CONNECTING RESEARCH AND TEACHING CONFERENCE
FOR CURRENT AND FUTURE FACULTY
May 21, 2018

Sponsored by the Center for Teaching Innovation (CTI)
and the Cornell University Center for the Integration of
Research, Teaching, and Learning (CU-CIRTL)
Welcome

It is our great pleasure to welcome you to the 2018 Connecting Research and Teaching Conference. This is the seventh annual offering of what was previously known as the Classroom Research and Teaching Symposium. This event highlights and supports the research of graduate students, postdocs, faculty, and staff into effective teaching and learning.

What is Teaching as Research?

Teaching as Research is the deliberate, systematic, and reflective use of research methods by instructors to develop and implement teaching practices that advance the learning experiences and outcomes of both students and teachers. It can be a great capstone experience for graduate students and postdocs interested in learning more about teaching and learning, enhancing their CVs, and moving closer to an academic career. Teaching as Research also helps new and veteran faculty build upon their skills as researchers to help them systematically use evidence to inform and improve teaching and learning in their classrooms.

Introductory remarks will be provided by:

Mathew Ouellett
Executive Director, Center for Teaching Innovation (CTI)

Colleen McLinn
Director, Center for the Integration of Research, Teaching, and Learning (CU-CIRTL)

The conference program planning has been chaired by:

Kimberly Williams
Teaching Support Specialist, Center for Teaching Innovation

We thank our sponsors and others who have contributed, listed in more detail on page 19.
AGENDA

All events are in 423 ILR Conference Center

8:00am - 8:30am  Breakfast and check-in

8:30am  Welcome and introductions
Opening remarks by Colleen McLinn, CU-CIRTL

8:40am - 10:50am  Paper presentations I

11:00am - 12:00pm  Poster session

12:00pm - 12:30pm  Lunch served

12:30pm - 1:20pm  Roundtable discussions

1:30pm - 2:30pm  Paper presentations II

2:45pm - 4:15pm  Keynote - More Than Just Shiny Objects: Using Technology to Support Student Learning
Derek O. Bruff, Vanderbilt University
Introduction by Mathew Ouellett, CTI

4:15pm - 4:45pm  Networking reception
Dr. Derek Bruff oversees the Vanderbilt University Center for Teaching’s programming and offerings for faculty and graduate students, helping them develop foundational teaching skills and explore new ideas in teaching and learning. He also consults regularly with campus leaders about pedagogical issues, seeking to foster a university culture that supports effective teaching.

Dr. Bruff served on the board of directors of the Professional and Organizational Development (POD) Network from 2010 to 2013, and currently serves as co-PI on a three-year, $750,000 National Science Foundation grant supporting the creation of two massive open, online courses on evidence-based teaching practices for future STEM faculty.

Dr. Bruff’s research interests include educational technology, visual thinking, and social pedagogies. He blogs on these topics at derekbruff.org, and his book, *Teaching with Classroom Response Systems: Creating Active Learning Environments*, was published by Jossey-Bass in 2009. Bruff has taught at Harvard University and has a Ph.D. in mathematics from Vanderbilt University.

Dr. Bruff will be presenting his keynote, *More Than Just Shiny Objects: Using Technology to Support Student Learning*, at 2:45pm.

CTI Executive Director Mathew Ouellett will be introducing Dr. Bruff.
Paper Presentations I

Evaluating the Effectiveness of the Flipped Classroom in a Nutritional Sciences Course
Emily Riddle, Nutritional Sciences, Cornell University
Nutrition professionals must routinely apply scientific principles to patient care. However, students often struggle linking science with practical nutrition interventions. The flipped classroom encourages students to apply material to real life situations and may improve student synthesis of challenging material. In this study, we compared student engagement and learning outcomes in a medical nutrition therapy class that was traditionally taught in 2015 and taught using the flipped format for 50% of the material in 2017. Use of the flipped classroom increased student engagement during class and promoted community among the students. However, student engagement with online course material declined over the course of the semester. Students felt that the flipped classroom increased the amount of time they needed to spend on the class and made it difficult to keep up with assignments.

