111th Meeting of the 1909 Conference: Advancing Thought, Research, and Practice in Technology and Engineering Education Crowne Plaza Downtown, Memphis, TN

Thursday, November 20, 2025

9:00 a.m. Welcome, Introductions and Announcements

Aaron Clark, 9th Life Chair, 1909 Conference

9:30 a.m. **SESSION I: Special Session: Artificial Intelligence**

Presiding: Josh Brown, Illinois State University

1. **Building and Exploring Course-Specific AI Chatbots: Preliminary Findings and Feedback**

   This exploratory study investigates how course-specific AI chatbots can be intentionally designed to support deeper cognitive engagement in graduate-level learning, grounded in Cognitive Apprenticeship Theory (CAT). A custom-built chatbot was deployed in an asynchronous Change Leadership course, engaging students in strategic and systems thinking tasks across K–12, higher education, and organizational learning contexts. Using qualitative analysis of student-AI transcripts, the research found strong alignment between the chatbot's behaviors (e.g., scaffolding and coaching) and CAT constructs, while also surfacing limitations regarding structural constraints and potential digital equity concerns.

   Presenters: Kevin Sutton, Krista Wojdak, & Jason LaFrance, Appalachian State University

2. **Artificial Intelligence as Formative Assessment in Engineering Graphics**

   This research addresses the critical need for providing students in engineering and technology education classrooms with formative feedback on engineering graphics (specifically hand sketches) outside of the classroom setting, prior to submitting a graded assignment. The paper presents the development and pilot testing of an artificial intelligence program that allows students to upload their isometric or orthographic sketches to a website for immediate feedback on the quality and accuracy of the drawing. The program utilizes computer vision and machine learning algorithms to compare submitted sketches to a pre-trained model, detailing the current state and accuracy of the model and its broader impacts in the evolving AI environment.

   Presenter: Daniel Kelly, North Carolina State University

3. **Human-AI Collaboration in Teaching Performance Assessment: Designing Scalable, Trustworthy Moderation Workflows**

   This study addresses the need for scalable, trustworthy assessment methods for teacher education candidates, as increasing numbers create assessor challenges related to high cognitive demands, workload, and maintaining marking consistency in Teaching Performance Assessments (TPA). The research piloted an Artificial Intelligence (AI)-powered dashboard—developed to analyze portfolio data, link feedback to

criteria, and flag inconsistencies—which was trialled with six experienced TPA assessors in a structured workshop. Findings suggest that when used responsibly, the AI tool can enhance marking consistency, reduce cognitive load, and prompt richer professional dialogue, offering early design insights for a fairer, more efficient, and scalable human-AI collaboration in education assessment.

Presenter: Zara Ersozlu, University of Newcastle

4. **Virtual Reality Training for Students and Responders in an Emergency Management Technology Program**

   The escalating severity of natural and human-caused disasters creates a critical need for robust disaster preparedness training to prepare professionals in Emergency Management for complex crisis scenarios. This proposed study investigates the use of Virtual Reality (VR) simulation technology, providing follow-up from students and responders who have participated in the VR training within a Technology and Engineering Education (T&EE)-aligned program. Findings and discussion will detail how VR simulation provides scalable, risk-free, and repeatable training, significantly enhancing workforce readiness by improving trainee decision-making capabilities and building greater community resilience.

   Presenters: Jessica Murphy and Marlisa Scott, Jackson State University

11:30 a.m. - 1:30pm **Lunch Break (on your own)**

1:30 p.m. **SESSION II: Graduate Student Mini Presentation Session**

Presiding: Kevin Sutton, Appalachian State University

5. **What is Design Intent in Engineering Graphics?**

   This research addresses the need to clarify the concept of design intent in engineering graphics, arguing that current and historical definitions fail to effectively identify the concept because they overlook the designer's experience. To explore this concept, a thematic analysis of existing literature was conducted, leading the author to propose a new model for contextualizing design intent that integrates previous definitions with new classifications. This presentation discusses the new model, which will offer the field a robust framework for recognizing design intent as a concept shaped by factors like context, purpose, constraints, criteria, and expertise.

