



RiSE Conference 2015: Teaching, Learning, and Assessment in the Context of the Next Generation Science Standards and the Common Core State Standards in Mathematics

Invited Talk Abstracts

In Order of Session

Keynote Talk

Title: More than Content Knowledge: How We Think about Students' Ideas and How To Change Them

Presenter: Dr. Michael C. Wittmann, Professor and Chair, Department of Physics and Astronomy, Cooperating Professor, College of Education and Human Development, and RiSE Center Faculty Member, University of Maine

Abstract: Working with teachers has given me a broad, deep appreciation for the complicated professional lives that teachers lead. Content learning seems like the least of it, but it's also the thing we say is most important. How do we, as teachers, respond to the wonderful variety among our students and the many (many, many) requirements for our instruction? We can't do it all, we're going crazy! So what do we do? I want to focus on our strengths. When we look at the teaching of energy in middle school, how have teachers talked about the various goals of teaching and learning? I'll talk about a policy pressure to do something new, the deep teacher awareness of what students bring to the classroom, and those simple human traits we teachers have when dealing with something new, like judgment, attention, curiosity, and care.

Monday, June 29, 9:00-9:40 am

Title: Leveraging Visualization in Mathematics Teaching, Learning, and Assessment

Presenter: Dr. James A. Mendoza Epperson, Associate Professor and Distinguished Teaching Professor, Department of Mathematics, University of Texas at Arlington

Abstract: With the increasing availability of technology that enables students and teachers to produce dynamic visual representations to explore mathematical relationships and models, it is critical for teachers to understand how to strategically use visualization as an appropriate tool in mathematics teaching, learning, and assessment. We will highlight dynamic visualization tasks grounded in algebra, precalculus, and calculus and link their use to learning goals and appropriate assessment. We also examine the use of visualization on high stakes algebra exams and corresponding connections to assessment practices in college mathematics. [Note: Audience grades 8-12]

Title: Why Do We Need To Do Authentic Assessments

Presenters: Carla Magoon, Middle School Math and Science Teacher, Troy Howard Middle School
Elizabeth Haynes, Middle School Math and Science Teacher, Troy Howard Middle School

Abstract: In this session, we will discuss what authentic assessment is and isn't, discuss why a teacher should consider doing more authentic assessments, and introduce some of the different types of authentic assessment that are available. This talk may be of interest to any educator that teaches mathematics or science.

Monday, June 29, 9:40-10:20 am

Title: Vehicles in Motion, Data-based Decisions to Align to the NGSS

Presenter: Dr. Carolina Alvarado, Postdoctoral Research Associate, RiSE Center, University of Maine

Abstract: The Maine Physical Science Partnership (MainePSP) promotes the use of research-based active learning strategies in middle school. In this talk we will discuss the process of assessing and redesigning the Vehicles in Motion (Forces and Motion) unit. We have collected data from the classroom, taking students' and teachers' data throughout the years, in order to inform the modification process. We share the information that lead us to decide to modify the materials implemented for this unit. We are also discussing the changes made to the materials, explaining how the added section helps to align to the Next Generation Science Standard.

Title: 7 + 5 = Assessment Literacy

Presenter: Dr. Anita Stewart McCafferty, Assistant Professor, Educational Leadership, University of Southern Maine

Abstract: Want to improve student learning? Anita will share the 7 strategies of assessment for learning + the 5 keys to quality of assessment of learning proven to positively impact student achievement.

Monday, June 29, 1:00-1:40 pm

Title: Chalk Talk in Geometry: Presenting Proofs as Opportunities for Practicing Discipline-Specific Communication

Presenter: Dr. Justin Dimmel, Research Associate, Mathematics Education, University of Michigan

Abstract: When students are called to the board to present proofs during geometry class, the students tend to focus on creating mark-for-mark reproductions of work they have completed already. Transcribing completed proofs helps to ensure the accuracy of the statements and reasons that are written on the board. A drawback of proof transcription is that the emphasis on accurate writing can detract from developing fluency with other communication skills, such as coordinating mathematical speech with drawing and gesturing. This session considers how the activity of presenting proofs in geometry classrooms could be modified to create opportunities for students to develop these other communication skills.

Title: What Are Middle School Students Talking about During "Clicker" Questions?

Presenter: Dr. Michelle K. Smith, Assistant Professor, School of Biology and Ecology, Cooperating Assistant Professor, College of Education and Human Development, and RiSE Center Faculty Member, University of Maine

Abstract: There is a growing interest in using classroom response systems or "clickers" in science classrooms as they are widely viewed as a promising technology by both university and K-12 instructors. The existing literature on this technology has largely focused on the efficacy of clicker implementation, with a few studies investigating collaboration and discourse during clicker conversations. In our work, middle school students in a physical science class were asked to answer clicker questions individually, discuss the clicker questions with their neighbors, and answer the questions again. We audio-taped the conversations and analyzed learning gains on each question. The analysis of the conversations revealed that students largely talked about science content during the clicker conversations and collaboratively discussed content instead of just having one student

telling peers an answer without further discussion. Furthermore, the majority of conversations were productive in that they contained evidence of collaborative knowledge co-construction.

The authors are: Lauren A. Barth-Cohen, Michelle K. Smith, Daniel Capps, Justin D. Lewin, Jonathan T. Shemwell, MacKenzie R. Stetzer

Tuesday, June 30, 8:00-8:40 am

Title: Argumentation in the Science Classroom: Supporting Students in Justifying Claims with Evidence and Reasoning

Presenter: Maria Gonzalez-Howard, Doctoral Student, Curriculum & Instruction, Boston College

Abstract: This session will explain an effective framework that breaks down the structural aspect of scientific argumentation into three components – claim, evidence and reasoning (CER). This framework provides teachers with a tool for supporting and enhancing students’ argumentation practices. During this session we will see how the CER framework can be used for evaluating students written and spoken arguments. Although this session is geared for both middle and high school teachers, it uses examples mainly from middle school classrooms.

Title: Why Do I Need this Class? A Tale of Developing a Calculus Course for Preservice Elementary Teachers

Presenter: William Hall, Doctoral Student, Mathematics Education, North Carolina State University

Abstract: Current reports call for the better preparation of STEM teachers as a way to create a STEM-literate population who can address many of the nation’s problems. Supporting the development of well-prepared, STEM-focused elementary teachers is one way to address the on-going demand to increase the STEM pipeline, address STEM teacher shortages, and develop a STEM-literate nation. Calculus is a powerful setting for analyzing the world, but knowledge of it is not often thought of as necessary for a preservice elementary teacher. However, if approached in a way made meaningful for such a population, calculus can be immensely useful for any teacher of mathematics as it opens doors to a mathematical understanding of the world unreachable with only algebra and geometry. In this talk I will describe the CELTIC (Calculus for Elementary Teachers: An Innovative Context) research project, in which we developed a calculus curriculum specifically for preservice elementary teachers. I will discuss how we use fundamental concepts like patterns, rate of change, and function to simultaneously address both elementary mathematics and calculus topics as well as showcase pedagogical strategies for preservice teachers. Specifically, I will share the development of an introductory task on patterns and geometric sequences we use to help preservice elementary teachers experience active learning while learning about limits, infinity, and sequences. This task utilizes a children’s story, *One Grain of Rice* by Demi, to connect elementary mathematics of patterns and change with the more advanced concepts of sequences and limits.