“Inquiry On the Spot”: Leveraging the Oral Exam Environment for Training Students to Rapidly Evaluate Scientific Evidence
Andrew St. James, Microbiology, Cornell University
Numerous studies have analyzed the effects of inquiry-based learning strategies on students’ abilities to critically evaluate scientific evidence. However, these studies have mainly focused on teaching critical thinking within frameworks that allow students ample time to wrestle with complex scientific ideas. Relatively few studies have evaluated methods to teach students to critically analyze data with greater immediacy, a necessary skills for science professionals. In this work, I present evidence to show that the oral exam environment can be leveraged to train students to rapidly evaluate experimental data. I provide instructional recommendations for educators wishing to incorporate “inquiry on the spot” training in their courses and reflect upon the use of teaching assistants as the primary deliverers of inquiry instruction.

Debates as Teaching Tools to Discuss Emerging Technologies
Carolyn Chlebek, Biomedical Engineering, Cornell University
The gut microbiome is a relatively unexplored aspect of human health with potential applications across a wide spectrum of disease. In a Cornell graduate-level course developed by Dr. Ilana Brito to cover this topic, a graduate student
delivered four guest lectures followed by an in-class debate. Under IRB approval, surveys were administered to examine students’ opinions on the debate topics regarding emerging technologies in the microbiome field, as well as to gather background information on the students. This pilot study revealed that students largely felt the debate influenced their opinion in directions consistent with those reflected by their final survey-indicated opinion, and there appear be trends in some functions of the debate assignments. Additionally, background information such as experience with patents or owning companies, may correlate with student opinions for these debate topics. This pilot study shows potential for using debates to assist students in forming educated opinions on emerging technologies.

Virtual Reality as a Teaching Tool for Moon Phases and Beyond
Jack Madden*, Astronomy and Space Sciences; Natasha Holmes, Physics; Andrea Stevenson Won, Jonathon Schuldt, Byungdoo Kim, Swati Pandita, and Yilu Sun, Communication, Cornell University

*Presenting
Virtual reality (VR) has the technologic capabilities and embodied cognitive advantages of a computer simulation and a hands-on demo combined. This positions it well as a potential new way to engage students and elevate their learning. We designed a VR Moon phase demo and tested it with students to see how it performed against traditional lessons on Moon phases.

Anarchy in the Classroom: The Efficacy of Self-Directed Learning for Anti-Racist Pedagogy
Katherine Thorsteinson, English, Cornell University
This autoethnography traces my experiences designing and teaching two freshman writing seminars on topics of race. As a white female graduate instructor, I set out to locate, interrogate, and decenter my whiteness in the classroom. I thus turned to models of Self-Directed Learning (SDL) for extending agency and responsibility to my students over their own racial education. This study documents both the possibilities and pitfalls afforded by this pedagogy.

Student Learning and Engagement in a Growing Engineering Classroom
Jeffrey A. Mulligan, Electrical & Computer Engineering and Biomedical Engineering, Cornell University
Biomedical signals and systems is a required course in Cornell’s new biomedical engineering major track. Over the past three years (coincidentally, the age of the BME major), I have been both a teaching assistant and a guest instructor for a module of this course. As the BME major has rapidly grown, so too has student
enrollment in the course. Here, I summarize challenges that have emerged as a result of this growth, discuss their impact on student learning and engagement, and propose practices which may help mitigate their effects in future iterations of the course.

**Publishing Active Learning Classroom Lessons Improves Undergraduate Education**
Michelle Smith, Biology and Ecology, University of Maine; Ecology and Evolutionary Biology, Cornell University
To improve undergraduate education, there is a need for instructors who are using active learning to publish their innovative instructional materials in peer-reviewed journals. To do this, instructors can assess student knowledge, iteratively design activities, measure student learning, and publish the results. Creating a set of well-vetted activities, searchable through a journal interface, saves other instructors time and encourages the use of active-learning instructional practices. For authors, these publications offer new opportunities to collaborate and can provide evidence of a commitment to using active learning instructional techniques in the classroom.

