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The 3rd Annual UC Davis  
Scholarship of Teaching and  
Learning Conference

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**ABSTRACT BOOK**

**UCDAVIS**

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*The 3<sup>rd</sup> Annual UC Davis Conference is presented by the Center for Educational Effectiveness and UC Davis Undergraduate Education. It is supported by the UC Davis Office of the Provost, and by grants from the American Association of Universities and the Howard Hughes Medical Institute.*

## Talks

## 1. Effects of adjustment, grading, and class size in academic equity

*Selected for the HHMI Inclusive Excellence Track*

### **Work in Progress**

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### **Purpose**

There is a widely-studied equity problem in academia: students from different demographic groups have different outcomes in terms of both grades and completion rates, and these differences are often robust to controls for preparation and academic ability. The demographic effects occur at all levels from points earned and drop rates in individual courses to overall university GPA and retention. We will present a selection of the work we have done to understand these gaps focusing on the effects of three potentially contributing factors: adjusting to college, normed grading practices, and large class sizes.

### **Main Findings**

We find that these gaps are most apparent in large introductory courses and courses with normed grading. Furthermore, the intersection between demographic characteristics appears to matter more than any given characteristic alone. We focus on students with multiple factors indicating risk for low achievement and use a combination of techniques to investigate the extent to which gaps can be explained by grading practices or large classes versus being a natural part of adjusting to college. This work is currently in progress.

### **Description**

First, we will present an outline of these demographic differences as they appear at UC Davis with particular attention to interactions between demographic characteristics. Second, we will describe patterns in the three factors noted above and the interactions between them. Finally, we will present our work to separately identify the effects of these factors. Our methods include innovative visual representations of demographic achievement gaps, k-means clustering, and multivariate regression using Registrar data on student demographics and grades.

### **Relevance and Takeaways**

The results of this project are being used to help faculty and administrators support under-served students at UC Davis. We hope that participants in the session will leave with new ideas about how to define, report, and understand, demographic-based gaps in academic achievement as well as a better understanding how under-served students at UC Davis interact with the types of courses they encounter here.

### **Author Biographies**

Marco Molinaro, Ph.D., is the Assistant Vice Provost for Educational Effectiveness at UC Davis where he oversees the Center for Educational Effectiveness. Dr. Molinaro has over 20 years of educational experience creating and leading applications of technology for instruction, scientific visualization and simulation, curriculum development and evaluation, and science exhibits for students from elementary school through graduate school and for the general public.

Meryl Motika is the Lead Analyst in the Center for Educational Effectiveness (CEE). Her background includes a Ph.D. in Economics from UC, Irvine and three years as faculty at St. Lawrence University. At CEE, she leads the data analysis team in measuring the effects of new teaching practices, programs such as advising and TA orientation, and other

aspects of the academic experience at UC Davis. She also develops statistical models of student success and course impact to identify ways faculty and others can improve student outcomes.

Tiffany Johnson is an Analyst in the Center for Educational Effectiveness (CEE). An alumna of UC Davis (B.A., English, Studio Art), she began her career on campus working with students as an undergraduate Academic Advisor. In 2014, she received her M.Ed. in Measurement, Evaluation, Statistics, and Assessment from the University of Illinois, Chicago. Now, as a member of the Educational Analytics team at CEE and a second-year doctoral student in the UC Davis School of Education, Tiffany enjoys the challenge of statistically modeling student success, and exploring equity issues in higher education.

Kavi Tan is an analyst in the Center for Educational Effectiveness (CEE). She did both her B.S. and M.S. in Statistics at UC Davis and have been working with CEE since her junior year of undergrad. At CEE, she has created various analytical dashboards using R Shiny and assisted in a multitude of analysis projects to examine student outcomes under the supervision of the lead analyst.

## 2. Exploring How Classroom Dialogue and Student Writing Protocols Shed Light On My 6th Graders' Use of the Mainstream and Non-Dominant Englishes Within Their Linguistic Repertoires

*Selected for the HHMI Inclusive Excellence Track*

**BernNadette Best-Green**

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### **Purpose**

As a teacher-researcher in a Northern California contact zone (Pratt, 1991), I serve youth whose linguistic plurality allows them to blend features of mainstream English with the non-dominant Englishes that they use outside of school. However, when students incorporate Ebonics (AAVE), Spanglish, Hmonglish, etc. into their school-based verbal and written communication, it usually triggers remediation of CCSS-aligned ELA conventions. The purpose of this work is to examine two protocols that strengthen my ability to accurately assess my students' English proficiency by allowing me to gain deeper insights about how they use the mainstream and non-dominant Englishes within their linguistic repertoire.

### **Main Findings**

Through employing the 7-Step Classroom Dialogue Protocol and the Second-Look Student Writing Protocol I discovered that my traditional assessment protocols had failed to generate accurate evaluations of students' English language proficiency. Although students frequently "albeit inadvertently" incorporated their non-dominant Englishes when expressing their written and verbal ideas, both protocols effectively prompted students to translate their Ebonics, Spanglish, and Hmonglish speech and writing into mainstream or academic English. Despite students' documented mainstream English proficiency and their awareness of standard language ideology, their tendency to privilege their "languages of the heart" suggests that they don't ascribe deficit valuations to these non-dominant Englishes.

### **Description**

In forwarding culturally sustaining pedagogy, Paris admonishes educators to employ pedagogies that support students to sustain the cultural and linguistic competencies of their communities while simultaneously offering (them) access to dominant cultural competence (Paris, 2013, p. 95). Through this investigation, I have examined my praxis as a teacher-researcher of youth with linguistic plurality as characterized by their frequent alternation between the mainstream and non-dominant Englishes within their linguistic repertoires. This investigation consists of my document analysis of varied artifacts generated by the 7-Step Classroom Dialogue Protocol and the Second-Look Student Writing Protocol that I employed in my 6th grade classroom. The artifacts that were analyzed include excerpts of lesson plans; student work samples; teacher's journal entries detailing lesson execution, student performance details, and insights gained during dialogue with students; as well as reflective memoranda that I generated to explore my thoughts about appropriate teacher-responses to my insights about students' linguistic practices. Through the process of executing this research I have promoted my students' acquisition of mainstream competencies (through investigating and supporting their proficiency of mainstream or academic English) while also supporting my students' right to their own language (NCTE, 1974) "their languages of the heart."

### **Relevance and Takeaways**

Through this document analysis of selected artifacts, I have gained greater insight to inform the pedagogy that I employ within my own classroom. Findings of this investigation have deepened my praxis of culturally sustaining pedagogy (Paris, 2013) and meaningfully impacted my work as a teacher-researcher of linguistically marginalized youth. Teacher

educators, pre-service and novice teachers, as well as veteran teachers whose effort serve youth with linguistic plurality should share my interest in the insights and findings generated by this investigation.

### **Author Biographies**

BernNadette's experiences as a K-12 teacher & school leader, as well as her educational experiences as a UC Davis Education PhD candidate and teacher educator-scholar fellow fuel her passion for executing and promoting classroom inquiry which leads to improved educational outcomes for ALL students especially the most vulnerable and underserved. BernNadette's unique set of personal and professional experiences provide a rich and valuable backdrop for her research agenda which promotes innovations that improve the educational trajectories of students from culturally, linguistically, and socioeconomically marginalized backgrounds. Impact of an Application-Oriented Circuits Curriculum on Performance of non-Electrical-Engineering Students in the Downstream Courses

### 3. When Active Learning Impedes Inclusion Excellence

*Selected for the HHMI Inclusive Excellence Track*

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#### **Purpose**

The purpose of this study is to explore peer relationships as experienced by underrepresented health professions students during group learning. Active learning is essential to student accountability in learning, social skill development, and exploring new ideas and perspectives. This study is a secondary analysis of three studies which suggest that there may be an aspect to active learning, particularly small group work, that is not only counterproductive to the intended benefit of active learning, but that may, in fact, contribute to stress and anxiety for racially and ethnically underrepresented students.

#### **Main Findings**

The first finding highlights the significance of peer interactions in experiences of exclusion in health professions learning environments. The second finding identifies a tendency for students to self-group by racial/ethnic background. The third finding illustrates examples of racialized group dynamics that can occur in small group learning. When there are participants in the small groups who have not learned to value and respect contributions from people different from themselves and without skilled facilitation by faculty, small group work may have the opposite effect than intended.

#### **Description**

Active learning has emerged in the educational literature as an important component of adult learning. The process of active learning asks students to reflect upon their understanding and learning, and then apply that knowledge. However, small group activities, like any active learning technique, require careful design and execution. Data for this article come from a secondary analysis of primary data from three studies related to inclusion and exclusion in health professions learning environments. Simple statistical analysis was used to analyze survey data. A secondary thematic data analysis was conducted for the qualitative portions of the studies. Words and phrases were coded by hand and using NVIVO, then themes and patterns were identified. The details of these themes and patterns will be presented and discussed during the Scholarship of Teaching and Learning Conference.

#### **Relevance and Takeaways**

The findings of this study should not be used to justify a movement away from either increasing diversity or the use of active learning. In fact both of these are essential in higher education as a whole and may be especially important in health professions schools. However, an expectation that students will default to inclusion without training and intervention on the part of schools and faculty is naive at best and potentially traumatizing for those who are on the receiving end of bias and microaggressions.

#### **Author Biographies**

Dr. Piri Ackerman-Barger is an assistant clinical professor at the Betty Irene Moore School of Nursing. She teaches social determinants of health, collaborative practice, and organizational change. As co-director of the Interprofessional Teaching Scholars Program at UC Davis Health she provides faculty development on topics related to pedagogy, interprofessional education, and education equity. Dr. Ackerman-Barger's academic interests relate to health equity, social justice, and promoting diversity and inclusion in academic and health care settings. She conducts research and serves as a national consultant and speaker on strategies to help underserved and underrepresented groups in health professions thrive academically.



## 4. Finding a Simple Solution to the Problem of Student Evaluations: An Index of Traditional Evaluation Questions

Janine LF Wilson and Derek Stimmel

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### Purpose

The literature commonly finds that student evaluations of instruction do not assess teaching effectiveness. In fact, many of the techniques that we know develop the best learning outcomes result in lower student evaluations because they require students to work harder. Yet, we continue to use these student evaluations to rate teaching quality and determine hiring and promotion outcomes. The simple reason that undergraduate education has not turned to better methods is the time and expense needed to track the true success of the achievement of learning outcomes. We construct an index of student responses that greater evaluates learning outcomes.

