Sixth Annual

Appalachian Ohio
Mathematics and Science Teaching

Research Symposium

All Things STEM from Education!

Saturday, September 26, 2015
8:30 a.m.–3:00 p.m.
Morton Hall Second Floor
Ohio University, Athens
8:30  **Symposium Registration** (south 2nd floor foyer)

9:00  **Welcome** (237)
    *Courtney Koestler*, SEOCEMS Director
    *Howard Dewald*, Associate Provost, Ohio University

9:10  **Introduction of Keynote Speakers** (237)
    *Greg Foley*, CAT Program Director, Ohio University

9:15  **Keynote:** *What Science Olympiad Means to Me...* (237)
    *Kevin Dael*, Alexander HS Science Olympiad Coach
    *Blue Kennedy*, Senior, Alexander HS
    *Bryce LeMaster*, Senior, Alexander HS
    *Tyler Martin*, Senior, Alexander HS
    *Casey McDonald*, Junior, Alexander HS
    *Katie McDonald*, Senior, Alexander HS
    *Sydney Scripp*, Senior, Alexander HS
    *Meghan Trout*, Senior, Alexander HS

    Alexander High School students will share their experiences being part of the Science Olympiad Team as well as what they have learned as a result of their successes and challenges.

10:00  **Break**

10:10  **Zoom In! A Nanoscience Claymation Video Project** (115)
    *Nancy Sandler*, Ohio University, 20 min

    *Zoom In!* is a claymation video that conveys concepts of scale, surface tension, and hydrophobicity for children in Grades K–3. Sandler showcases the video plus supporting material for teachers contained in the DVD.

10:10  **Science and Math Interpretations of Howard Gardner's Multiple Intelligences** (126)
    *Julio Camacho*¹, North Central University, 50 min

    Teachers who are creative, innovative, effective, and passionate allow and encourage students to learn, to assess, to reach their
own conclusions, to seek information, to form their own opinions, to make educated decisions, and to apply what they already know while using their unique cognitive profile and learning styles.

10:10  **Acid Mine Drainage Activity (127)**  
*Tim Prange*, Rural Action, 50 min  
Participants will take on the role of scientists to test water samples and determine which samples contain acid mine drainage, the origin of the samples, and how to treat them. They will test pH, use maps, and design a treatment system.

10:10  **Popcorn and Volume: Expanding Your Kernels of Knowledge (215)**  
*Derek Sturgill* & *Lindsay Gold*, Ohio University, 50 min  
Participants will experience an activity that helps students visualize and understand volume. We will also read a children’s book that is connected to this activity.

10:10  **An Effective Mathematics Setting and Instructional Process for All Children (219)**  
*Stephen Shadik*, Ohio University, 50 min  
How does a math classroom operate to produce significantly improved student achievement, to infuse and strengthen 21st century skills, and to curb the need for remediation programs? Attend and find out.

10:10  **Math Circles—A Sample Activity (322)**  
*Bob Klein*, Ohio University, 50 min  
Get a taste of a Math Circle activity used with students and teachers and a chance to engage in protracted problem solving and fun. Descriptions of broader impacts work and research basis will be provided.

10:35  **Science Nights: Scientific Literacy, Outreach, and Professional Learning (115)**  
*Danielle Dani & Science Nights Team*, Ohio University, 30 min  
Dani and co-presenters Olivia Hawley, Sara Helfrich, Chris
Kennedy, Katie Meeks, Susan Payne, Nancy Sandler, and Katlyn Schrumpf tell the story of three Science Nights in 2013, including the planning process, the factors that contributed to the success of each night, and the outcomes for teacher candidates, participating children and families, and the professional development school.

11:00  
**Break**

11:10  
**Graphing Rational Functions (115)**  
**Ahmad Alhammouri**, Ohio University, 30 min  
Alhammouri discusses the features that high school students should consider when graphing a rational function on grid paper, including domain, range, continuity, increasing and decreasing intervals, and horizontal and vertical asymptotes. Handheld calculators will be available, and Alhammouri will discuss how to use them effectively when graphing rational functions.

11:10  
**Classroom Management Tips and Concerns of a Pre-Service Teacher (126)**  
**Anthony Bokar**, Dover City Schools, 30 min  
Establishing routines, expectations, and collaboration in year one are critical to achieving success. Bokar provides some strategies and concludes with a discussion of the concerns of pre-service teachers.

11:10  
**STEM Education in Finland: Strengths, Challenges, and Curriculum Updates (127)**  
**Sari Havu-Nuutinen**, Ohio University, 30 min  
Elementary science education does not have long roots in the Finnish educational system. In the past two decades, there have been significant developments in the nature and content of science education. Visiting scholar Havu-Nuutinen summarizes the past and current situation, provides some national evaluation study results to show the current challenges, and reviews the revised and recently published national core curriculum as an implementation of the latest research findings.
11:10  *Engaging Statistics* (215)  
**Valerie Long**, Shawnee State University, 30 min  
Graphs and statistics are found in advertising, opinion polls and business. They are used to describe our world. Developing concepts of data analysis assists students in becoming statistically literate. This presentation includes hands-on middle grades activities aligned with Ohio's Learning Standards.