**Assessing Assessment: An Evaluation of Weekly Formative Quizzes as a Teaching Tool in an Intensive Undergraduate Ornithology Course**
Cornelia (Lily) Twining, Ecology and Evolutionary Biology, Cornell University
As the field of ecology and evolutionary biology continues to grow, students face the challenge of learning and teachers face the challenge of evaluating student retention of an ever-increasing amount of content. Educational research across a variety of disciplines suggests that low-stakes formative assessments can help students learn and retain content more content than studying alone and may provide students with an effective alternative to cramming before larger summative assessments. Here, I assessed the effectiveness of formative assessment in the form of weekly quizzes in an intensive undergraduate ornithology course. In addition to learning the evolutionary history, ecology, behavior, and physiology of birds, students in the class were tasked with learning to recognize and describe the distribution and breeding biology of 350 families of birds and 151 species of birds from specimens over the course of a 13-week semester. I compared student performance on summative lab practical exams between one year with and one year without weekly low-stakes quizzes, finding that quizzes had limited effects on student performance. My preliminary findings suggest that even with formative assessment opportunities students may still struggle to retain content content-heavy courses.
Addressing Misconceptions of Experimental Design in the Biomedical Instrumentation Classroom
Daniel Rivera, Biomedical Engineering, Cornell University
The purpose of this research is to identify and remediate misconceptions in the biomedical engineering curriculum pertaining to experimental design in order to improve the quality of future research and experiments by the students in this field. In the bioinstrumentation course, students designed and implemented their own experiments pertaining to measures of heart rate. For the year prior to this study, students relied solely on their previous experience with experimental design. The students taking the course during the time of this study received a pre-lecture quiz followed by a refutational lecture to address misconceptions that were observed from the quizzes and in the previous year before the students gave their final design and performed any experiments. Without lecture in the year prior, there were many noticeable errors and misconceptions throughout the experimental design process as compared to the students who received the additional lecture on experimental design. Even with lecture, misconceptions persisted primarily in the areas of group design involving experimental and control groups as well as the appropriateness of using separate groups or crossover studies. These findings indicate that additional measures should be taken earlier in students’ education about how to appropriately design and conduct experiments.

Resculpting the Multiple Choice Question Based Assessment System in a Large Science Classroom
Kathleen Hefferon, Food Sciences, Cornell University; Cell and Systems Biology, University of Toronto
This study examines the impact of providing alternatives to the pre-existing assessment system for a third year university science class of 250 students. The entire grade in this course is based upon two midterms and a final examination, and the tests are composed of multiple choice questions (MCQs). While scantrons facilitate the marking process for instructors, many students are unhappy with this method of assessment. This study attempted to determine whether subtle changes in course structure and assessment methods would improve student overall performance, classroom experiences and the student career decision-making process. Methods used to examine these key aims included a bonus point assignment system by which the students could explore material outside of the course content and thus play a more empowered role within the classroom. The following presentation describes the results of this study through the examination of bonus point assignment selection choices, grade improvements over the duration of the course, as well as feedback on questionnaires and Facebook postings.
Science History to Improve Statistics Instruction in an Introductory Biology Course
Dhyan Palanichamy, Integrative Plant Science, Cornell University
In the past decade, advancements in automation, DNA and RNA sequencing, robotics, remote sensing, imaging etc., has increased the data in biology by several folds. Biologists of the future are required to be literate and innovative in statistical methods to make meaningful interpretations of big data. However, students who attend an introductory biology courses with no experience in statistics, often find it hard to grasp statistical concepts. In engineering, science history has been frequently used in physics labs to get students motivated about physics and prevent them from dropping out. This led us to hypothesize that inspiring students with science history of statistical methods could improve our statistics instruction in an introductory biology course. The study provided us with interesting insights into the student thought process when it comes to learning statistics and incorporating science history of statistical methods in an introductory biology course.

Poster Presentations

What Really Happens in Office Hours? Characterizing Feedback in Introductory Programming Courses
Molly Q. Feldman, Computer Science, Cornell University
Office hours and the teaching assistants (TAs) who run them play a significant role in providing feedback to students in large introductory computer science (CS) courses. However, there is limited work understanding what type of feedback CS TAs provide to students and why they choose some types of help over others. We conducted an observational study of two different introductory programming courses in order to better characterize how TAs interact with students every day. Our results suggest a number of action items for future TAs as well as discussion points for the greater CS education community.

