

**The Joint Conference of the
105th Mississippi Valley Technology Teacher Education Conference and the
56th Southeastern Technology Education Conference**

Clarion Hotel, Nashville Downtown Stadium, Nashville, TN
November 15-16, 2018

Thursday, November 15, 2018

9:00 a.m. Welcome, Introductions and Announcements
Dr. Michael Daugherty, Life Chair, MVTTEC

9:30 a.m. **SESSION I: Content, Methods, and New Directions**

Presiding: **Dr. Ryan Brown, Illinois State University**
Session Chair: **Dr. Jennifer Buelin, International Technology and Engineering
Educators Association**

1. To what degree are newly minted technology and engineering education teachers incorporating engineering design into their ETE curriculum. Technology and engineering teacher education institutions have been promoting engineering design teaching approaches for more than a decade. Do we know whether this effort is being impactful—particularly among new ETE teachers? Where are new teachers obtaining the engineering design challenges that they use in class? Do they simply use the design challenges offered through commercial products like PLTW or EBD, or are they creating their own locally sourced engineering design challenges? What engineering design process do the newly minted teachers follow—is it their own design or a commercial product? Do they use journals or inventors logs? How do they assess student designers? Do they use performance-based assessments, or commercial curriculum worksheets?
 - **Dr. Chris Merrill, Illinois State University**

2. Technology Education degree programs provide opportunities to learn more about technological processes, and how to implement those processes into both the educational and workplace arenas. In Technology Education, there are categories (e.g. Manufacturing Technology, Information Technology, Construction Technology, etc.) and sub-categories (Automotive Technology, Computer Application Technology, Design Technology, etc.) to help students better understand limitless technological applications. Students participating in such an academic discipline are prepared for a variety of technology-related occupations as they learn, after critical evaluation, how to properly apply innovative strategies to solve problems. In describing such, three questions may be examined. 1) What are examples of progressive undergraduate and graduate Technology Education programs, and how do they prepare students for the workforce? 2) What careers are such programs preparing its graduates to pursue and acquire? 3) Are Technology Education programs still deemed relevant as degree programs for the 21st century student and beyond?

- **Dr. Jessica L. Murphy, Jackson State University**

3. Educational technology has become a component of many classrooms in the 21st century, but the use of technology by beginning teachers is a concern of both educators and researchers. A gap exists between the way in which preservice teachers are taught with technology in their courses and how teachers are expected to use technology for instructional purposes. While preparing to teach a course for preservice teacher preparation: Literacy, New Media, and Creative Pedagogies, the researcher designed an instructional model for using technology and integrating STEM education through project-based learning. The resulting syllabus was constructed around a student-centered, blended learning environment using a flipped classroom approach and Universal Design of Learning. The theoretical framework for the research is Technological Pedagogical Content Knowledge (TPACK). Being addressed are: What is the difference in preservice teachers' TPACK self-efficacy after completing a preparation course in which the instructor modeled how to use technology and integrate STEM education through project-based learning? How do preservice teachers perceive using STEM education and project-based learning during their instructional practices? How effective is using e-Portfolios to engage and motivate preservice teachers in their learning?

- **Julie Maynard, The Ohio State University**

4. With the expanding opioid crisis, immigrant family separation policies, and increasing amount of time spent in alternative care settings, foster care services are well beyond capacity and the number of children in foster care increased by 10% nationally over the last five years. Many of these children (8%) age out of the system with \$500 and the clothes on their back. Only half of foster kids graduate high school, and college is an unreachable idea for most. How can these statistics be changed? What is the role of technology education in addressing these statistics? What programs currently exist for students in foster care? What resources are available to teachers to better address the needs of students in foster care?

- **Dr. Dan Kelly, Texas Tech University**

Noon - 1:15 p.m. SESSION II: Research, Assessment, and Standards

(Lunch session – lunch provided for MVTTEC/STEC members/guests)

Presiding: **Dr. Brian McAlister, University of Wisconsin-Stout**

Session Chair: **Dr. Tanner Huffman, The College of New Jersey**

1. To what extent do the assessment practices, outcomes, and trends of students, instructors, and industry professionals align? If there is a lack of alignment does this suggest a problem in the preparation of students? Are educators responsible for aligning their own teaching with industry demands? If so, how will educators know they are successfully doing so? What similarities and differences emerge when comparing the assessment practices and results from students, educators, and practicing professionals? What can we learn from these similarities and differences?