### Main Findings

We break down subjective teaching evaluation questions into two groups: instructor likability and instructor difficulty. Testing these two aspects of student impressions of instructors gives us a greater ability to predict the long-term effectiveness of instruction. We find that when a student considers a course more difficult, they will be more likely to effectively use that knowledge in follow on courses. When student responses on likability questions are more favorable then students are more likely to get a lower grade in follow on courses.

### Description

First, we have the anonymous teaching evaluation data completed by students during the last week of the quarter. Students are provided statements about the course and its instruction and then asked the extent they agree or not with those statements on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

Second, we have specific data about students that enrolled and completed intermediate microeconomics during this time period. For specific students we have their demographic information (e.g. gender, international student status, ethnicity, transfer student status, first generation status, low income status, language spoken at home), academic aptitude, grade earned in intermediate microeconomics, and their grade earned in the subsequent quarter for courses that have intermediate microeconomics as a prerequisite.

As we now turn to examining how the student evaluations affect follow-on course performance, our dependent variable of interest is the grade earned in elective courses taken in the quarter subsequent to intermediate microeconomics. Given the ordinal discrete nature of that variable we use an ordered multinomial logit model to test the impact of the average instructor "likability" rating index score and the average instructor "difficulty" index score on the students grades in the follow on course.

### Relevance and Takeaways

This work gives department administrators a simple, low cost, methodology that will use UCD's current student evaluation system in a more instructive and informative way. The instructors in this community are using innovative teaching methods that often lead to better learning outcomes but not better responses to the "My instructor did a good job" question on the student evaluations. The methodology provided in the paper will tool up their administrators to quantitatively measure learning outcomes more effectively at a very low cost.

### Author Biographies

Dr. Derek Stimel has expertise in monetary and macroeconomics as well as financial economics. As the internship coordinator for the Department of Economics, he is the primary contact and advisor for economics students seeking academic credit for internships. Dr. Stimel has earned certification in quantitative methods in finance from Stanford University and in applied econometrics from the National Association for Business Economics.

Dr. Janine LF Wilson has been teaching economic history, public finance, labor economics and economic development at the University of California, Davis since 2005. She earned the Provost's Hybrid Course Award for a redesign of her traditional economic development course into a hybrid course using both online and face-to-face teaching. Dr. Wilson also serves as the Chair of Undergraduate Studies for the Department of Economics.

## 5. The Hand of God: Grades and Extrinsic Motivation in Engineering Writing Courses

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### Purpose

While educators and employers agree that today's engineer needs to write well, they are often concerned that undergraduate students might not be on the same page. A common perception inside and outside the engineering community is that our students are unmotivated in their writing classrooms and unmotivated to write in general. Often, instructors faced with a demotivated class use grades to induce extrinsic motivation, treating grades as a universal motivator that is always available when other modes of learning motivation aren't present. In this study, we examine student extrinsic motivation in writing classes, with an eye for understanding grade-based motivation in particular. When and how do grades motivate our students? Are grades indeed a universal motivator, or should we put our faith elsewhere?

### Main Findings

Student survey respondents reported comparable levels of extrinsic motivation for their engineering writing course and a comparison engineering course with no graded writing. However, within these results, students reported finding it less satisfying to get good grades in their engineering writing class than their comparison traditional engineering course. In follow-up interviews, a recurring theme in student experience was that for grades to be satisfying and motivating, they generally must be serving as proxies for some deeper and more internalized value or need for the student. In absence of this link between grades and other values, grades themselves were unmotivating and sometimes directly demotivating, thus undermining the idea that grades serve as a universal motivator. Instead of grades, our work suggests that providing interesting writing topics is a more successful universal motivation tactic for most students, regardless of their writing ability and general disposition toward writing coursework.

### Description

In this mixed-methods study, 715 engineering students completed the Motivated Strategies for Learning Questionnaire's validated scale for Extrinsic Goal Orientation, in reference to two courses they were currently enrolled in: an engineering writing course, and another required engineering course with no graded writing. Trends and differences between writing and nonwriting courses were analyzed for significance. From the survey participants, 22 students were recruited for semi-structured follow-up interviews. These students were prompted to elaborate on their attitudes and experiences regarding writing itself, writing courses before and during college, engineering coursework, engineering identity, and their ideas about teaching and learning in writing courses. These interviews were transcribed and simultaneously coded 1) provisionally, around themes of expectancy-value motivation and writing apprehension; 2) descriptively, to identify themes. These themes were then mapped onto Ryan and Deci's expanded theoretical model of extrinsic motivation (2001), to understand the degree of internalization that grades-related experiences required in order to be satisfying and strongly motivating to a student.

### Relevance and Takeaways

This work shines a harsh light on the common assumption that grades act as a motivational failsafe in higher education. It suggests a positive interpretation of student extrinsic motivation in writing classes: student value for content drives extrinsic motivation, not student value for grades. This presentation will include a brief coda of practical evidence-based ideas for instructors, toward more successfully engaging students through extrinsic modes of motivation.

### Author Biographies

Dr. Stephanie Pulford is the Center for Educational Effectiveness' Associate Director for Instructional Research & Development. Stephanie and her team conduct instructional innovation and discovery in support of teaching and learning at UC Davis. Additionally, Stephanie supports the growing community of scholarly educators at UC Davis through consultation, collaboration, and research support.

Kavi Tan is an analyst in the Center for Educational Effectiveness (CEE). She did both her B.S. and M.S. in Statistics at UC Davis and have been working with CEE since her junior year of undergrad. At CEE, she has created various analytical dashboards using R Shiny and assisted in a multitude of analysis projects to examine student outcomes under the supervision of the lead analyst.

Michael Gonzalez is a research assistant at UC Davis's Center for Educational Effectiveness, focusing on projects involving engineering students' motivations around writing. To support this work, Michael applies and utilizes the skills he learned through his time as an English tutor, and his BA coursework in English, with an emphasis in literature, criticism, and theory.

Amanda Modell has worked as a graduate student researcher at the Center for Educational Effectiveness at UC Davis, where she supported research on engineering writing education. In addition to research, Amanda has worked in graduate student professional development and program management at CEE, where student centered, inclusive, and feminist pedagogies informed her work.

## 6. Classifying and Visualizing Students' Cognitive Engagement in Course Readings

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Microbiology and Molecular Genetics

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### Purpose

Reading material has been part of course teaching for centuries, but until recently students' engagement with that reading, and its effect on their learning, has been difficult for teachers to assess. We explore the idea of examining cognitive engagement (CE), a measure that has been shown to correlate with learning gains, as it varies over course reading material. We show that a combination of automatic classification and visualization of CE anchored in the text can give instructors valuable insight into their students' thinking, suggesting ways to modify their lectures and their course readings to improve learning.

### Main Findings

We developed and evaluated new computational tools focused on detecting, from their discussion forum behavior, the degree to which students engage cognitively and meaningfully with course materials. The resulting tools enable teachers to distinguish students who are actively involved in analyzing and synthesizing course information from those who are interacting with the information more passively. The information provided by the in-place commenting forum can also help instructors to distinguish areas within the text that trigger deeper student engagement from areas that may need editing for clarity or enrichment.

### Description

For the purpose of this study we used NotaBene in the context of two courses: (a) an introductory biology course at UC Davis and an introductory, calculus-based physics course intended for engineering and premedical students taught at Harvard University. For both courses, students receive reading assignments on NB and are required to provide meaningful comments to the reading assignment before each class. We used a modified version of Wang et al's. [16] extended taxonomy of Cognitive Engagement (CE) for assessing engagements in posts and designed an interactive decision-tree application to accelerate the manual classification of CE. Greater than 2000 annotations were manually classified for each course. A goal of the study was also to design an automated CE classifier that considers features based on students' annotation and the contextual features that exist in the reading and marked by the annotation. We tested several classification models, including SVM, Decision Trees Random Forests and logistic regression and obtained the best predictive results on a validation set was a Random Forest classifier with a decision tree as the base classifier (~76% accuracy).

### Relevance and Takeaways

Our results suggest that analyzing students' discussion forum based behavior using CE can aid teaching, and that using in-place annotation forums offer a natural way to bring out these benefits. We expect that some of the tools under development may help to generalize these benefits broadly across diverse classes and subjects adding value to both student and instructor preparatory time.

### Author Biographies

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## 7. Impact of an Application-Oriented Circuits Curriculum on Performance of non-Electrical-Engineering Students in the Downstream Courses

Hooman Rashtian

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### Purpose

The purpose of this research is to study the impact of a curriculum update that has been applied to the second circuit course taken by non-electrical engineering students at UC Davis. The course is ENG 100: Electronic Circuits and Systems and is taken by students from engineering disciplines other than electrical and computer engineering. To assess the effectiveness of the implemented curriculum update on students' learning, the performance of ENG 100 students in their downstream courses is compared for the two groups of students who have taken the course before and after the curriculum update.

### Main Finding

The lectures and the lab experiments of this course were updated in Fall Quarter 2016 to teach the class using an application-oriented style by reducing the amount of covered theory and expanding real-life examples and labs. The downstream courses that we tracked included BIM111, EBS165, EME171, EME172 and EME108. The results of this study shows that in all of this courses except one, either the median or the distribution of students' grade has improved following the curriculum change in ENG 100. The new results complements the previously collected qualitative data about students' subjective experience in taking the course.

### Description

ENG100 students take this class mainly because they need to acquire the knowledge on how to use electronic circuits for measurement applications. In the new course structure, students are introduced to the basics of electronic circuits and systems by first seeing a real-life measurement problem followed by discussions on how to synthesize circuits that can solve that problem. The general building block of measurement systems and the role of each block in the chain is discussed throughout the quarter. In the laboratory, students work on individual building blocks of a light-meter system in weekly lab sessions and at the end, they connect the different building blocks together to build a system that can show the light intensity on scale of 0 to 9 on a 7-segment display. A qualitative assessment was performed by asking students to complete a survey with Likert scale questions about their experience in taking the course especially as compared to their first circuits course (ENG 17) which is a theory-heavy class. The quantitative data was collected with the help of Center for Education Effectiveness (CEE) in which the final grades of ENG 100 students in their downstream courses were compared before and after this curriculum update.

