



# TRESTLE

## PROGRAM OF 2016 ANNUAL MEETING PRESENTATIONS

### Course Transformation Case Studies

**Friday, October 21<sup>st</sup> 9:00-11:00**

Case Study 1

Implementing Interrupted Case Studies Across a Human Anatomy and Physiology Course Sequence  
*Janet Casagrande and Ruth Heisler, University of Colorado Boulder*

Case Study 2

Generating Buy-In and Transforming an Introductory Molecular Biology Course  
*Mark Mort, Brian Ackley, Stefanie DeVito, University of Kansas*

Case Study 3

Transformation in Progress: An Intro Astronomy Course at UBC  
*Linda Strubbe, University of British Columbia*

### Poster Session

**Friday, October 21<sup>st</sup> 11:00-12:00**

A Tale of Two 1st Year Biology Courses - The BioFlex Approach Collaborative and Evidence-Based Approaches Towards Improving Student Learning and Experiences  
*Sunita Chowira, University of British Columbia*

Analysis of How Supplemental Instruction Impacts Student Success in a High Enrollment Upper-Division Biology Course  
*Marina Crowder, University of California Davis*

Continued Use of Research-Based Instructional Strategies after Paired Teaching  
*Linda Strubbe, University of British Columbia*

Development of a Blended edX Resource for Face-to-Face and Online Learning in Physics 100  
*Georg Rieger, University of British Columbia*

Engineering Physics at Queen's - Teaching Engineering and Experimental Design to Scientists  
*Rob Knobel, Queen's University*

Examining the Impact of Collaborative Two-Stage Exams on Long-Term Retention  
*Mark Mort and Stephanie DeVito Martin, University of Kansas*

Scaling Up Active Learning Success from One Course to a Department  
*Mark Mort and Stephanie DeVito Martin, University of Kansas*

The Journey to a New Undergraduate Major: What Do We Want Our Students to Learn?  
*Alexandra Jahn, University of Colorado Boulder*

Transformation of CE 301: Statics and Dynamics  
*Bob Lyon and Molly McVey, University of Kansas*

VARK Learning Styles & Study Habit Preferences in an Undergraduate Anatomy Class  
*Polly Husmann, Indiana University Bloomington*

### **Lunch Speaker**

#### **Friday, October 21<sup>st</sup> 12:30-1:10**

**Title:** Talking about Leaving Revisited: What Factors Currently Affect Students' Decisions to Switch from STEM Majors?

**Presenter:** Anne-Barrie Hunter, Program Manager, Center for STEM Learning, University of Colorado Boulder

**Abstract:** Anne-Barrie Hunter presents preliminary findings from the research study, "Talking about Leaving Revisited." This study augments and replicates the research producing the influential volume Talking about Leaving: Why Undergraduates Leave the Sciences (Seymour & Hewitt, 1997). Hunter will briefly describe the multi-component study and share preliminary results on current factors affecting students' decisions to switch from their STEM majors, using extracts from interviews to illustrate these students' STEM learning experiences.

### **Quick Hits**

#### **Friday, October 21<sup>st</sup> 3:30-4:35**

Disproportionate Benefits of Active Learning for Underrepresented Groups  
*Kyle Trenshaw, Brown University*

Implementation of Collaborative Assessment in a Large Lecture Course  
*Miriam Martin, University of California Davis*

Rubrics and Learning Outcome Identification with Web Based Tool  
*Natalie Simper, Queen's University*

Syllabus Quizzes  
*Teresa Foley, University of Colorado Boulder*

Trojan Horse Physics  
*Chris Fischer, University of Kansas*

Using Annotation of Graphs and Tables to Describe Evidence as a Basis for Making Claims  
*Andrew Martin, University of Colorado Boulder*