Student Perceptions of Learning Outcomes and Writing Prompts: A Case Study Approach in a First-Year Sociology Writing Course
Lauren Griffin, Sociology, Cornell University
Much research has been conducted in the field of teaching and learning on the importance of learning outcomes and grading rubrics for student learning. However, we know relatively little about how students actually use these
To Be or Not to Be: Efficacy of Focused Efforts at Correcting Overuse of “to be” in a 2018 First-Year Writing Seminar
John Wyatt Greenlee, Medieval Studies, Cornell University
The purpose of this project is to assess the efficacy of instructional focus on overuse of the verb “to be” in student writing over the course of a semester. The project assesses both student usage of “to be” through an examination of their usage rates in their essays, and student perceptions of overuse of “to be” as an issue, both in writing generally and in their own writing specifically. The study charts “to be” usage rates per 100 words across five essays in conjunction with specific points of pedagogical intervention, and considers these results in coordination with students responses to survey questions, with the purpose of appraising the value of both the overall focus and of individual instructional moments.

Graduate Students at a Crossroads in Feedback: Sources for Receiving and Practices of Giving
Yen Vu, Romance Studies, Cornell University
Graduate Student Instructors are both recipients and givers of feedback, in their work toward a degree and in their instruction for writing-heavy courses. Understanding how feedback is learned and incorporated in practice is exemplary of how teaching as a whole is learned and incorporated: through formal training, example, and trial and error. This study traces where graduate students learn the kinds of feedback that are useful, and how they apply them within their courses, and initiates a way for instructors to be reflective and thoughtful of feedback as a best-practice in teaching.

Transforming Undergraduate Physics Labs at Cornell
Emily M. Smith, Martin M. Stein, and N.G. Holmes, Laboratory of Atomic and Solid State Physics, Cornell University
In Fall 2017 at Cornell University, we conducted a quasi-experiment to investigate the effects of physics lab pedagogy—content-focused versus experimentation-focused—on students’ exam performance, beliefs and attitudes about experimental physics, and in-lab critical thinking behaviors. Previous work has separately explored these effects on different types of lab courses, however, this is the first
study to explore these effects in combination and within a single course, better isolating the effects of lab pedagogy. Differences in lab pedagogy did not measurably affect students’ exam performance (which measured physics content knowledge, and not lab skills) but did contribute to differences in students’ beliefs and attitudes about experimental physics: Students in the experimentation-focused labs became more expert-like in their beliefs, while students in the content-focused labs became less expert-like. Furthermore, students in the experimentation-focused labs exhibited similar and better critical thinking performance compared to implementations of similar labs at other institutions. These results demonstrate the extensive added benefit of the experimentation-focused labs, with no loss to students’ content knowledge despite the dramatic shift in learning goals. This study was supported by the Cornell University College of Arts & Sciences Active Learning Initiative.

Investigating Confirmation Bias in Introductory Physics Labs
Martin M. Stein, Emily M. Smith, and N.G. Holmes, Laboratory of Atomic and Solid State Physics, Cornell University
The aim of this study was to quantify the proportions of students engaging in confirmation bias related behaviors in Introductory Physics Labs. Students in these labs are asked to investigate a given physical model, iterate their experimental procedures and document their decision processes. The labs were only graded on participation, such that there should be no external incentive to achieve a specific outcome. A subsequent discussion reveals the inadequacy of the model under consideration. This study was supported by the Cornell University College of Arts & Sciences Active Learning Initiative.

A Survey of Major Requirements in Liberal Arts Computer Science Programs
Scott Wehrwein, Computer Science, Cornell University
Computer science (CS) departments in liberal arts colleges occupy a unique position in their institutions, and face a unique set of challenges. An informal body of faculty from these institutions, known as The Liberal Arts Computer Science Consortium (LACS), published curriculum recommendations for liberal arts CS programs in 1986, with updated versions published in 1996 and 2007. We review the state of CS programs at liberal arts colleges with respect to the model curriculum. In particular, we focus on where the model’s recommendations are not followed. We find a broad trend towards fewer core required courses, with software development courses most often left optional. We also examine examples of unique curriculum differences found at a small number of institutions that appear to be motivated by pedagogy instead of resource limitations.
Examining Student Views on Project Based Learning: Weather Balloons in the Astro 1104 Lab
Matthew Hankins and Andrew SD Foster, Astronomy, Cornell University
In this study, we examine a project based learning opportunity in the Astro 1104 lab section where students participated in the design, construction, and launch of a payload for a weather balloon. We focus on student perceptions of this project and comparisons between their experience in this lab and other more traditional lab courses. Based on our survey of the class, a majority of students had an ‘Extremely good’ opinion of the lab and more than 80% of the students are likely to take a similar lab course with a project based learning component in the future.