### Relevance and Takeaways

Service courses play significant roles in providing students with the information that they need from disciplines other than their own. However, there is oftentimes not much distinction between the service courses and their counterpart versions for major students in terms of the depth of the coverage of topics and/or the style of teaching. Here, we argue that in case of teaching circuits, adopting a curriculum designed to answer real needs of students will make students more motivated and improves their subjective experience and attitude toward the course. Moreover, students seem to be more successful in their downstream courses.

### Author Biographies

Hooman Rashtian received the Ph.D. degree in Electrical and Computer Engineering from the University of British Columbia, Vancouver, BC, Canada in 2013 and the M.Sc. and B.Sc. degrees in Electrical Engineering from Isfahan University of Technology, Isfahan, Iran, in 2008, and 2006, respectively. He was a Postdoctoral Scholar at Davis MM-

Wave Research Center (DMRC) at University of California, Davis from 2014 to 2016. Since July 2016, he has joined the Department of Electrical and Computer Engineering at University of California, Davis as a Lecturer. His educational research interests include curriculum innovation for teaching circuits, project-based learning and use of technology in teaching and learning.

## 8. Influence of Students' Prior Animal Experience and Grouping Strategy on Student Learning in an Applied Animal Laboratory Setting

Allen Pettey

Animal Science

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### **Purpose**

In an applied animal management skills course, sophomore students are instructed and allowed to practice hands-on, applied management tasks with domesticated livestock animals. Skills practiced include handling and restraint techniques, techniques to prevent adverse health reactions (vaccinations, tail removal) and basic preventative health care procedures (i.e. sampling blood). Learning goals for the course include developing introductory skill in most procedures and understanding rationale for their use in animal industries. Many students in the course may have previous experience working with animals and performing these procedures, yet most do not. The purpose of the study was two-fold: 1) to measure the effect of prior experience on learning in an applied course; and 2) to compare student learning from one laboratory section where students were allowed to form working groups for each laboratory activity on their own, compared with a laboratory section where students were assigned working groups based on their previous animal experience.

### **Main Findings**

Overall, our data reveal the potential impact that prior experience and knowledge can have on student learning. Students who were most experienced with animals, demonstrated the lowest level of learning following this course, even though they still recognized the value of the content of the course to their academic career. Students who were assigned to groups with other students of similar experience level demonstrated the highest amount of learning about the course material and more than students who were not assigned to specific groups.

### **Description**

Prior to initiating the first activity, students were provided a survey asking them to self-assess on a 1-10 point scale their comfort and experience working with livestock animals. Students in the control laboratory section (C) were not assigned to any specific groups during each laboratory activity during the quarter. Students in the test laboratory section were assigned to one of three experience level groups: Low (L), Moderate (M), or High (H). Prior to the activities, students in H group rated the value of the course the highest of all groups. The L and M groups increased ( $P < 0.05$ ) their rating of the value of the course on post-course surveys, yet H students did not. When asked 3 basic questions for each species covered in the quarter to assess student learning, H students scored the lowest ( $P < 0.05$ ) in sheep and dairy cattle and were lower than M and L students overall ( $P < 0.05$ ). Students in the laboratory section where groups were assigned based on prior animal experience had a higher perception that they learned in the course and also scored higher ( $P < 0.05$ ) on the final assessment questions.

### **Relevance and Takeaways**

This data provides insights into managing applied laboratory courses. Traditional thinking is that mixing experience levels of students in working groups is ideal, yet our data indicate that higher level of learning can occur when students of similar experience are grouped together. It also appears that students with previous experience with the material in a course may believe they understand the concepts, yet may actually have reduced learning compared with students with no prior experience.

### **Author Biographies**

Dr. Pettey is the Director of Animal Science Curriculum and Assessment and specializes in curriculum development and assessment in animal sciences, teaching livestock management and evaluation, and research in applied animal nutrition.

He completed his Ph.D. in animal science at the University of Kentucky. He served on the faculty at Cal Poly San Luis Obispo and Cal Poly Pomona before joining the UC Davis faculty in 2015.

His interests include advancing the use of technology in animal science courses, specifically laboratory courses, as well as improving the participation rate of students in large lecture and laboratory settings.

## 9. The impacts of lecture capture usage on student performance, attendance, and perspective in large-enrollment introductory STEM courses

Laci Gerhart-Barley, Miriam Martin, Jay Stachowicz, Rick Grosberg

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### Purpose

Lecture capture (LC) allows instructors to record live lectures and provide them to students online. Benefits of lecture capture include students' ability to review material whenever, wherever, and however often they choose, which has the potential to improve performance, particularly for at-risk or marginalized student populations. LC also has the potential to increase absenteeism, which is concerning given that attendance is often strongly correlated with performance. Studies report widely varying results of lecture capture usage on performance and absenteeism and student opinion surveys indicate that students overwhelmingly find LC beneficial, even when course performance data do not support this perception.

### Main Findings

This study addressed four questions: 1) how do students use LC? 2) does LC usage positively impact performance? 3) does LC usage negatively impact attendance? and 4) what are student perceptions of LC? Student LC usage varied widely across sections and throughout the quarter and was primarily used to study for exams, review missed lectures, or supplement notetaking. LC usage conferred a small and usually insignificant increase in performance. LC usage was correlated with reduced attendance in lower-performing students of MIC 102. The majority of students believe LC usage improved their performance, despite contradictory performance data.

### Description

"LC usage, course performance, and attendance were tracked in Spring 2018 sections of BIS 2B: Introduction to Biology, Ecology and Evolution (1179 students) and MIC 102: Introductory Microbiology (370 students).

In both courses, student LC usage varied across sections (55-91%) and dropped significantly in the last third of the course. The highest periods of LC access occurred immediately prior to exams. Students primarily used LC to study for exams or make up missed class periods (BIS 2B) or to supplement notetaking (MIC 102). Students in MIC 102 preferred LC to audio-only podcasts.

LC usage did not significantly increase performance in four out of five sections. Average course performance and failure rates were nearly identical to previous offerings of both courses.

Attendance counts in BIS 2B indicated increasing absenteeism near the end of the course, corresponding to reduced LC access during this time. In MIC 102, attendance did not change throughout the quarter and was significantly correlated with performance even when excluding points related to attendance. Increased LC usage was correlated with reduced attendance in lower-performing students.

Despite a lack of corroborating evidence in course performance data, students overwhelmingly believed that LC usage improved their performance in the course."

### Relevance and Takeaways

LC technology is already available in many UCD classrooms, with more being equipped every year. Robust technical support makes implementing LC nearly effort-free for the instructor, and dozens of courses have already adopted it. The published literature on positive or negative impacts of LC usage is widely contradictory, and no broad conclusions can

yet be drawn. Consequently, it is the presenters' goal to share the results of our experiences and to collaborate with other instructors that have used, or are interested in using, LC in their courses to better understand the impacts of LC on the UCD student community.

**Author Biographies**

Dr. Laci Gerhart-Barley is an LPSOE in the Department of Evolution and Ecology at the University of California, Davis.

Dr. Miriam Martin is an LPSOE in the Department of Microbiology and Molecular Genetics at the University of California, Davis

Dr. Jay Stachowicz is a Professor and Chair of the Department of Evolution and Ecology at the University of California, Davis

Dr. Rick Grosberg is a Distinguished Professor in the Department of Evolution and Ecology and Director of the Coastal and Marine Sciences Institute at the University of California, Davis

## 10. What you need to know about Collaborative Learning before attempting Collaborative Learning

Julia Chamberlain

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### **Purpose**

Collaborative learning should be a reasonable adventure, ... neither high-risk ... nor something to introduce spontaneously (Barkley et al., 2014, p. 27). Yet, sometimes inspiration and motivation to try something new conspire against our methodical approaches to instruction, leading to less-than-optimal student and faculty experiences. Collaborative learning, when approached correctly, can lead to meaningful learning and faculty satisfaction.

### **Main Findings**

Using qualitative analysis, we present five emergent characteristics that shape success for collaborative learning experiences.

### **Description**

An international team of faculty and undergraduate students asked the research question what characteristics make collaborative learning successful? Detailed self-reflections on past collaborative learning experiences were analyzed using thematic analysis (Braun & Clarke, 2006; Saldana, 2009). The emergent themes included: 1) familiarity with collaborative learning, 2) relationships, 3) benefits, 4) motivations, and 5) design and process. Data sources were further analyzed using interpretive phenomenology (Matua and Van DerWal, 2015) to identify the essence of success for collaborative learning that was common among the individual researchers.

### **Relevance and Takeaways**

In this session, we will reflect on the essential characteristics of active learning and the distinguishing features of collaborative learning. Results from the international study on success in collaborative learning will further inform faculty aiming to embark on a collaborative learning adventure with greater confidence.

### **Author Biographies**

Julia Chamberlain is a Lecturer with Potential for Security of Employment in the Chemistry Department. She is an alumna of Reed College (Chemistry BA) and Northwestern University (Chemistry PhD), and she completed her postdoctoral studies at the University of Colorado Boulder in Chemical Education Research on interactive educational simulations. She has taught large and small university and community college chemistry courses, and joined the UC Davis faculty in 2015. This is her third UC Davis SOTL Conference.

## 11. Understanding Students' Attitudes towards Oral Communication Skills in a Project-based Engineering Course

### Work in Progress

Jennifer Mullin

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### Purpose

Knowledge of students' attitudes towards learning oral communication skills is crucial for on-going instructional development in a large project-based hybrid communication and design course. Given the multifaceted nature of the course experience, systematically capturing students' affective states towards learning communication soft skills through a technically intensive team-based project proved challenging at the instructional level. This research project aimed to provide a starting point towards better understanding changes in students' attitudes for learning oral communication skills in terms of the inherent value and course outcomes. Differences by gender and class standing along with student reflections on skill attainment provided further insights.

### Main Findings

Students enrolled in the hybrid communication and engineering design course reported significant gains based on a pre-post Likert-scale survey in the following three areas: (a) finding the communication skills course interesting, (b) developing a better awareness of their communication skills, and (c) acknowledging that communication skills could be mastered through formal instruction. Post-only significant difference between freshmen and seniors reveal opportunities for instructional iteration. Further insights gained from students' self-reflections highlighted differences in skill development along with a diversity of prior interpersonal and presentation experiences.