## **Workshops**

### **Saturday, October 22<sup>nd</sup> 8:45-11:00**

#### **Mini-Workshop Round 1 Options**

##### **Room A: PhET Interactive Simulations: Effective Classroom Use**

*Leader:* Mike Dubson, University of Colorado Boulder

Michael Dubson is a Senior Instructor in the Physics Department at the University of Colorado at Boulder, where he is Associate Chair for Undergraduate Studies and a member of the Physics Education Research group. He has a BS in Physics from the University of Illinois at Champaign-Urbana (1978) and a PhD in condensed matter experiment from Cornell University (1984). He has won several teaching awards, including the 2006 American Association of Physics Teachers Education Award. He is also a software designer for PhET, which is "the best educational software that money can buy, except you can't buy it, because it's free." (See <http://phet.colorado.edu> .)

*Abstract:* In this workshop, I will give a brief tour of the PhET website ([phet.colorado.edu](http://phet.colorado.edu)) which is "the best science education software that money can buy, except you can't buy it, because it's free". PhET is a suite of more than 100 interactive simulations which illustrate principles in physics, math, chemistry, and biology. I will describe the various ways these sims can be used in the classroom and in homework, and we will see a few specific examples of classroom activities. We will discuss what makes an activity good or bad. This will be an interactive presentation; audience members will confer with neighbors to answer concept tests. No laptops are needed.

##### **Room B: Decoding the Disciplines: Making Expert Thinking Explicit**

*Leaders:* Joan Middendorf and George Rehrey, Indiana University

Joan is the Co-director of Faculty Learning Community, Associate Director of Campus Instructional Consulting (CIC). With a Ph.D. in Instructional Systems Technology from Indiana University, she has taught faculty and instructors at IU to assess and improve their teaching by presenting workshops, observing classroom teaching, and collaborating on course development and testing procedures. She has traveled to South Africa several times to train staff at universities and in the health care field to adapt their teaching to an influx of diverse students. She studies T'ai Chi for relaxation and as an exercise in learning.

George Rehrey is the director of Indiana University's award winning Scholarship of Teaching and Learning (SOTL) program, leading efforts to support instructors of all ranks as they transform their courses, conduct classroom research, collect evidence of student learning, form Communities of Transformation, and disseminate their work locally, nationally, and internationally. In this role he leads the Student Learning Analytics program, where faculty are making use of analytics at the course, program and curricular level to improve student learning and success. George is also a member of the Bay View Alliance Steering Committee, an international organization funded to transform the teaching and learning culture in STEM departments, and serves on BVA Governance Committee as well. In addition to understanding how learning analytics can inform the SOTL, his other current research is concerns the influence that social and economic reward systems may have upon faculty learning communities and academic development programs.

*Abstract:* Experts often hold their knowledge in tacit and implicit ways that are not easily accessible to novices. Thus, it can be difficult for disciplinary experts to show students how to operate in their fields. Decoding the Disciplines provides a process for uncovering these mental processes and epistemologies and helps teachers gain deeper understanding of their tacit disciplinary mental moves. In this workshop we will provide an overview of the seven-step process before focusing on the place where a majority of students get stuck in their learning. Participants will have an opportunity to practice interview strategies that experts can use to make implicit disciplinary operations explicit for students. Then, working in groups, we will explore how decoding can transform student learning within any give context.

#### **Room D: Support Structures for Embedded Experts: What Works**

*Leaders:* Stephanie Chasteen, University of Colorado Boulder and Warren Code, University of British Columbia

Stephanie Chasteen is the Associate Director for the Science Education Initiative at CU Boulder. She has been involved the SEI for 8 years, originally joining as a postdoc in the physics department. She has written several papers and articles about the SEI, including results and lessons learned across departments. She is currently the PI for the TRESTLE project at CU.

Warren Code is Associate Director for the Science Centre for Learning and Teaching at the University of British Columbia. He is responsible for coordinating support structures across departments for the dozen or so Science Teaching and Learning Fellows (STLFs; UBC's term for its embedded experts) in the Carl Wieman Science Education Initiative at UBC. He was previously an STLF in the Mathematics Department.