Lost in Translation? Student Action Plan Assignments Reveal Climate Change Course Messages May Not Be Getting Through
Tristan Shepherd, Earth and Atmospheric Sciences, Cornell University
The Department of Natural Resources at Cornell University offers a Massive Open Online Course (MOOC) ‘Climate Change Science, Communication, and Action’ which is open to people around the world. The students of this course undertake a final assignment where they design a realistically achievable climate change action plan informed by the course material. In order to assess whether students comprehend the course material and use what they have learned, the content of a randomly selected number of action plans was assessed to identify whether misconceptions about climate change exist after their undertaking of the course. From assessing the sampled action plans, it is found that the students generally have a basic understanding of what climate change is, but are not translating this into actions they can take, instead reverting to actions they already do. This finding is useful for informing the teaching and learning process, and provides some direction for changes that might be required to improve learning outcomes in this particular online teaching platform.

Engagement Without Electronics – Lessons from a Voluntary Electronics Ban
Jared Enriquez, City and Regional Planning, Cornell University
When there are no consequences for violation, does banning the use of electronic devices in lecture still improve student engagement? This study reflects on observations from a freshman-level undergraduate lecture that implemented a voluntary ban on all electronics in the spring of 2018. The teaching assistants evaluated if the ban improved student engagement and mastery of learning outcomes using the qualitative approaches of participant observation and text analysis of student reviews and assignment submissions. The teaching assistants
observed that the voluntary nature of enforcement should have been supplemented by other methods to more substantially improve student engagement with course material and interactions with the professor.

**Do Students Read When There Is No Accountability? An Analysis of Midterm Responses**

Nidhi Subramanyam, City and Regional Planning, Cornell University

Getting students to read course material is one of the biggest challenges for instructors in the social sciences. In the absence of accountability structures such as weekly assessments or grades, it is likely harder. Which students are likely to read and how does it shape their performance on exams? In this study, we analyze midterm responses from a large, lecture-based undergraduate classroom to identify whether students read and how it correlates with their class attendance and engagement. We find that students who do not attend lectures are more likely to reference the course readings alone rather than synthesize materials across the readings and lectures. They are also more likely to misinterpret the key concepts that underpin the course material. The findings from this case have the potential to inform teaching practices that seek to adopt an approach based on volunteerism and student-initiatives rather than those based on sanctions and incentives.

**Student Perceptions of Performance and Confidence Engaging with Science Beyond the Walls of the Classroom**

Elizabeth Kreitinger, Biological and Environmental Engineering, Cornell University

This study evaluated student perceptions and experiences before and after completion of a large introductory biology course.

**Graduate Teaching Assistants’ Perspectives on Active Learning in a Large Lecture Human Anatomy and Physiology Course**

Sri Lakshmi Sravani Devarakonda, Nutritional Sciences, Cornell University

Active learning classrooms involve great student-to-student as well as student-instructor interaction. Graduate teaching assistants’ (GTAs’) role is critical in supporting an active learning classroom and monitoring undergraduate student engagement. By exploring GTAs’ perspective on active learning in a large lecture Human Anatomy and Physiology course, this project aims to identify the gaps in knowledge regarding effective active learning strategies among GTAs’ and potential ways to address those gaps.
Motivating the Students: Should we Assign Points for Everything?
Steve Bennoun, Mathematics, Cornell University
During this roundtable discussion, we will address the following questions:

• For which tasks should we assign points and for which should we not,
• What criteria should we use when deciding to give points to a certain task/ type of task (in other words, why do we assign points to a given task), what are the differences between the disciplines and level of study?
• To what extent is assigning points to a given task such as pre-reading isn’t just a way of controlling the students and thus alleviate the fear of losing control of the instructor? How does that impact teaching? And student learning?
• How could we test the competing options that exist?