   Presenter: Samuel Munzer, North Carolina State University

6. **Exploring Expert Opinions for Defining Computer Science in K-12**

   This study addresses the absence of contemporary industry and research perspectives informing K–12 computer science (CS) education, arguing the outdated foundational definition and over-generalized term undermine educational initiatives. The transcendental phenomenological study explores how computational professionals define CS literacy, aiming to distill the essence (specific skills and technical abilities) that a

CS literate individual should possess. Centering expert voices, this research provides essential understanding for future educational standards analysis and preparing Technology and Engineering Education (TEE) licensure individuals to integrate contemporary CS into the public arena.

Presenter: Joseph Kaskel, North Carolina State University

7. **A Qualitative Comparison of Undergraduate Student Motivation Toward Making and Doing**

   This study addresses the need for Technology and Engineering (TE) professionals to understand undergraduate motivation toward making and doing to enhance curriculum and achieve technological literacy outcomes. Using a hermeneutic phenomenological methodology, the study captured the lived experiences of students across two making and doing-centered courses via a two-interview set. Findings generated structural and textural descriptions of student motivation for comparing courses and previous studies, offering insights for developing innovative, motivational curriculum.

   Presenter: Madison Hansen, Millersville University

8. **Beyond Professional Development: Sustaining Integrated STEM Practices**

   This study addresses the need to understand why integrated STEM teaching practices either sustain or diminish after a formal professional development (PD) program ends, arguing that few studies explore this long-term teacher change beyond initial program outcomes. A qualitative multiple case study will be conducted with three teacher pairs who previously participated in the TRAILS project, using the framework of Communities of Transformation (CoT) to examine how they sustained or failed to sustain innovative practices. Through within-case and cross-case analysis, the study will identify the conditions influencing sustainability and offer practical guidance for designing future STEM PD that leads to enduring instructional change, thereby bridging the gap between vision and sustained practice.

   Presenter: Woongbin Park, Purdue University

9. **Choosing with Confidence: Navigating STEM School Options through Expert Consensus**

   Families and caregivers are increasingly tasked with choosing STEM-labeled PK–6 schools without clear guidance on what constitutes high-quality integrated STEM education. This study addresses the issue by using a modified Delphi method with expert teacher educators to identify critical instructional practices and defining attributes of high-quality integrated elementary STEM learning. The result is a practical, research-based framework designed to empower families and caregivers to make informed enrollment decisions about school options.

   Presenters: Leah Cheek, Vinson Carter, & Michael K. Daugherty, University of Arkansas

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3:30 p.m. **Presentation of Outstanding Publication Award**

Following the graduate student presentation session, the *Technical Foundation of America* will present the *Outstanding Publication Award*—which was determined prior to the start of the conference.

3:30 p.m. **Traditional 1909 Conference Group Photo**

Coordinating: Maya Stafford, North Carolina State University

3:45 p.m. **1909 Conference Business Meeting**

Presiding: Aaron Clark, North Carolina State University

1. Update on Reorganization Process
    a. Board position updates
    b. Website update
2. Conference Update
3. Membership Update
4. Report from Working Committees
5. Finance Update
6. New Business
    a. New member initiation ceremony
    b. Updates to membership status for organization, Daniel Kelly
    c. EPT official sponsorship, Kevin Howell
    d. Create committee for new bylaws
    e. Future papers at conference
    f. Consideration for new dates starting 2027
    g. Nominations of new members
7. 2026 Conference Location Update

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Friday, November 21, 2025

9:00 a.m. **Installation of New 1909 Conference Members and New Life Chair**

Master of Induction Ceremony: Jeremy Ernst, Embry-Riddle Aeronautical University

9:30 a.m. **SESSION III: Sustaining Programs through Modern Practices: Outreach, Digital Tools, and Curriculum**

Presiding: Byron McKay, Pittsburg State University

10. Measuring the Potential Impact of Technology & Engineering Education Regional Professional Development Conferences

This study examines the potential impact of the Four-State Regional Technology Conference (FSRTC) on the recruitment and advancement of Technology and Engineering Education (T&EE) programs. Using survey data from the 74th and 75th FSRTC events, the research documents the substantial engagement of secondary educators—a key recruitment demographic—demonstrating a significant, quantifiable outreach potential to thousands of students. The study concludes that these long-running regional conferences function as strategic recruitment tools crucial for the long-term sustainability of post-secondary T&EE programs.