### Description

The UC Davis hybrid course, ENG 03 Introduction to Engineering Design, fulfills a communication elective and is offered each quarter to all students in the College of Engineering (COE) regardless of major and class standing. During the project-based experience students (N = 117 in Spring 2018) worked in teams to carry out an engineering design project. Presentations skills were taught through interactive lecture activities and assessed through a series of individual and team design-related oral communication assignments. To better understand students' attitudinal outcomes, a pre-post Likert-scale student survey was administered with all 10-items adapted from the Communication Skills Attitude Survey (CSAS) developed by Rees, Sheard and Davies (2002) for medical students. Paired T-test analysis was performed to explore areas of significance in the teaching and learning of oral communication skills along with suspected differences based on class standing and gender. Open-ended responses to an in-class self-reflection assignment were ranked and examined to provide a baseline understanding of student's perspective on their communication skill development in the course.

### Relevance and Takeaways

Instructional developers, curriculum designers and technical instructors interested in the teaching and learning of soft skills (i.e., communication, collaboration, etc.) in project-based course-work may find this research helpful in terms of assessing students' attitudes towards learning these skills.

### Author Biographies

Jennifer Mullin is a LPSOE faculty in the Department of Biological and Agricultural Engineering. Her research focus is on engineering design education with an emphasis on creativity, design thinking and the impact of design experiences on student's self-concept and development. She earned her Ph.D. in Engineering Education from Virginia Polytechnic

Institute and State University in 2010 and has had experience teaching engineering design at a project-based high school, community colleges and through numerous informal learning programs.

## 12. Community Engaged Teaching and Learning: A View from UC Davis

Michael Rios, Ingrid Behrsin

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### **Purpose**

The purpose is to provide an overview of community engaged teaching and learning, its benefits and challenges, as well as initiate dialogue with scholarly educators about enhancing community-based teaching and learning at UC Davis.

### **Main Findings**

Some of the questions to explore with conference attendees include:

How can opportunities be increased for students to participate in community engagement through coursework, internships, and independent studies?

How can outcomes related to leadership development, cross-cultural understanding, and global learning be improved through experiential learning in community settings?

What types of resources and incentives are needed for faculty to support student learning in community settings?

How can the outcomes of student learning experiences in community settings be evaluated?

### **Description**

A participatory and collaborative design process is being used to learn from diverse campus stakeholders to enhance publicly-engaged research and teaching at UC Davis. Results of this process will be presented and include a mixed-method analysis of: 1) a university-wide survey of 767 individuals holding academic titles in the Academic Senate and Academic Federation across the ten colleges and professional schools at UC Davis; 2) fifty-three hour-long interviews with individuals holding academic titles in the Academic Senate and Academic Federation; 3) six focus groups with over 100 individuals in the Sacramento region representing a range of community stakeholders from the public, private, and non-profit sectors; and 4) the results of a survey and a workshop with faculty and staff that support community engaged learning through teaching and community-based programs. Additional data collection and analysis prior to the conference will include interviews and focus groups with students that participate in community-based learning curricula and projects.

### **Relevance and Takeaways**

At the end of the presentation and discussion, participants will learn about the following:

- 1) Benefits of community engaged teaching and learning.
- 2) Findings of a campus-wide inventory of community engaged teaching and learning at UC Davis including the range of opportunities available to students.
- 3) Strategies to enhance community-based teaching and learning experiences at UC Davis.

### **Author Biographies**

Michael Rios is Professor of Human Ecology and Founding Director of the Office of Public Scholarship + Engagement in the Office of the Provost, Engaged Scholarship. He has many years of organizing, teaching, and evaluating community-

engaged learning experiences. Related publications include "Learning from informal practice: Implications for urban design in American cities" in *The Informal American City* (2015); "Operative sites for dialogue and reflection: The role of praxis in service learning in *Beyond Boundaries: Service Learning in Design and Planning* (2011), and "Where do we go from here? An evaluative framework for community-based design" in *From the Studio to the Streets: Service Learning in Planning and Architecture* (2006).

Ingrid Behrsin is the Provost's Postdoctoral Fellow in Engaged Scholarship and Engaged Learning, University of California, Davis. Ingrid earned her PhD from UC Davis' Geography Graduate Group in June 2018, and holds a M.Sc. in Community and Regional Development from UC Davis. As a 2016-2017 Professors for the Future Fellow, she co-convened a workshop for fifty UC Davis campus and external community members to discuss the benefits of, and obstacles that emerge in, pursuing engaged scholarship and learning.

## Posters

## 1. Adventures in Chemical Thinking: Implementing Inquiry in General Chemistry Lab

### Work in Progress

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### Purpose

The UC Davis general chemistry program serves thousands of students each quarter and provides a full-year laboratory curriculum that compliments the general chemistry lecture course. The present laboratory activities have been optimized for cost, safety, and minimal waste production. Two areas of desired improvement include incorporating digital technologies for data collection and analysis, and using inquiry-based projects to promote scientific practices such as critical thinking and problem solving in open-ended experiments.

### Main Findings

This poster describes the CHE3 laboratory project and presents preliminary evaluation of student reception and learning, as well as insights from the staff and instructors who facilitated the new labs.

### Description

In 2017-2018, we piloted the Chemical Thinking curriculum in a course titled General Chemistry for Life Sciences (CHE3). In addition to different topics and sequence in the course lecture, we implemented a full year of inquiry-based laboratories that trained and required students to practice critical thinking both inside and outside of lab. The laboratory projects centered around real-world questions and incorporated digital data collection methods for visible spectroscopy, emission spectroscopy, thermal measurement, titrations, and concurrent temperature and absorbance data collection. In addition, pedagogical emphasis was placed on science as a collaborative endeavor and on effective communication of scientific work.

### Relevance and Takeaways

Future directions include applying the knowledge gained from the CHE3 pilot to guide improvements to the larger general chemistry laboratory program at UC Davis.

### Author Biographies

Charlie Tapio is a 4th year graduate student in the Chemistry Department. He completed his BA in chemistry at St. Olaf College in Northfield, Minnesota. In addition to his research on inorganic spectroscopy at UC Davis, he has taught general and organic chemistry as a graduate TA. In 2016, Charlie took a lead role with the laboratory program for CHE3, Chemistry for Life Sciences. This is his first UC Davis SOTL Conference.

Julia Chamberlain is a Lecturer with Potential for Security of Employment in the Chemistry Department. She is an alumna of Reed College (Chemistry BA) and Northwestern University (Chemistry PhD), and she completed her postdoctoral studies at the University of Colorado Boulder in Chemical Education Research on interactive educational simulations. She has taught large and small university and community college chemistry courses, and joined the UC Davis faculty in 2015. This is her third UC Davis SOTL Conference.

## 2. Developing a learner-centered instructional template to address achievement gaps in a large-enrollment introductory biology course (BIS 2B) at UC Davis: A CREATE course redesign project

### Work in Progress

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### Purpose

Studies show that learner-centered classroom structures significantly improve student performance (Freeman et al 2013) and reduce or close the achievement gap between white and non-white (Eddy and Hogan 2014), multi- and first-generation (Eddy and Hogan 2014), prepared and under-prepared (Freeman et al 2011), and disadvantaged and non-disadvantaged students (Haak et al 2011) dropping the overall course failure rate by as much as 30% (Freeman et al 2007). This project develops learner-centered classroom activities structured around research programs of UC Davis faculty for use in the large-enrollment introductory course BIS 2B and geared towards addressing potential achievement gaps in this course.

### Main Findings

This project has three goals: 1) inspire dialogue among instructors of large-enrollment introductory STEM courses (especially the BIS 2 core) on the structures, practices, and impact of learner-centered courses and large-enrollment class activities, 2) develop a portfolio of activities aligned with BIS 2B content and structured around the research programs of UC Davis faculty which can be incorporated a la carte into any BIS 2B section, and 3) assess if performance gaps exist among students enrolled in BIS 2B and if course structure affects these gaps.

### Description

The initial phase of this project, supported by the CREATE fellowship through CEE, provides a portfolio of classroom activities explicitly linked with the content of BIS 2B and tested in a section of >300 students. Each activity is structured around the research program of a UC Davis faculty member, with the goals of 1) introducing students to the types of research programs that exist at UC Davis, 2) inspiring student interest in research programs in which they could be involved during their degree programs, and 3) illustrating to students the diversity of today's scientists (to explicitly counter the lack of diversity common in 'classic' research examples). Enrollment and final course grade data compiled by CEE indicates that achievement gaps exist in BIS 2B; however, these findings have relied solely on course grade and not on formal assessment. Consequently, this project also incorporates an assessment of student performance using the Concept Inventory of Natural Selection (CINS, Anderson et al 2002). Student performance on the CINS as a pre- and post-quiz across all sections of BIS 2B (standard offerings and this redesign) will identify existing achievement gaps in BIS 2B and the impacts of redesigned instructional techniques on student performance.

### Relevance and Takeaways

It is the presenters' goal that this presentation leads instructors of large enrollment sections to consider implementing learner-centered activities into their courses and to discuss the logistics, concerns, benefits, and practice of doing so with the presenters and with other instructional colleagues. The structure of this project and its products could easily be applied to other large-enrollment courses across campus and the presenters welcome the opportunity to collaborate with other UC Davis faculty interested in developing or expanding activity portfolios for this and other courses. This work also serves as an example of course redesign projects supported by the CREATE fellowship.

**Author Biographies**

Dr. Laci Gerhart-Barley is an LPSOE in the Evolution and Ecology Department at the University of California, Davis. She is a fellow in the Course REdesign And Teaching Effectiveness (CREATE) Program through the UC Davis Center for Educational Effectiveness, which supported the project presented here.

Amelia Munson is a PhD candidate in the Animal Behavior Graduate Group working with Dr. Andy Sih in the Environmental Science and Policy Department.