*Abstract:* We will discuss a variety of support structures for embedded experts that emerged as valuable components in the Science Education Initiatives at UC-Boulder and UBC. The main themes will be support for integration in a department and ongoing professional development of the experts in the areas of faculty development, evidence-based teaching, and education research.

#### **Mini-Workshop Round 2 Options**

#### **Room A: Addressing Bottlenecks in Computing and in STEM**

*Leaders:* Memhmet Dalkilic and Bryce Himebaugh, Indiana University.

Mehmet M. Dalkilic is an Associate Professor of Computer Science in the School of Informatics and Computing, Indiana University, Bloomington, IN. He was the first full-time faculty at the school and also co-created the Computational Biology graduate program. His main areas of research are big data and analytics. As a teacher, he has been responsible for the development of many classes spanning both undergraduate and graduate in Informatics, CS, and Computational Biology. He now is offering a new CS introductory class C200 that leverages contemporary pedagogy to attract and retain women and underrepresented groups. He also is assisting with educating K-12 teachers to become CS instructors with Indiana's School of Education.

Bryce Himebaugh is a Clinical Assistant Professor of Computer Science at Indiana University. He is the Chief Technical Officer at Analog Computing Solutions and the Director of Information Technology at Indiana University School of Informatics and Computing.

*Abstract:* In this workshop we will discuss how to address bottlenecks to student learning both in computing courses and in STEM. A bottleneck is the place where most students get stuck in a given course. Over the past 18 years, faculty have uncovered many “types” of bottlenecks using the Decoding the Disciplines model. In this session we will focus on two of the more reoccurring ones. First, we will share the bottlenecks he has uncovered in an introduction computer science course and show how he teaches and assesses student mastery of specific mental actions that block student learning. Then, participants will identify both a conceptual and an emotional bottleneck that students often encounter within their own discipline. Finally, working in teams, participants will develop good questions to ask their students in order gather more information about where and why most students are getting stuck in their learning.

### **Room B: Learning Assistants/Using Undergraduate Students in the Classroom**

*Leader:* Devon Quick, Oregon State University

Devon Quick is a Senior Instructor in the Department of Integrative Biology at Oregon State University. She is in town for the Learning Assistant Conference and has agreed to share her knowledge of working with undergraduate students in STEM courses in this workshop with TRESTLE participants.

*Abstract:* In this workshop, we will examine how you can couple trained undergraduate peer facilitators — which we call Learning Assistants (LAs) — with active learning approaches. This approach allows you to increase the teacher to student ratio by leveraging trained undergraduate students, who are often more intimately familiar with the student learning difficulties than graduate TAs. LAs have been shown to increase student learning in many courses, and some LAs go on to become certified teachers. We will discuss best practices in using LAs, including how to prepare LAs for the active learning sessions. We will watch videos of LAs in practice to ground our discussion in actual practice, and talk about different ways to implement an LA program. More about LAs at [http://serc.carleton.edu/sp/library/learning\\_assistants/index.html](http://serc.carleton.edu/sp/library/learning_assistants/index.html).

## **Room D: The Design and Use of Interactive "Tactivities" for Undergraduate Calculus**

*Leader:* Faan Tone Liu, University of Colorado Boulder

Faan Tone Liu is an Instructor in the Department of Mathematics and serves as the Calculus Program Coordinator at the University of Colorado Boulder. She will be sharing with us about the innovative work that she is doing to help students learn calculus.

*Abstract:* This interactive presentation will provide a brief overview of undergraduate mathematics at the University of Colorado Boulder, and portable interactive activities called Tactivities that we have designed and used in the first-year calculus sequence to ensure more widespread experience of active learning in calculus courses. In Tactivities, students arrange sets of cards to explore mathematical relationships and communicate their reasoning as they solve mathematics problems. Participants will have an opportunity to engage in these activities and discuss ways these active learning principles can be applied in undergraduate mathematics and science classes.