Presenters: Trevor Maiseroulle and Byron McKay, Pittsburg State University; Randall Jordan, Fort Hayes State University

11. Place, Identity, and Environmental STEM: Insights from Hawaii Students

This study explores the effects of place-based integrated STEM education on students' interest in sustainability and environmental careers within the distinctive cultural and ecological setting of Hawaii. Part of the TRAILS (Teachers and Researchers Advancing Integrated Lessons in STEM) project, the research aimed to strengthen students' sense of place by embedding STEM concepts within their local environments. The presentation will also discuss how unique challenges, such as technology limitations in Hawaii and American Samoa, influence both teacher practice and student outcomes.

Presenters: Jung Han and Todd Kelley, Purdue University; J. Geoffrey Knowles, Bryan College

12. The Importance of Commercial Flow Simulation Software and Finite Element Analysis (FEA) in STEM Curriculum

This study advocates for the integration of commercial flow simulation software and Finite Element Analysis (FEA) into higher education STEM pedagogy to bridge the critical instructional gap between material science and industrial design. Integrating these tools teaches students crucial best practices, such as finding design flaws and analyzing material flow before manufacturing tooling, making students highly

marketable and reducing the need for organizational training. By utilizing these simulations to analyze component design, students effectively make data-driven decisions that save organizations significant money on costly manufacturing corrections.

Presenters: Jeremy Agozzino, Ohio Northern University

13. Exploring Technology and Engineering Student Experiences with Digital Engineering Notebooks

This qualitative descriptive study addresses the need for a digital engineering notebook template, driven by the growing shift toward digital tools in the field. The research introduces an initial digital engineering notebook template that teachers can use to provide students with practical experiences in engineering discourse applicable to their future academic and professional environments. Analysis of student data will report themes, including how the digital notebooks promote engineering discourse, students' perceptions of successes and challenges, and essential considerations for teachers during integration.

Presenters: Erik Schettig and Marissa Franzen, North Carolina State University

14. Data Science in Technology and Engineering Education: A Vast Toolbox for Modeling and Visualization

This paper addresses the need to integrate Data Science principles, an underutilized discipline, into comprehensive Technology and Engineering Education (T&EE) to strengthen instruction and support data-driven decision-making. The presentation provides an overview of Data Science and applicable T&EE principles (aligned with the Standards for Technological and Engineering Literacy), offering initial resources like definitions and available tools for teachers. This integration is vital for the success of students and teachers, as state systems rely on T&EE educators to lead initiatives where their courses fulfill computer science requirements, sparking discussion and resource sharing.

Presenters: Steven Miller and Erik Schettig, North Carolina State University

11:30 SESSION IV: Lunch and Guest Speaker

Mark Harrell, STEM CTL Director, ITEEA

Mark Harrell is the Director of ITEEA's STEM Center for Teaching and Learning, where he focuses on developing innovative resources and strategies to prepare Pk-12 students for the future STEM workforce. His dedication to high-impact learning stems from an extensive background as a successful Technology Education teacher who built one of Kentucky's top Project Lead The Way (PLTW) Engineering Pathways. Mark later applied his expertise at the state level as a consultant for the Kentucky Department of Education. Today, his leadership at ITEEA is centered on advancing integrated STEM education through the classroom and community.