### 3. Bringing active learning and group activities into a senior-level chemical engineering class: a CREATE course redesign project

#### Work in Progress

Jason White

Chemical Engineering

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#### Purpose

In the chemical engineering curriculum at UC Davis, the Process Economics and Green Design (ECH 158A) introduces students to topics that will be crucial to their success in their senior capstone projects as well as in their future careers. In the past, this course has been offered in a lecture-only format, and student engagement has been low. Funded by the CEE CREATE program, the Fall 2018 offering of this course was redesigned to include a laboratory-component with a group-project focus. It is hypothesized that the new format will better engage students, better prepare students to work as a member of a team, and better demonstrate the relevance of the course material to the students' future careers.

#### Main Findings

Work on the course redesign began in Spring 2018 and the redesigned course is to be offered during the Fall 2018 quarter. During the implementation of the redesigned course, it is anticipated that:

1. student engagement in both the lecture and laboratory sessions will increase as the students are actively engaged with the course material and better realize the relevance of the course material to their future careers,
2. students will improve in their ability to work effectively in a team, and
3. students will demonstrate enhanced achievement of course outcomes with respect to previous offerings of the course.

#### Description

In order to better engage students in this course, the four hours previously allotted as lecture time was reallocated to include three hours of lecture and discussion with the class as a whole, and one hour of small group activities with no more than twenty-four students at a time. The lecture period was redesigned to focus on topical case studies related to chemical engineering plant design complete with active learning type exercises where students are actively engaged and working to solve a complex design problem with the instructor, while simultaneously learning key concepts.

The heart of the redesign was realized in the new laboratory component. These laboratory sessions emulate a work environment, where students work in groups on mini design projects and rotate through various roles within the group. The mini projects prepare students to take on larger plant design projects such as the capstone projects that they are required to complete in the spring quarter. Assessment data was collected in order to measure the three goals of the course redesign (listed under Main Findings).

#### Relevance and Takeaways

This work details an effort to increase student engagement and achievement of course outcomes in a large enrollment (100 students) engineering course by using active learning strategies during lecture and also requiring students to complete group assignments during an associated laboratory session. Success stories and lessons learned from this project will be shared. I hope that this work will lead the audience to reflect on their own teaching practices and come away with a few ideas on how to increase engagement in their own courses.

**Author and Biographies**

Dr. Jason R. White is a LPSOE in the Department of Chemical Engineering at UC Davis. Dr. White has been a faculty member at UC Davis since 2015, and was awarded the 2015-2016 and 2017-2018 AIChE Professor of the Year Award by the UC Davis AIChE Student Chapter. Dr. White received a Center for Educational Effectiveness CREATE fellowship to redesign his Process Economics and Green Design course in Fall 2018.

## 4. Exploring the Undergraduate Learning Assistant Experience at UC Davis; A Potential Intervention to Improve Students' Self-Efficacy, Science Identity, and Metacognition.

### Work in Progress

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### Purpose

Learning Assistants (LAs) are undergraduate students who serve as peer tutors in lectures, discussion sections, and lab sections. Unlike the few institutions where the experiences of LAs have been explored, UC Davis has an informal learning assistant program, where the level of mentoring and training varies with instructor and class. This project studies the experiences, gains and benefits of being a LA at UC Davis and the ways in which the learning assistants' experience at UC Davis could be improved. In particular, we are interested in studying how being a learning assistant can help increase a student's self-efficacy, science identity, and metacognition.

### Main Findings

We surveyed students who were LAs in Spring 2018 (n=54). The majority of LAs were female (64.2%), non-URM (84.9%), non-first generation (69.81%) students and had a GPA above 3.3 (68.8%). LAs were overwhelmingly positive about their experiences as LAs. In a variant of the SURE survey, LAs reported gains in the majority of items with the biggest improvements taking place in: "being a part of a learning community", "learning how to work in small groups", and "ability to integrate theory and practice". Being an LA had impacts beyond content and pedagogical knowledge, with 73.68% of students self-identifying as scientists at the end of the Quarter compared to 50.88% at the beginning. When highlighting key mentoring experiences, the majority of the learning assistants identified: (1) being officially introduced to the class by Teaching Assistants as a resource and (2) being included in the conversations around class organization, as the most impactful practices.

### Description

Data was collected at the onset and end of Spring 2018 Quarter. Students partaking in a LA-specific pedagogy course completed self-reported surveys consisting of Likert-scale and open-ended questions. The surveys included items from the Metacognitive Awareness Inventory (MAI, Schraw & Dennison, 1994), the Science Identity Survey (SI, Robnett, 2015) and the Survey of Undergraduate Research Experiences (SURE, Lopatto, 2004). Open ended questions asked students about their interactions with undergraduates, their identities as scientists and teachers and about the mentoring they received. Additional qualitative data was collected through individual interviews (n=16). Preliminary analysis of the SURE survey shows gains in several items, suggesting that a Quarter as an LA at UC Davis can lead to an increase in student self-efficacy. In contrast, preliminary results of the MAI and SI tools showed little impact of this 10-week experience on students' metacognition and science identity. We are currently coding the qualitative data and interview transcripts to complement the quantitative data and plan to continue data acquisition for the next 2 Quarters. We are especially interested in the impact of the specific mentoring experiences that learning assistants have on their outcomes, with the goal identifying good mentoring practices to train TAs and Faculty working with LAs.

### Relevance and Takeaways

The impact of peer tutors on undergraduates has been extensively documented. However, little research has focused on the impact of the experience on the tutors themselves. The few studies of structured LA programs suggest that being an LA can foster science identity and self-efficacy, factors linked to student retention. Less is known about the impact of

informal LA programs, such as the one at UC Davis. Our preliminary results show that participation in the program can positively impact student science identity and self-efficacy, factors shown to increase student retention. This brings forward the possibility of developing a program to recruit URM STEM students to the LA program as an intervention to increase the success and retention of these students.

### **Author Biographies**

Jia Tan is a fourth-year Neurobiology, Physiology and Behavior major at the University of California, Davis. She has served as a Learning Assistant for General Biology course (BIS 2B) and is passionate about studying the interactions between undergraduate Learning Assistants and faculties. Her research interest includes studying the benefits and personal growth of being a peer tutor. In the future, she is interested in going to graduate school and pursuing a career in higher education.

Mary-Betty Stevenson is a lecturer and former academic coordinator for the UC Davis CalTeach/MAST program. Her main focus has been creating meaningful coursework and internships for undergraduate STEM majors that encourage them to explore careers in K-12 STEM education. Instrumental in bringing the learning assistant program to campus, she currently facilitates the LA program and teaches the pedagogy course that accompanies the experience. Before joining UC Davis, she taught high school mathematics for 27 years and worked with the Northern California Mathematics Project, focusing on creating active, problem-solving environments within the mathematics classroom.

Dr. Sandra J. Carlson is a Professor in Earth and Planetary Sciences. Her research is focused on marine invertebrate animals and determining their evolutionary relationships to extinct relatives. She is Faculty Director of CalTeach/MAST on campus, a UC system-wide program to encourage STEM undergraduate majors to consider careers in K-12 STEM teaching. She teaches 400+ undergraduates each year in paleobiology and is interested in identifying barriers to the success of underrepresented students in science. Sandy received her B.S. degree in Earth Sciences at UC Santa Cruz and M.S. and Ph. D. in Geological Sciences from the University of Michigan.

Dr. Natalia Caporale is CAMPOS Scholar, Teaching Faculty in the NPB Department. In addition to teaching majors and non-majors human physiology and cell biology courses, Natalia is interested in (1) teaching strategies that promote student self-efficacy, resilience and sense of belonging; (2) identifying barriers to the success of underrepresented students in science and developing interventions to help students overcome them. Natalia received her B.S. degree (Licenciatura) in Biology at the Universidad de Buenos Aires and her PhD in Neuroscience from UC Berkeley. She was a postdoc at UC Berkeley and UCSF and then an adjunct lecturer at UC Berkeley and SFSU.



## 5. Use of Short Essays to Address Core Competencies in Medical School Pathology Education

Andrew D. Jones, Elham Vali Betts, Kristin Olson

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### **Purpose**

The goal of graduate medical education is not just the transference of medical and clinical knowledge, but also the cultivation of successful, engaged, and enlightened professionals. The Accreditation Council for Graduate Medical Education (ACGME) has delineated six core competencies in which physicians-in-training must demonstrate understanding and acumen. Our goal was to develop a pathology-based medical school narrative writing assignment series, integrated into the PMD 410C-D team-based learning sessions, with the assignments mapped to one or more competency areas.

### **Main Findings**

Extant narrative writing assignments were assessed for the student's level of engagement with the core competencies of the ACGME and analyzed in a comparative matrix. Additional narrative assignments were developed to address competencies that were underrepresented (e.g., systems-based practice). A modular essay matrix was developed, which allowed for rotation of essay prompts based on topics covered, core competencies addressed, and course structure needs. While the competencies addressed in each essay were not explicitly shared with the students, the feedback has been positive, with students recognizing (both in their writing assignments and in course evaluations) the intersectionality of pathology-related medical knowledge and other domains of medical education.

### **Description**

Incorporation of the core competencies into an already overfull pathology curriculum is a challenge. Out-of-class short writing assignments have been deployed in team-based learning (TBL) curricula elsewhere, but to our knowledge this is the first such work that has specifically addressed the ACGME Core Competencies in a systematic and comprehensive way. System-based practice was one of the core competencies that was under-represented by our short essays. More essays were developed to address this core competency.

Students were asked to complete the writing assignments prior to the associated TBL sessions, and the responses were assessed both for sophistication and complexity of thought in addressing the issues (often with no single right answer), and for clarity of expression and style (grammar, punctuation, etc.). Each student was required to respond to at least two of the twelve prompts each year, which accounted for 5% of their final course grade.

By better understanding and mapping competencies to specific prompts, we were able to develop a more flexible modular system of essays that could be swapped in and out, depending on the course needs for a given year, while ensuring all the core competencies were still addressed over the duration of the course.

### **Relevance and Takeaways**

While pathology education has been typically approached with heavy emphasis on medical knowledge, our work shows that there are opportunities to incorporate all aspects of physician core competencies while increasing student engagement with material and topics. This approach reinforces for students that the traditionally soft or humanistic parts of medicine are not relegated to special sessions but are instead an integral component to becoming a competent and successful physician, regardless of specialty area. Further, a systematic approach to evaluation of a curricular element can illuminate gaps in learning outcomes and lead to a more adaptable teaching tool.