- **Dr. Scott Bartholomew, Purdue University**
 - **Dr. Greg Strimel, Purdue University**
2. The CTETE Accreditation Committee has drafted Accreditation Standards to use in evaluating technology and engineering teacher education programs. There are six standards. Each of the six standards are further described and explained by including outcome statements called “indicators.” The “indicators” are statements that further define the standard. They, help to show the depth and breadth of the standard and provide examples as to the type of topics that are components of the standard. The Committee seeks to inform the profession and invites feedback on the standards, how they can be assessed, and the proposed process to implement accreditation.
- **Dr. Paul Post, The Ohio State University**

1:45 p.m. SESSION III: Research, Laboratories, and New Initiatives

Presiding: **Dr. Jeremy Ernst, Embry-Riddle Aeronautical University**
Session Chair: **Dr. Scott Warner, Millersville University**

1. Can engineering and technology education be revitalized through Computer Science? The reality of declining certified engineering and technology education teachers is not a new one. Since the late 1980s/early 1990s, we have witnessed a decline in both certified teachers and teacher preparation programs. Those that are still in existence are not producing enough graduates to meet the demands of increasingly vacant teaching positions nationally. Berea College’s Technology and Applied Design Department is exploring one way to address these concerns with the help of Computer Science. Will this effort meet the needs of schools in our state – especially high-risk areas like South-Eastern Kentucky? Will it increase the number of qualified teachers – from our school and throughout the state? Will this help slow down (if not prevent) the closing of technology-based programs state-wide? If successful, can or should this model be replicated in other institutions?
- **Dr. Mark Mahoney & Dr. Scott Heggen, Berea College**
2. As Career and Technical Education (CTE) programs become more prominent across the country, comprehensive Technology & Engineering Education classrooms designed to teach technological literacy seem to be disappearing. Has the pendulum swung back to vocational programs and left avocational programs to meet their end? Does the small town school with one technology or CTE teacher have the ability or capabilities to “Teach it all”, or are students missing an opportunity? Pittsburg State University’s newly redesigned Center of Applied STEM Education (CASE) at Pittsburg State University was designed specifically to teach a comprehensive, standards-based Technology & Engineering Education program through the use of Design Build Centers which work in conjunction with two fabrication studios. The model facility is capable of supporting STEM programs such as Maker/Builder Spaces, Fab Labs, and PLTW. The design also allows for cluster courses such as Power & Energy, Communications, Manufacturing, or Construction. Specific courses such as Materials and Processes, Robotics, CAD, Additive

Manufacturing, are also easily taught within the facility. The CASE facility allows students to engage in meaningful learning without the being constricted to specific career pathways. This is not a presentation on the value of CTE, but rather, the value of technological literacy and the facilities needed to teach it.

- **Dr. Andy Klenke, Pittsburg State University**

3. In what ways can we create experiences for students, who may not have access to advanced manufacturing equipment, to explore trade careers, engineering, and other technical fields? What entities are willing to support such an effort? What types of programming can best help develop student awareness of technology and 21st century manufacturing? Collaboration among The International Yacht Restoration School, Rhode Island College, Polaris Manufacturing Extension Program, and the Rhode Island Economic Development Corporation created a 30' trailer to house a mobile maker lab (MML) that delivers programs to high schools, after school programs, and state sponsored career events in Rhode Island. Data from the first year of the MML has informed us of student preferences and program design.

- **Dr. Charlie McLaughlin, Rhode Island College**

4. Perceptions of Safety in Makerspaces: Examining the Influence of Professional Development. Makerspaces have become increasingly common in P-16 schools, higher education residence halls, libraries, and community centers. A number of professional STEM educator and librarian associations have advocated for these Integrative STEM learning spaces, but to what extent have they recommended collaborating with T&E educators to address inherent safety issues? To what extent do educators and librarians consider safety risks when planning makerspaces? Who possesses the appropriate safety training and expertise to oversee these collaborative areas while maximizing the opportunities for hands-on STEM learning? Can professional development delivered by T&E educators significantly influence librarians' and other educators' perceptions of makerspace safety? How can T&E educators become more involved with the design and oversight of makerspaces to increase awareness of safety and T&E education programs?