12:30 p.m. **SESSION V: What Works in Technology Education: Insights from Practice, Philosophy, and Pedagogy**

Presiding: Scott Warner, Millersville University

15. New Technology Engineering Education Teacher Support and Retention Through a Making and Doing Survival Skills Boot Camp

This study addresses the challenge of teacher retention and student engagement faced by non-traditionally prepared teachers, such as those from NC Residency or lateral entry programs, who often lack the formal technical preparation needed to teach Technology and Engineering Education (TEE) and related STEM content. To respond, the authors developed a complement of resources, including the Making and Doing Survival Skills Boot Camp (MDSSBC) and a series of Quick-Start Guides, to introduce "making and doing" essentials and provide STEL-aligned (Standards for Technological and Engineering Literacy) instructional activities. Feedback indicated that the combination of mentoring, structured resources, and support networks significantly eased participant concerns, establishing a replicable framework to enhance the preparation, retention, and integration of core STEM practices in diverse classrooms.

Presenter: Steven Miller, North Carolina State University and Glenn “Trey” R. Moore, New Hanover County Schools

16. Service Learning in Technology Education with Incarcerated Youth

This work provides updates to an ongoing program teaching programming and robotics to incarcerated youth, addressing the need to share longitudinal data and programmatic details from high-risk/limited access environments that are often inaccessible for publication. The paper details the project’s evolution, including securing NSF CAREER award funding, moving the program from Texas to North Carolina, and incorporating social and emotional learning into the curriculum. The presentation will share previously inaccessible data, lessons learned, and specific guidance on how to create a service-learning project for technology education students, outlining barriers to conducting this specialized research and teaching.

Presenter: Daniel Kelly, North Carolina State University

17. What Works in Student Recruitment and Retention: An Analysis of Four Successful University Student Growth Initiatives

This paper addresses the critical need for effective student recruitment and retention strategies within university units housing Engineering and Technology Education (ETE) programs, considering institutional differences. The paper analyzes four successful, diverse student growth initiatives at Bowling Green State University, Brigham Young University, Western Illinois University, and Eastern Kentucky University, detailing their strategies and sustained enrollment increases. The analysis identifies effective strategies unique to each university, providing guidance on developing program-specific visions, assessment techniques, and planning needed to increase enrollments.

Presenters: Thomas Erekson, Western Illinois University

18. From Training to Teaching: A Call for a Philosophical Renaissance in Technology Education

This presentation addresses a critical schism in Technology & Engineering (T&E) education: the historical and ongoing preference for technical "training" over broader "educating," resulting in a field largely detached from philosophical and pedagogical foundations. The proposal presents new research findings from a survey of pre-service T&E teachers that revealed a significant knowledge gap concerning foundational educational theories and their specific application to the T&E classroom. The session will explore this disconnect and provide practical, research-informed strategies for reintegrating theoretical and philosophical dialogue back into T&E teacher preparation and classroom pedagogy.

Presenter: Molly Miller, Millersville University

19. Trisquarecle: Student Visualization and Design Intent for Orthographic Drawings

This presentation fits into a larger body of research into design intent within Technology and Engineering Education (T&EE), addressing the need to understand how students approach and execute the visualization of novel, ambiguous objects. The study investigated how students visualized and then represented a single random object, specifically named the Trisquarecle, as a method of capturing individual design interpretation. The presentation will provide the detailed results of this analysis, offering insights into the student thought process regarding design and modeling.

Presenters: Daniel Kelly and Samuel Munzer, North Carolina State University

3:00 p.m. **Report from the Conference Pollution Committee**

Presiding: **Kevin Sutton**, Appalachian State University

Although not officially connected to the Pollution Committee, Dr. Sutton will share the infractions from the 2025 - 1909 Conference. All members and guests should remember that you can and will be fined for attempting to ascertain the names of members of the Pollution Committee.

Conference Awards Program

Presiding: **Aaron Clark**, North Carolina State University
Kevin Howell, Executive Director, Epsilon Pi Tau

During this session, members and guests will vote to select the *Epsilon Pi Tau Outstanding Conference Presentation Award* recipient and that award will be presented by *Epsilon Pi Tau*.

Conference Adjournment

Presiding: **Aaron Clark,** 9th Life Chair, 1909 Conference

We welcome your suggestions and feedback regarding the 1909 Conference. Suggestions can be submitted via the QR code to the right.