**Author Biographies**

Dr. Andrew D. Jones is the current Chief Resident in the department of Pathology & Laboratory Medicine at UC Davis Health. He has a background in philosophy and women's studies and worked in IT prior to his pursuit of medicine. He is currently a teaching assistant for the medical school pathology course.

Dr. Elham Vali Betts, Department of Pathology and Laboratory Medicine, completed residency and fellowship at UC Davis with a focus on Hematopathology. She is currently the co-instructor of record for the pathology course at the School of Medicine.

Dr. Kristin Olson is the incoming Associate Dean for Curriculum and Medical Education and an Associate Professor of Pathology at the University of California at Davis School of Medicine (UCDSOM). A recipient of several teaching awards, Dr. Olson is co-Instructor of Record for the required PMD 410 General and Systemic Pathology course, which emphasizes active learning and has been highly ranked by medical students for the past several years. She regularly consults with other medical faculty locally and nationally about the structuring of their own courses.

## 6. I am bilingual: Building a program for native speakers

### Work in Progress

Agustina Carando

Spanish & Portuguese

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### Purpose

Although never completely uncontroversial, the idea of what constitutes a native speaker has prompted repeated reformulations, particularly in the context of bilingualism. When the language learned and spoken at home is not the majority or societal language, there are added challenges that can have an effect on some aspects of proficiency, revealing great variation in native abilities. This newly designed course aims to address the idiosyncrasies facing Spanish-English speakers in the US, and nurture their bilingual proficiency through discussion of relevant sociopolitical issues, coaching by writing mentors, and assignments that promote community engagement.

### Main Findings

Designed to develop the communicative skills of native Spanish speakers, this course serves students who learned Spanish at home but did most of their schooling in English. Upon completion, students are expected to have acquired the skills to move on to upper-division courses and/or careers in the language. However, they often struggle during the transition, which creates discouragement and insecurity. This course will explore whether engaging students with topics relevant to their own experience, approaching writing in the company of encouraging mentors, and connecting to the community can change their attitude towards Spanish and positively impact their ability to perform in more specialized registers.

### Description

This course aims to identify the specific academic (vocabulary and writing practices related to scholarly work) and professional (vocabulary and writing practices related to the workplace) needs of this population, developing assignments that address those needs and compiling materials that connect to their unique situation as Spanish speakers in the US (multiculturalism, immigration and diaspora, bilingual education, linguistic diversity, translation, identity, globalization).

These themes will then be weaved into a series of writing assignments leading up to two major essays, which students will formulate individually and then revise weekly with a peer mentor. These mentors are not editors or teachers; rather, their role is to accompany the students throughout their learning process, helping them develop their ideas and offering feedback on clarity and depth.

At the end of the term, students will be interviewed for a radio podcast. They will discuss their final essay and offer a brief reflection on their writing process and the course as a whole. This has multiple benefits: 1) having a real audience in mind will require students to accommodate their register for a specific communicative purpose, 2) students speaking about their experience will draw more students to the course, and 3) they will engage the Spanish-speaking community at large.

### Relevance and Takeaways

According to the American Academy of Arts and Sciences, English alone is not enough to meet the needs of our nation in a global economy, declaring an urgent need to invest in and promote multilingual competence. My rationale in designing this course was to take advantage of the valuable linguistic capital that students already possess; that is, they already have fluent command of a second language. Furthermore, there is thriving bilingualism on campus, with

students from many different language backgrounds. In other words, our native speakers already have a head-start. Let's nurture their bilingualism and celebrate it!

**Author Biographies**

Agustina Carando is Assistant Professor in the Department of Spanish and Portuguese, and Director of the Spanish for Native Speakers Program. As a native Spanish speaker immersed in an English context, she became interested in the ways that bilinguals use their two languages and how one may influence the other. Working with spontaneous and experimental data, she seeks to explore the ways that languages interact in the bilingual mind and the internal mechanisms underlying linguistic change. The present proposal describes the course redesign she is undertaking as part of the 2018 CREATE Fellowship from the Center for Educational Effectiveness.

## 7. Assessing Online Course Accessibility

### Work in Progress

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### Purpose

This research seeks to better understand whether online courses promote or undermine different forms of accessibility, so that instructors may proactively improve courses to better support student success. This study uses surveys and interviews of students who have enrolled in a large GE course at UC Davis, and students who have subsequently dropped the course. Specifically, we seek to understand drop rates for online courses, reasons students drop online courses and student attitudes toward online courses.

### Main Findings

This research is in progress. UC Davis has made a significant investment transforming large courses into hybrid/online formats. These courses are often suggested to have high potential to improve access and remove barriers to underserved and at-risk students. However, have we sufficiently addressed the potential downsides of these types of courses? A practical understanding of whether online courses are supporting, or undermining underserved or at-risk students is needed. With this understanding we can begin to provide insights into ways instructors may better guide and support the success of students enrolled in online courses.

### Description

This research involves data to be collected from undergraduate students enrolled in a large, online GE course across various quarters beginning SSII 2018. Every quarter, students who enroll and complete the course will be asked to participate in two surveys, at the beginning and end of the course. The first survey assesses student reported reasons for taking the course, previous experiences with online courses, and perceptions of online courses. The post course survey assesses student perceptions of the course, attitudes toward online courses, challenges of the online courses and perceived advantages/disadvantages of online courses. Students who drop the course will be invited to participate in a survey that seeks to find student reported reasons for dropping the course, their online course experience, and student attitudes/perceptions of online courses. Students who have dropped the course and completed the drop survey will be invited to participate in one-on-one interviews to further drill down into their reasons for dropping the course, their experiences with online courses, and their perceptions and attitudes of online courses. The survey and interview data will be supplemented by registrar data that includes information on participants' student standing, transfer status, ESL status, SES, status, URM status, first generation status, etc.

### Relevance and Takeaways

As more and more courses move, or plan to move, into hybrid/online formats, it is important for instructors and administrators to have a better understanding of the specific accessibility challenges these formats may place on students as well as student perceptions of online courses. This research will highlight the need to consider the potential drawbacks of online course formats by asking if and how hybrid/online courses are supporting or subverting equity. More importantly, it can help begin a conversation around ways that instructors may better guide and support the success of students who choose to take online courses.

### Author Biographies

Jeanette Ruiz is a Lecturer (LPSOE) for the Department of Communication at UC Davis and a CAMPOS Faculty Scholar. She specializes in strategic communication with a specific interest in emerging practices and concepts in digital and

social media. In addition to her appointment in the Department of Communication, she has served as a human resources and public relations consultant. Dr. Ruiz's research focuses on public health communication and the Internet as well as the globalization, structure and ownership concentration of the international Internet. Currently, she is working on assessing issues of assessment and student accessibility and inclusivity in higher education.

## 8. Predicting Performance in a Lower-Division Psychology Course

### Work in Progress

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Psychology

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### Purpose

An exploratory study of the variables that predict successful performance in a lower-division psychology course. This study explored some of the many demographic, achievement, and experiential differences in our student body and evaluated their use as predictors of exam scores, homework scores, attendance, extra credit participation, and final course grade. This study was completed with an eye to gaining a deeper understanding of the variability in our student body and the factors that predict academic achievement. Importantly, we will also examine if any of these predicting factors are a target for possible improvement. This model will be useful both in comparing student performance in other courses (different levels and different departments) and in evaluating the impact of instructional interventions.

### Main Findings

GPA, SAT score, and a critical thinking pre-test best predicted course performance. Overall, students who scored better on the pre-test outperformed their peers who scored lower on the pre-test. However, students with low pre-test scores had greater variability in their final score, indicating these critical thinking skills may be a prime area to target for improvement benefit performance.

### Description

Statistical modeling of demographics and academic achievement.

How large of a role do factors that can be changed (critical thinking skills) have on predicting course performance compared to factors that cannot be changed such as previous academic achievements (SAT, GPA) and demographics.

### Relevance and Takeaways

This thorough exploration of performance in a large, required, lower-division course will provide insight into fruitful individual differences to track in other courses and provide insight into tracking the impact of instructional interventions.

### Author Biographies

Kathryn Bousquet - graduate student in Psychology.

Matthew Sazma - graduate student in Psychology. Member of the Human Memory Lab.

Victoria Cross - LPSOE in Psychology

## 9. Specialized workshop on learning strategies for studying Engineering courses for students in academic difficulty

### Work in Progress

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### Purpose

The purpose of this study is to evaluate the study skills of engineering students in academic difficulty and assess the impact of a specially designed workshop to improve students' study skills, their academic progress, and retention rate. This study specifically aims to:

1. Evaluate students' perspectives about studying engineering, students' expectations of their roles in their future engineering careers, their learning styles, and their ability to monitor and regulate themselves.
2. Examine sources of variation in students' academic performance (gender, first generation status, socioeconomic status, etc).
3. Assess the impact of a specifically designed workshop to improve students' study skills on students' understanding of the psychology of learning and metacognitive development.

### Main Findings

At the end of each quarter students with unsatisfactory academic performance are placed on academic probation or may be subject to disqualification. Students facing these situations should meet with advisors in their college to discuss their academic standing. Depending on the students' academic history and the reasons that they provide for their unsatisfactory academic performance, students may be dismissed or allowed to continue their studies. While there could be various reasons and extenuating circumstances affecting students' academic performance, some of these students may only suffer from inappropriate and inefficient studying habits which subsequently will prevent them to be successful in their courses.

### Description

Since the focus of this study is to evaluate students' learning styles, as well as their study habits, the experimental and control groups will consist of "continued" students whose academic history suggest that only factors associated with study skills or habits have adversely affected their academic performance. Students in the experimental group will be assigned to complete a one-day online workshop in Canvas, titled "*How to Study for Engineering Courses*", which will begin in the first weeks of the following quarter. Through the workshop, students will be asked to complete a set of qualitative and quantitative surveys which prepare them for the concepts that will be discussed in the video series of the second module of the workshop. The video series will define and explain critical elements of metacognitive learning and engage students in improving their learning skills. In the third module, students will be exposed to conceptual question(s) from the course(s) in which they could not achieve the satisfactory result(s) to examine their understanding of concepts, creativity, critical thinking, logical and complex thinking. This workshop will be followed by a meeting with students for one-on-one check-in through the quarter and online post-surveys (evaluation of attributing factors in

changes/successes in their academic performance) after final grades are released. As for the control group, a randomized de-identified data (final grades) will be collected by Center for Educational Effectiveness from students with matching criteria.