Participants should get out of the discussion a clearer view what the pros and cons of assigning points to many tasks are and how this would impact both their teaching and student learning. The goal is also that next time they teach, participants will be able to make a more informed decision on how to assign points to various tasks in their course.

Evaluating Critical Thinking Skills
Kelsey Utne, History, Cornell University
We all know we want to teach our students to “thinking critically”—but how do we do that? One key component is providing clear feedback for improvement. This roundtable will discuss productively evaluating critical thinking in the classroom, particularly in written assignments.

Best Practices in Measuring Student Learning?
George Orlov and Doug McKee, Economics, Cornell University
Standard assessments have been a critical driver for improvement of teaching in many STEM disciplines. They are used to measure changes in learning outcomes associated with new ways of teaching courses as well as to identify specific misconceptions students may have at the beginning or the end of a course. George Orlov and Doug McKee will lead a discussion of how to develop and use standard assessments as they share their experience creating and using the Economics Statistics Skills Assessment (ESSA) and the Applied Econometrics Skills Assessment (AESA).
Using Students’ Answers to Inspire Instructional Change
Michelle Smith, Biology and Ecology, University of Maine; Ecology and Evolutionary Biology, Cornell University

Using active learning instructional techniques increases student learning and decreases the failure rate in undergraduate classes. As a result, several national reports have called for a redesign in how undergraduate courses are taught, moving away from a lecture-only approach to one in which students are engaging in problem solving activities and having peer discussions. Many instructors are answering these calls by developing active learning classroom activities and measuring their impact on students. However, due to a number of variables, including constraints on instructor time, it can be difficult to use an evidence-guided approach to measure student learning and iteratively revise the activities. At this roundtable, we will discuss and share strategies to efficiently revise classroom activities based on student responses.

Interdisciplinary Teaching and Learning
Brian M. Balduzzi, Esq., Management, Cornell University

Building upon the April 2018 GET SET workshop, the Interdisciplinary Teaching and Learning roundtable will continue to discuss the possibilities and opportunities for creating interdisciplinary courses and classrooms as well as brainstorm some strategies for managing some of the challenges within this new, evolving pedagogy. We look forward to welcoming faculty and students from a wide range of disciplines to share in a collective effort to new critical thinking and problem-solving through interdisciplinary teaching and learning!

Implementing Active Learning in Large Courses: Cornell’s Active Learning Initiative
Justin St. Juliana and Abby Drake, Ecology and Evolutionary Biology, Cornell University

Implementing active learning in large courses brings its own set of challenges. As part of Cornell’s Active Learning Initiative, several large introductory level courses have been redesigned to incorporate a variety of active learning activities. This roundtable will discuss the process of redesigning the courses, what they have learned about what works well, and also their research on student learning, attitudes and confidence as a result of these changes.
Evaluating Student Writing: Approaches to Providing Fast, Fruitful, and Fair Feedback
Kacie Armstrong, Psychology, Cornell University
Come join us for a discussion on how to effectively respond to student writing. We’ll talk about methods of evaluation throughout the revision process (from first to final drafts), as well as how to create effective writing prompts. We’ll also discuss our own experiences with evaluating student writing across disciplines.

Paper Presentations II

Preparing for Practice: Introducing Cross-disciplinary Collaboration for Students Pursuing for Professional Careers
Josh Cerra* and Graham Smith, Landscape Architecture; M. Todd Walter* and Christine Georgakakos, Biological and Environmental Engineering; Shorna Broussard Allred, Natural Resources; Liz LoGuidice, NYS Hudson Valley Estuary Program; Kimberly Williams, Center for Teaching Innovation
*Presenting
Landscape architects and engineers often work together professionally in the workplace, but infrequently do they have an opportunity to collaborate in the classroom. This presentation describes our approach and initial results of a cross-disciplinary course collaboration between students in landscape architecture and engineering. This effort took place between the senior Urban Design Studio in the Department of Landscape Architecture and the Watershed Engineering course in Biological and Environmental Engineering at Cornell University. The focus of the collaboration was on alternative strategies for climate adaptation, primarily around issues of projected flooding and inundation associated with climate change as part of a service learning project.