11:10  *The Egyptian Way* (219)  
**Amanda Rinaldi**, Ohio University, 30 min  
Rinaldi explains how Egyptian methods can be used to gain a deeper understanding of the concept of multiplication.

11:40  *Lunch and Conversations* (boxed lunch pick-up in foyer)  
Woodrow Wilson Teaching Fellows Lunch Gathering (215)  
CAT & Noyce Scholars Lunch Gathering (219)  
STEM Community Lunch Gathering (237)

12:45  Break

12:55  *Exploring Triangles on a Sphere* (126)  
**Greg Foley**, Ohio University, 50 min  
Imagine what it would be like if we lived on a sphere. What would the geometry of our world be? Oh my gosh, we do live on a sphere! This interactive session will explore the geometry of the surface of the Earth—with a special focus on triangles.

12:55  *Tech Tools for Teachers* (127)  
**Tony Tracy**, Belpre High School, 20 min  
Tracy showcases Internet-based tools that simplify grading and communication, including Google Apps, Google Classroom, backchannel sites, Zipgrade, Studyblue, Socrative, Remind, and others. Bring your laptop if you have one.

12:55  *Modeling the Maximum Volume of an Open Box* (215)  
**James Adabor**, Wright State University, 20 min  
Adabor presents an activity in which students are asked to construct rectangular open boxes of various dimensions.
Students are prompted to explore the volume of the boxes using beans, variables, functions, and graphing calculators as an introduction to calculus.

12:55  *Music, Movement, and Mathematics* (219)

**Courtney Koestler, Ohio University, 50 min**
This session will provide engaging opportunities for teachers to learn community-building ways to use music and movement to support and deepen students’ understanding of important mathematics concepts.

12:55  *Math Is a Puzzle* (322)

**Ky Davis, Muskingum University, 20 min**
Teach and review middle and high school math standards using simple 24-piece dollar store puzzles. Many puzzles, aligned to the standards, will be put together and shared. Participants may take pictures for easy creation of an activity for Monday!

1:20  *The Importance of Knowing Who Lives in Your Backyard* (127)

**Linda Rogness, Muskingum University, 30 min**
We can meet Ohio's science standards and teach children about who lives in their backyard. Understanding the ecological relationships that exist in our backyards is vital to a sustainable future. The children of today will be making important decisions in the future.

1:20  *Teaching K–8 Mathematics Through Mathematical Modeling and Problem Solving* (215)

**Reuben Asempapa, Ohio University, 30 min**
Mathematical thinking is cognitively foundational, and students’ early knowledge of mathematics strongly predicts their later success in school and in particular, STEM areas. High quality mathematics instruction has meaningful effects on students’ mathematical knowledge and achievements. This presentation emphasizes effective mathematics instruction that meets the needs of all students.
Building on Clement’s theoretical framework for model-based learning (2000), we explore ways in which teacher understanding of various topics is strengthened through the construction of interactive applets for students. The mathematical knowledge required to build a sketch is often related, but not identical to, content understanding required to interact with the completed model. We explore these differences through the analysis of several sample sketches.

To best foster 21st century learning, teachers should know the best ways to access, use, and collaborate with places of informal STEAM learning. This keynote presentation will provide information about engaging with places of informal learning in ways that enhance classroom learning.

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1 Choose Appalachian Teaching (CAT) scholar
2 OU PhD student
3 Woodrow Wilson Teaching Fellowship (WWTF) mentor
The purpose of the Appalachian Ohio Mathematics and Science Teaching Research Symposium (AppO MaSTRS) is to strengthen mathematics and science teaching throughout southern and eastern Ohio by fostering relationships among pre-service and in-service teachers and university and college faculty.

AppO MaSTRS 6 is sponsored by the Gladys W. and David H. Patton College of Education; the Southeast Ohio Center for Equity in Mathematics and Science (SEOCEMS); the Southeast Ohio Teacher Development Collaboration (SEOTDC); the Ohio University Woodrow Wilson Teaching Fellowship program; and the Choose Appalachian Teaching (CAT) scholarship program, which partners with Marietta College, Muskingum University, Shawnee State University, and the University of Rio Grande. Additional support was provided by the Ohio University Departments of Mathematics and Teacher Education as well as the Patton College Associate Deans for Research and Outreach.

The research symposium team wishes to thank the speakers, the volunteers, and the participants, especially the CAT scholars, the Noyce scholars, and the Woodrow Wilson Teaching Fellows. We also wish to express our appreciation to the Choose Ohio First Scholarship Program administered by the Ohio Department of Higher Education, which funds the CAT Scholarship Program; the National Science Foundation, which funded the Noyce Scholarship Program; and the Woodrow Wilson National Fellowship Foundation.

Help us improve next year's seventh annual symposium by completing an evaluation survey, available at the registration table during the lunch hour. You may leave your completed survey on the registration table.