### **Relevance and Takeaways**

This study will help members within the UC Davis community to get a better sense of students' learning styles and the approaches that they take to study, which in turn may inspire the educators to develop new teaching methods or course structures which promote more efficient learning strategies. This study may also show the significance of using effective and efficient techniques in studying courses and may encourage educators as successful role models in sharing some of their personal experiences in studying specific courses with their students during their classes. Also, this study may help advising teams to ask more effective questions to detect the root causes of students' struggles in classes and provide them with more suitable guidance.

### **Author Biographies**

Lili Mirshahzadeh received her M.Sc. in Structural Engineering and B.Sc. in Civil Engineering from Isfahan University of Technology (IUT), Isfahan, Iran, in 2009 and 2006 respectively. After receiving her Master's degree, she pursued a dual-path career in both industry as a Structural Consultant and Research and Development (R&D) Engineer, and in academia as an Adjunct Engineering Professor. After moving to the U.S., she has taught engineering classes at American River College (ARC), Sacramento, as an Adjunct Engineering Professor and since January 2018, she has joined Engineering Undergraduate Office at UC Davis College of Engineering as an Academic Advisor.

Dr. Spight began his career providing academic advising to undecided students at Colorado State University. In 2008, he was named the Assistant Dean for Academic Advising in the School of Undergraduate Studies at the University of Texas at Austin and was tasked with developing a new advising center for a new academic unit aimed at helping students explore majors. In 2016, he transitioned to a new position as Director of Undergraduate Affairs in the College of Engineering at the University of California, Davis. Spight has been highly involved in NACADA: The Global Community for Academic Advising, a professional organization focused on enhancing academic advising with nearly 15,000 members nationally and internationally. He has served as chair of Commission on Undecided/Exploratory Students, a member of the council, a board member, Vice President, and most recently as President. Spight has presented and published articles on advising undecided students, first-generation students, assessment of advising, and integrating academic and career advising. Spight earned his Doctorate of Education in Higher Education Administration from the University of Alabama.

## 10. Thinking About Learning: Examining students' general chemistry study practices with metacognitive surveys

### Work in Progress

Julia Chamberlain, Elizabeth Cox, Emil Rezkalla

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### Purpose

General chemistry is a course that many UC Davis students find challenging. In an effort to support student learning, a wide array of study materials and resources are made available by instructors, teaching assistants, and academic support services. We examine how students use these resources, through surveys that ask students to report planned and actual study practices before each course exam.

### Main Findings

Preliminary results indicate student optimism, with more study resources planned than used. Ongoing analysis examines the most popular resources reported by students, changes over the course of the quarter, and correlation with student performance on course assessments. Future work will examine the use of lecture capture videos in greater detail.

### Description

Four Thinking About Learning surveys were administered to ~600 general chemistry students at the beginning of the quarter and approximately 1 week before each exam. While the goal of these for-credit reflections was to encourage study planning before exams, student responses provide insight to students' study practices over the course of the quarter. Analysis of a matched dataset over all four surveys demonstrates that students' plans exceed their reported actions as of 4-7 days before an exam, and shows that students favor course resources assigned for course credit (such as homework) over resources provided not-for-credit.

### Relevance and Takeaways

Insight into how students view and use study resources can guide instructors' efforts to generate, adopt, and refine course materials. Our results offer perspective into the study practices that students used for a large general chemistry course, and provide a starting point for developing course materials to encourage self-regulated learning in general chemistry, and other courses at UC Davis.

### Author Biographies

Elizabeth Cox is a 4th year Forensic Chemistry major with an English minor. She is completing her fourth quarter of Chemistry Education Research with projects on student study practices, assessment of learning, and lecture capture. She is a Peer Mentor in the Chemistry Department, has been a general chemistry Learning Assistant for multiple quarters, and can work magic with spreadsheets.

Emil Rezkalla is a transfer student and Spring 2018 graduate of UC Davis chemistry. His interest in students' use of

textbooks (or lack thereof) kicked-off his co-leadership of the Student Study Practices project for two quarters of Chemical Education Research in Dr. Chamberlain's group.

Julia Chamberlain is a Lecturer with Potential for Security of Employment in the Chemistry Department. She is an alumna of Reed College (Chemistry BA) and Northwestern University (Chemistry PhD), and she completed her postdoctoral studies at the University of Colorado Boulder in Chemical Education Research on interactive educational simulations. She has taught large and small university and community college chemistry courses, and joined the UC Davis faculty in 2015. This is her third UC Davis SOTL Conference.

## 11. Active Learning in the Gross Anatomy Laboratory

### Work in Progress

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### Purpose

The overall purpose of this study was to evaluate student experience in a gross anatomy laboratory as part of an advanced practice pathophysiology course for nurse practitioner and physician assistant students. New active learning gross anatomy laboratory sessions were designed alongside the implementation of an interactive 3D anatomy atlas.

### Main Findings

Student evaluations, feedback and engagement data show overall positive impact of gross anatomy lab active learning sessions for the NRS 250 course. In particular, data shows impact in areas of engagement, professionalism, and core content knowledge. In addition, preliminary data indicates that the anatomy sessions also positively impacted student performance in a concomitant clinical skills course.

### Description

NRS 250 is part of the Foundations in Primary Care series for first year Nurse Practitioner and Physician Assistant students at the Betty Irene Moore School of Nursing. This course introduces students to applied anatomy, physiology and pathophysiology. Prior student feedback identified a strong interest in gross anatomy laboratory experience and applied anatomy. Course design and implementation of anatomy lab active learning sessions will be presented. In particular, these course sessions were specifically designed to be short, low cost and clinically applied. Anatomy class session design included design of laboratory manual, assessments, 3D anatomy videos and gross anatomy laboratory discussions. Faculty experience and general considerations for large class size, program integration, use of technology, faculty and staff support will be discussed. Preliminary student feedback, engagement and assessment results will also be shared.

### Relevance and Takeaways

Preliminary findings suggest that implementation of gross anatomy laboratory sessions have a positive impact on student experience, student engagement and student performance. Additional findings also suggest that integration with concomitant clinical skills course may further impact student learning in the future.

### Author Biographies

Cara M. Sandholdt, Ph.D. is an assistant adjunct faculty member in the Department of Cell Biology and Human Anatomy teaching at the UC Davis School of Medicine and the Betty Irene Moore School of Nursing. Dr. Sandholdt received her PhD in Neuroscience from UCSF and has taught courses in General Biology, Anatomy, Physiology and Pathophysiology. Her research interests include active learning course design, education technology, student success and professionalism in clinical education.

Jeffrey M. Pearl, M.D. is the interim director for the Master of Health Services • Physician Assistant Studies Program and a visiting professor at the Betty Irene School of Nursing at UC Davis. Pearl has extensive experience in education, research and clinical practice. Throughout his clinical career as a physician, Pearl led extensive research in basic science, small and large animal, translational and clinical research including National Institute of Health (NIH) and American Heart Association funding. His research interests in general focus on the cardiovascular arena, including studies of ischemia and reperfusion, hypoxia and improving clinical outcomes for children and in transplantation.



## 12. Student Perceptions and Evaluation of Active Learning in an Advance Physiology Course

### Work in Progress

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### Purpose

The purpose of this study was to analyze student performance, perceptions and evaluations of an undergraduate active learning course. Previous studies have suggested that there are many challenges facing faculty developing active learning courses in the undergraduate setting, including low evaluation scores, student perception of faculty roles, and student performance. In order to analyze student perceptions two evaluations were provided, one from the undergraduate campus and one designed specifically for an active learning course. Data from evaluations over two years, as well as student performance and perceptions of faculty and student roles in active learning were analyzed.

### Main Findings

Comparison of evaluations over two years in HPH 157, an active learning course designed for pre-health professional students demonstrates that student perceptions of the course were overwhelmingly positive but also met challenges commonly seen in active learning courses. The detailed questions provided within an active learning focused evaluation provided additional insight into student perceptions and challenges. In addition, qualitative analysis of an introductory student assignment regarding faculty and student roles in an active learning class suggest that students continue to struggle with the shift in student and faculty roles during an active learning course. Our data suggest that administration and faculty involved in active learning courses should consider active learning focused evaluations for course and faculty performance review.

### Description

HPH 157 is an advance physiology course designed for pre-health professional students. This course was designed to be a small group, problem-based, active learning course with focused case-based learning modules. At the beginning of the course, faculty spent time discussing learning in an active learning setting. Students were then asked to complete an assignment regarding faculty and student roles in an active learning course. Students were provided with reading assignments and review questions prior to each learning module. Discussions of key points in a chalk talk style lecture format was provided weekly, along with office hours and on-line asynchronous discussion forums. Students then completed high level problem sets in groups with small faculty to student ratios for analysis and feedback. At the end of each learning module, student groups presented their problem set answers to the class. Students voluntarily completed two evaluations: a traditional university provided course evaluation, and a custom written active-learning focused evaluation. At the end of the course, student perceptions of faculty and student roles in active learning, student performance and student evaluations were analyzed.

### Relevance and Takeaways

Preliminary data suggests an overwhelmingly positive impact of the active learning course design on student engagement, critical thinking and learning. Student perceptions, experiences and challenges were evident in both traditional and custom evaluations, but were more appropriately captured by the custom evaluation than the traditional course evaluation. We also found that student perceptions of faculty and student roles in an active learning course continue to be challenging. Our findings continue to underscore the importance of continued effort toward student buy-in in an active learning setting. Our data suggests that course evaluations should be tailored for active learning courses in order to capture the breadth and depth of student experiences in an active learning course.

**Author Biographies**

Cara M. Sandholdt, Ph.D. is an Assistant Adjunct Faculty member in the Department of Cell Biology and Human Anatomy teaching at the UC Davis School of Medicine and the Betty Irene Moore School of Nursing. Dr. Sandholdt received her PhD in Neuroscience from UCSF and has taught courses in General Biology, Anatomy, Physiology and Pathophysiology. Her research interests include active learning course design, education technology, student success and professionalism in clinical education.