Evaluating Memory and an Industry Partnered Final Project in a Senior Level Biomechanics Lab Course
Rebecca M. Irwin, Biomedical Engineering, Cornell University
This project assessed memory of course objectives four months after students completed a senior level biomechanics course that was implemented for the first time. To determine if the course emphasized the applications of biomechanics in a laboratory setting, students were interviewed and responses were evaluated.
Additionally, this project looked at the influence of incorporating an Industry partnered final project on students memory and perception of learning.

**How Effective is TA Training?**
Reece Kearney, Mechanical and Aerospace Engineering, Cornell University
In the College of Engineering at Cornell University, all graduate teaching assistants are required to attend the TA Development Program (TADP), but how much of an impact does this have? Because teaching quality is difficult to measure, previous studies have focused on measuring TA confidence, anxiety, and feelings of self-efficacy. In this study, we assess the effectiveness of the TADP in terms of attendant retention and application of knowledge using an electronic survey.

**Insights from a New Undergraduate Biomedical Engineering Laboratory Course**
Matthew L. Tan, Biomedical Engineering, Cornell University
Laboratory courses are an integral aspect of an undergraduate engineering curriculum. As part of Cornell’s new undergraduate Biomedical Engineering program, we’ve developed and implemented a new laboratory course. This course exposes students to cutting-edge tools for molecular, cellular, and systems engineering. Here, I describe the implementation of this course as well as student perception and reactions to this brand new laboratory course.

**Instructor and Student Opinions on an Online Versus Written Feedback System for Homework**
Ashley Earle and Derek Holyoak, Biomedical Engineering, Cornell University
We implemented a two-part homework system in a sophomore-level thermodynamics class that requires students to submit two versions of each homework assignment. The students submit a first draft that emphasizes conceptual understanding of each problem where the TA provides detailed feedback to each student prior to them submitting a second draft that is graded on both conceptual and quantitative mastery. This was our second year using the system, and we changed the method feedback was supplied from hand-written to online between years 1 and 2, in order to make the system feasible for a large (>50 students) classroom size. We sought to compare the student and instructor/grader response to the handwritten versus online system, with specific focus on feedback effectiveness/consistency and study habits.
Teaching Written Argumentation in the Ecological Sciences: A Case Study
Erin I. Larson*, Ecology and Evolutionary Biology, Cornell University
*Recorded Presentation
Arguing through writing is an essential science process skill. Despite its importance in the practice of science, we are still working to understand how to most effectively teach written argumentation in the context of undergraduate STEM courses. In ecology, in particular, multiple competing hypotheses can often explain the same phenomena. Clearly articulating why your study demonstrates support for a given hypothesis is therefore crucial in this field. In this case study of an introductory writing-to-learn ecology course, I explore student self-assessed perceptions of their ability to evaluate written claims, compared to their ability to critically evaluate peers’ argumentative writing, and finally, their own ability to construct written scientific arguments.

Keynote Presentation

More Than Just Shiny Objects:
Using Technology to Support Student Learning
Derek O. Bruff, Vanderbilt University

An understanding of how learning works can help us make teaching choices that more effectively foster student learning. When new technologies enter the scene, however, it’s not always clear how they fit into this process. Educational technology can facilitate new avenues for student learning, but if we’re not careful to use that technology in ways consistent with principles of learning, the technology can become just a distracting shiny object. In this talk, we’ll explore a few of those principles of learning and how they can help us be more intentional and effective as we integrate technology in our teaching.
The Connecting Research and Teaching Conference was sponsored by Cornell University’s Center for Teaching Innovation (CTI) and Center for the Integration of Research, Teaching, and Learning (CU-CIRTL) in the Graduate School. Additional support was provided by the DALTA grant from the Association of American Universities (AAU) to the Center for Teaching Innovation. The work of some presenters was made possible through support for evidence-based teaching from the College of Arts and Sciences Active Learning Initiative and the Menschel Foundation.

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