) project funded the technology necessary (i.e., physiologic monitors) to measure pre-service teachers stress levels, identify positive and negative stress indicators, and strategies for coping with negative stress through virtual-reality simulation field experience. The purpose of this pilot project is to examine pre-service teachers' stress factors and strategies for coping with stress as well as the impact of stress (i.e., its level and type) on professional identity development. Research participants will consist of approximately six pre-service teachers within a college of education at a university in the southeastern United States. The participants wear physiologic monitors to measure variables related to stress while practicing their lessons to avatar students in the virtual-reality simulator and while teaching in the field. Additionally, participating pre-service teachers will be surveyed about their perceptions of teaching stressors. Primary data will be obtained from semi-structured interviews with pre-service teachers, reflections on the discussion board and observation protocol, which will be completed by a project team member. It is hoped that the preliminary findings will enlighten the project team in: (a) understanding of the relationship between pre-service teachers' stress and professional identity formation.

Meeting the demands of reform science teaching: Teachers' dilemma and the process of sense-making

Rose Pringle and Erin Poppert, University of Florida
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In current reform efforts, educators have agreed that science and engineering not only permeates modern living but are the keys to solving many of the world's current and future problems. To achieve such however, reform documents have proposed "a new approach to K-12 science education that will capture students' interest and provide foundational knowledge for basic proficiency and continuing study in science" (NRC, 2013). This new approach has implications for effectiveness in science teaching. While much has been discussed about mode of instruction, current research about learning clearly suggests that within the context of a learning goals driven and coherent unit of study, meaningful learning occurs when students make their initial thinking visible, examine science phenomena, and

during the sense-making process are allowed to reflect on the extent to which their initial ideas have changed during the teaching. In addition, opportunities are provided for students to articulate their understanding of the new knowledge and make connections to real life. The process of sense-making then becomes an important component of effective science teaching with implications for professional development for teachers. Couched within this larger context of reform in science education and effective science teaching, we examine a group of middle school teachers' instructional practices relating to engaging students in the sense-making process. Specifically, we respond to the following question: In what ways do teachers understand and incorporate the sense making process as a component of their science teaching? In this presentation, we (1) describe an experience provided in our professional development characterized by practices that emphasize inquiry-based science practices for the teachers (2) share samples of teachers' work as they focus on sense-making strategies, and (3) share our interpretation of teachers' understanding and inclusion of the sense-making process.   In this qualitative research, data sources include artifacts from a summer science summit for middle school science teachers, informal interviews, and classroom observations and reflections. Our findings indicate that the extent of inclusion of the sense-making process in a science lesson is directly related to its inclusion as a pedagogical strategy provided in curricular materials. Teachers attempting to provide sense making opportunities resort to simple question and answer sessions consistent with formative assessment and in some cases becoming summative assessment tasks for the lesson. However, when supported, middle school teachers are able to systematically include the process of sense making in their teaching.

Critical Conceptualization of Computational Thinking: How Preservice Teachers Plan for a Culturally Relevant Pedagogy

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Since Jeannette Wing introduced Computational Thinking in the Viewpoint section of the March 2006 edition of the Communications of the ACM with the emphasis: "it represents a universally applicable attitude and skill set everyone, not just computer scientists, would be eager to learn and use" (p. 33) it has become the attention of a broad academic community. Referred as one of the Scientific and Engineering Practices by Next Generation of Science Standards, Computational Thinking has caught more attention by science educators. Meanwhile, the Bureau of Labor Statistics revealed that computing is one of the fastest-growing job markets through 2018. However, this field does not represent the gender and racial diversity of the United States. Growing number of Latinx families in the South, as referred to as the new Latino diaspora, inspired implementation of this project namely, A Reciprocal Model for Teaching and Learning Computational Competencies: Connecting Pre-Service Teachers and Urban Latino Youth (ARMTLCC). As a part of the project 4 MAT students took a Trends and Issues in Teaching Science course which is focused on providing preservice teachers with opportunities to develop and implement Relevant, Engaging, and Authentic Learning (REAL) experiences for young urban Latino adolescents in the context of Computational Thinking. These REAL experiences includes two days teaching at the Latino Youth Leadership Academy at an urban middle school. In this course students explore concept of computational thinking, basics of computer science content knowledge, as well as socio-cultural perspectives on diversity that influence teaching and learning (we cover issues of Multiculturalism, Social Justice Education & Critical Pedagogy, Race & Ethnicity, Language, and Immigration in one semester; and issues of Gender, Sexual Orientation, Class & Socioeconomic Status, (Dis)ability, Religion, and Intersectionality in the following semester).