- **Dr. Tyler Love, Penn State University--Harrisburg**

4:30 p.m. SESSION IV: Business Meeting

Presiding: **Dr. Michael Daugherty, University of Arkansas**

1. Report of the Membership Committee
 - a. **Dr. Vinson Carter, University of Arkansas**
3. Consideration of nominations for membership
4. Other Business

8:00 p.m. STEC Past Presidents and Officers Meeting
Clarion Hotel Lounge

Friday, November 16, 2018

8:30 a.m. **Installation of New MVTTEC Members**
Dr. Ray Diez, Western Illinois University

9:00 a.m. **STEC Welcome**
Dr. Kevin Sutton, North Carolina State University

9:15 a.m. **Primary Results on the Development and Testing of Active Learning Modules for Engineering Design Graphics**
Dr. Jeremy Ernst, Embry-Riddle Aeronautical University
Dr. Aaron Clark, North Carolina State University
Dr. Daniel Kelly, Texas Tech

The presentation will update the membership on the first year completion of the NSF funded IUSE grant titled Active Learning Modules to Support Problem-Based Learning: Effects on Engineering Retention and Academic Outcomes of At-Risk Students. The authors will describe the project and how the active modules were developed, piloted, and edited for an online platform to be used in a fundamentals course related to engineering graphics.

9:45 a.m. **Arctic Exploration Project**
Dr. Petros Katsioloudis, Old Dominion University

About a year after a successful National Science Foundation-funded trip last spring, Victoria Hill, of Old Dominion University's College of Sciences, and Petros Katsioloudis, from the Darden College of Education, travelled once again to the cold Arctic to study climate change. Their research is key to gaining understanding about the decrease of ice coverage in the Arctic and the effect on our world. With a goal to produce a more affordable type of scientific sensor (light sensors) the researchers tested two prototype units. The old sensors cost \$800 each when purchased commercially and the ones developed at ODU cost \$80.

10:15 a.m. **Break**

10:30 a.m. **Identifying Various Forms of Knowledge in Technology and Engineering Education**
Dr. Tamecia R. Jones, North Carolina State University

Engineering and technology are being taught in formal and informal spaces in K-12 education. Assessment proves to be a challenge for teachers and volunteers, and engineering and design ways of being are not investigated systematically. This project describes the development of a K-12 engineering epistemic frame for the purposes of assessing student

knowledge doing engineering projects. The epistemic frame integrates local and national standards, policy directives, higher educational outcomes, and theories from design thinking. Definitions and examples from a high school summer program are given.

11:00 a.m.

Teaching Coding to Elementary Students

Joanna Papadopoulos, Virginia Tech/Ewing Public Schools

Many schools across the United States do not teach coding and it is a growing field in the 21st century. In introducing coding at the elementary level, students can increase their computational thinking and spatial awareness skills in addition to learning about mathematical algorithms. By using step-by-step modules with their favorite characters to teach basic programming, students are more likely to be interested in Computer Science. This presentation will review ways in which coding can be introduced at the elementary grade levels.

11:15 a.m.

STEM Education in Virginia 4-H: A Qualitative Exploration of Engineering Competencies in 4-H Educators

Chelsea Corkins, Virginia Tech

Research supports inquiry and problem-based learning as successful methods to teach engineering STEM education, specifically engineering design. These methods – readily utilized in Virginia 4-H youth initiatives – make 4-H non-formal programming an optimal setting for engineering design STEM integration. However, few studies target the understanding of engineering STEM integration in non-formal, out-of-school programs where educators may not be familiar with engineering design. Therefore, this qualitative study will utilize 4-H educator interviews and project observations to explore engineering design utilization. As STEM programs increase, it is important to understand how educators understand engineering to improve implementation and learning outcomes for those involved.

11:30 a.m.

Changing Assessment Practices with Millennials

Megan Morin, North Carolina State University

Dr. Pam Carpenter, Director of Education and Workforce Programs
FREEDM Systems Center and PowerAmerica

Current assessment practices in engineering classrooms can be traditional and even dull specifically for students who are millennials. In a Research Experience for Undergraduate Program, students used an E-Portfolio to reflect on their experiences, develop their transferable skills as well as strengthen their LinkedIn page. Through the use of the E-Portfolio platform, Portfolium, students documented their experiences with the use of pictures, videos, and other deliverables demonstrating what they

learned through short captions, hashtags, and the selecting skills similar to what would be seen in LinkedIn and Instagram. Portfolio allowed students to review material and reflect the impact on their experiences for the future.

11:45 a.m. Increasing Awareness and Opportunities for Women and Minority Students in Sustainable Biomaterials Education
Sara Cerv, Virginia Tech

The expanding U.S. bioeconomy is providing career opportunities that are not well known by today's students entering college or recruiters. A week-long summer camp for high school students that highlights the discipline of sustainable biomaterials is being created and marketed to women and minority students. The purpose of this hands-on non-formal learning opportunity is to increase awareness and preparation of women and minority students for careers in the biomaterials field.

12:00 p.m. Lunch Session - (lunch provided for MVTTEC/STEC members/guests)

International Technology and Engineering Educators Association (ITEEA) Updates & Initiatives

Steve Barbato, Executive Director of ITEEA

Dr. Jennifer Buelin, Director of the ITEEA STEM Center for Teaching and Learning (STEM CTL)

Dr. Anita Deck, STEM CTL Director of Innovation, Assessment and Research

Nancye Hart, STEM CTL Professional Development Coordinator & Special Projects Associate

Joanna Papadopoulos, STEM CTL Special Projects Associate & National Teacher Effectiveness Coach

1:00 p.m. STEM Education Research and Implementation: Incorporating the Google Suite

Dr. Bryanne Peterson, Virginia Tech

The world of tomorrow is about efficiency. Technology is a timesaver, it's about getting the most out of using the least. Educators have to think differently about how we are preparing our students for the world of tomorrow; we have a responsibility to prepare students for what is coming, not what once was. And as researchers, there's never enough time to complete our work, either. This quick session shares proven methods to increasing productivity and communication through the effective incorporation of G Suite tools into STEM Education research and implementation.

1:30 p.m. Technologies to Mitigate the Impact of Dysgraphia in Technology and Engineering Education

Dr. Daniel Kelly, Texas Tech
Deidre Kelly, North Carolina State University

Although dysgraphia is literally interpreted as “bad writing,” it also affects a person’s ability to visualize and draw lines and shapes. Technology and engineering education subject matter and activities often involve drawing and sketching, and that the ability to transfer mental imagery to paper and vice-versa is a predictor of technology and engineering subject matter and career success. Given this, there may exist a population of students who are being overlooked and would benefit from a better understanding of the condition by educators and potential interventions that can be researched to engage these students within technology and engineering disciplines.

2:00 p.m. Animation for Elementary Students? - Oh Yeah!

Dr. Douglas Lecorchick III, North Carolina State University

Disney's pre 1980's illustrator F.Thomas introduced 12 principles of animation that are currently used to guide post secondary school aged student's through animation courses. These concepts can be introduced to elementary students with a storybook platform. This story book address each principle systematically with a discussion question and activity to complete at the end of each principle.

2:30 p.m. Break

2:45 p.m. Exploring the Impact of Interactive Science Notebooks on Self-Efficacy and STEM Career Interest

Jessica Krachenfels, Virginia Tech
Dr. Bradley Bowen, Virginia Tech

Interactive science notebooks, used as a learning tool during instruction, has implications for supporting student self-efficacy in expressing science content knowledge and interest in pursuing a STEM-related career. This presentation discusses the integration of interactive notebooks into elementary school instruction as a useful practice full of possibilities and aims to engage in conversation about an on-going mixed methods study involving a unique population of military dependents.

3:00 p.m. A Study of Green Building Professions Data and the Building Information Model

Donald O’Keefe, North Carolina State University

The Building Information Model (BIM) is a parametric modeler used in the Architectural/ Engineering and Construction (AEC) industry. Other

parametric modelers have been successful in the aeronautical, automotive and product design industries and assisted companies in approaching the ideal concurrent engineering model. The great key to the advancement of BIM has been sustainable building movement. (Lachmi) asserts that ‘that if there ever was a technology "in the right place, at the right time"—at least in AEC—that has to be BIM in the context of sustainable design.’ The discussion will be about acquired data of green builders and designers, their rankings within their group and as part of larger groups, the relationship between accredited staff and revenue, Revenue comparisons (green to totals), and a correlation and regression analysis study. Lastly, I wish to discuss the future directions and areas to pursue for this study.

3:15 p.m. One Teacher’s Perspective on How to Integrate STEM Education for 4th/5th Graders

April Peacock, Virginia Tech

As a former 5th grade teacher, and a current 4th grade teacher, I have been using and investigating a variety of STEM education challenges and activities for the past five years. Initially conducting STEM only on one Friday each month, as a way to introduce and teach 5th graders about the engineering and technology process and how it connected to their world as 9, 10, and 11 year olds to now offering STEM on a weekly basis with 4th grade students having a choice about what they may use and do to illustrate and further their understanding of the knowledge that is being learned with regard to technology and engineering.

3:30 p.m. STEC Business Meeting

Dr. Kevin Sutton, North Carolina State University

4:30 p.m. Adjourn

Future Mississippi Valley Conferences:

106th Conference, November, 2019, Chicago, IL

107th Conference, November, 2020, St. Louis, MO

Future STEC Conferences:

57th Conference, November, 2019, Virginia Beach, VA

58th Conference, November, 2020, Raleigh, NC

Other Conferences:

ITEEA Conference, March 27-30, 2019, Kansas City, MO