John A. Payne, Ph.D. is a professor in the Department of Physiology and Membrane Biology at the UC Davis School of Medicine. His research has centered on chloride transport in epithelia, neurons, and cardiomyocytes. Dr. Payne has taught medical physiology at UC Davis School of Medicine for over 20 years, and he was the course director of the medical physiology course for 15 years. Dr. Payne is a firm believer in active learning and has employed various forms of active learning in medical school instruction in both small (35 students) and large (100 students) class formats for over 10 years.

## 13. Fulfilling the Implied Promise; Student Career Readiness through Academic Integration and Collaboration

### Work in Progress

Janice N. Morand and Marcie Kirk Holland

Internship and Career Center

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### Purpose

The Internship and Career Center is collaborating with colleges, departments, campus units and off-campus employers to integrate career exploration, development and skills into the academic curriculum. The purpose of this work is to ensure that UC Davis students experience career development as an integral part of their education and that they are career ready when they graduate. Integrating career and professional development into the curriculum provides equitable access to UC Davis students.

### Main Findings

Career development curriculum embedded in courses increases students' confidence in career exploration, preparation and decision making.

Students in career courses self-report increased knowledge in basic career skills.

Career development can be taught in a discipline-specific course as well as in a course with a cross section of students.

Employers can be utilized effectively in career curriculum.

First year students in career-related courses have increased confidence that they can access campus resources for career preparation.

First year students in year-long, cohort model, career exploration courses are over 20% more likely to graduate in 4 years.

### Description

The poster will include:

Comparison of key curricular components of five courses (i) Careers and Identity in American Culture (AMS 95), (ii) Career Discovery Group Seminar (SAS 5), (iii) Career Decision Making and English (ENL 149), (iv) Career Lab (AMS 98), and (v) Designing Your Professional Life for Graduate Students (AMS 298).

Outcome data from assessment of students' career confidence.

Student perception data of knowledge of specific career skills.

Elements of successful collaboration, including an example of employer-led curriculum.

Plans for future work and assessment.

### Relevance and Takeaways

Career exploration and skill development is particularly important as growing numbers of UC Davis students are the first in their families to attend college, which often means looking for careers they may not have been exposed to through family. Our experience with career courses indicates that multiple models are effective in integrating career development with academics and supporting career readiness for all students, including those with time constraints due to employment, intercollegiate athletics, etc. We seek to raise awareness that through collaboration and experimentation UC Davis can develop new approaches to connecting career development to academics.

### Author Biographies

Janice N. Morand, PhD is Associate Director at the Internship and Career Center (ICC). Janice has been helping students explore, prepare for and launch careers for more than 20 years. She coordinates the Internship and Career Center's teaching and academic integration efforts. At UC Davis, Janice has developed and taught career courses for undergraduate and graduate students. Prior to joining the ICC, she was a lecturer in Molecular and Cellular Biology. Janice holds a Bachelor of Arts degree in Biology from Central Methodist University and a PhD in Biochemistry from Purdue University.

With nearly 35 years of experience in career services, Marcie Kirk Holland M.S., serves as the first non-faculty director of the University of California Davis, Internship and Career Center (ICC). She has over 10 years of experience teaching graded career courses at UC Davis and graduate courses in career counseling at CSU Sacramento, National University and Chapman University. Marcie earned her undergraduate degree from the University of Colorado Boulder with a major in Environmental Conservation. She earned an M.S. in Counseling with a Career Emphasis from CSU Sacramento.

## 14. Assessing Engineering Students' Motivation on Programming Assignments

### Work in Progress

Susan P. Gentry

Materials Science and Engineering

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### Purpose

Programming skills are vital for practicing engineers, as the skills can be used to analyze data or simulate materials phenomena. However, some engineering students do not perceive the importance or relevance of programming tasks. This work aims to answer two questions: 1) What are students' motivations for programming assignments in technical engineering courses, as they relate to task value, intrinsic value, and extrinsic value? 2) Do students perceive programming assignments as less valuable than other types of assignments in their courses (such as homework)?

### Main Findings

Programming and traditional (such as homework) assignments are integrated into an upper-division engineering course to support student learning of technical course content. At the completion of the quarter, students completed a survey on their motivation for programming and non-programming assignments. The survey found that students are less motivated on programming assignments than on homework and other assignments.

### Description

This work investigates student motivation based on expectancy-value theory, which posits that students are most motivated when they expect to succeed at a task and find value in completing the task. A pilot study was conducted to measure three of students' value beliefs: intrinsic value, extrinsic value, and task value. Survey questions were derived from the Motivated Strategies for Learning Questionnaire (MSLQ) on these three value beliefs; the questions were repeated for programming assignments and non-programming assignments. This poster presents results of the pilot study and discusses takeaways from the study and future work.

### Relevance and Takeaways

Creating a learning environment where students are adequately supported and motivated is important to promote student learning and retention. Instructors can use expectancy-value theory to provide a framework for enhancing students' motivation. Finally, quantifying motivation can help instructors assess whether their changes to a course help students' motivation.

### Author Biographies

Susan P. Gentry is a Lecturer with Potential Security of Employment at UC Davis. Her work focuses on improving the materials science and engineering curriculum to better support learning. She is specifically interested in using simulations and computer-based tools to enhance student learning of engineering topics while also developing students' computer literacy. A secondary interest is understanding the experiences of students who transfer to the College of Engineering at UC Davis from a community college. Through studying these topics, she aims to develop learning activities which support the diverse population of students at UC Davis.

## 15. Equity issues arising from the punitive zero

### Work in Progress

David J. Webb, Cassandra Paul, Mary Chessey

Physics

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### Purpose

Different grading scales may weigh exam/problem grades differently. Two grade scales are commonly used in one of our intro-physics series. One of these grade scales gives higher weight to very low grades and the largest weight to grades of zero (given when an exam question is left blank and/or when a quiz is missed). Addressing equity issues in grading, we consider three questions: 1) How does the behavior of leaving problems blank vary by student population? 2) How does the behavior of missing an exam vary by student population? and 3) Are these behaviors correlated with other measures of understanding?

### Main Findings

Overall, the average student in Physics 7A/7B student left about 3% of their answers blank. Comparing different groups we found that:

Students from racial/ethnic groups underrepresented in STEM leave answers blank 35% ( $\pm 4\%$ ) more often than their peers.

First generation students leave answers blank 28% ( $\pm 3\%$ ) more often than their peers.

Female students leave answers blank 7% ( $\pm 2\%$ ) more often than male.

Skipping a quiz completely led to similar results except the gender difference is switched and much larger.

These patterns hold even when we include only students receiving a B or better on their graded answers.

### Description

For a separate study of differences between grade scales, we looked up 96 original class databases from 2003-2012 to compile a set of 794,088 grades given, on individual parts of 606 quizzes and 76 final exams, to 15,207 students taking Physics 7A and/or Physics 7B during that set of years. We then included student's demographic data from UC Davis administrative sources. We use this same data set in the current paper. This course utilizes the Grading by Response Category method, where student solutions are placed in categories that are later assigned a numeric grade, so that the 96 class-level databases include the individual grades that were given for each problem, the total exam scores for each student, the calculations that led to overall exam scores, and (often) the calculations that led to a final grade. We limit our results to students who were either US citizens or had permanent resident status. First-generation students are those for whom neither parent had earned a bachelor's degree or higher. For students from underrepresented racial/ethnic groups we use the categorization published by the American Physical Society and include the groups African American, Native American, Latina/o American, Mexican American, Chicana/o, and Pacific Island American.

### Relevance and Takeaways

Grades are used by students, teachers, schools, and much of the rest of society as a measurement of the student's understanding of, or skills in, a subject. A problem arises when a student fails to provide information about their understanding by skipping a question on a quiz or final exam, or by missing a quiz entirely. Although the reasons for this behavior are likely unknown to the instructor, the demographic differences we have found for this kind of behavior suggest that penalizing this behavior too heavily may inadvertently punish different groups differently.

### Author Biographies

David Webb is a Senior Lecturer (SOE) Emeritus in the Dept. of Physics at UC Davis. After 30 years of research experience in Condensed Matter Physics he has focused on Physics Education research for the past 11 years.

Cassandra Paul is an Associate Professor in the Dept. of Physics and Astronomy at San Jose State University. She received her PhD in Physics from UC Davis in 2012. As a member of the Physics Education Research group at UCD she investigated the interactions between students and instructors in interactive classrooms and contributed in the development of the Real-time Instructor Observing Tool (RIOT). Her research interests are under the umbrella of physics and astronomy education and include active learning techniques, assessment, instructor professional development, models/modeling, and graduate student teaching assistants.

Mary Chessey is a postdoctoral student in the Department of Physics at the University of Maryland. She received her PhD in Physics from UC Davis in 2018. As a member of the Physics Education Research group at UCD she used an ethnographic approach in a 2-year study focused primarily on junior transfer physics majors at UC Davis. Her research interests within Physics Education include issues of equity and inclusion.

## 16. Incorporating self-reflection and metacognition in a required fundamentals of bioengineering course

Jennifer Choi

Biomedical Engineering

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### **Purpose**

We are continually seeking to make content more accessible and enhance conceptual understanding to improve student learning in this challenging, fundamentals of bioengineering course. Previous course interventions focused on integrating additional formative assessments, video problems, and study sessions for students. While integrated active learning strategies showed some impact on student learning gains in a previous study, it was becoming clear that students may also benefit from additional guidance with respect to effective study strategies. The purpose of this work is to demonstrate how self-reflection through exam wrappers and metacognition through an in-class discussion were incorporated in this class.

### **Main Findings**

The incorporation of exam wrappers and in-class discussion were straightforward to implement. Survey responses indicate that students valued newly incorporated activities to a varying extent, and reported moderate levels of change in study strategies and impact in other courses. Feedback documented on exam wrappers provided the instructional staff with insight into students' perception of what they think would enhance course performance. While overall performance on exams improved, a controlled study would need to be performed to confirm statistical significance.

### **Description**

Exam wrappers were assigned to all students for extra credit following the first and second midterms. Exam wrappers consisted of five questions aimed to promote self-reflection and feedback once students received their graded exams. The questions asked students to document each of the following: 1. Time spent preparing for the exam, 2. Percentage of test-preparation time spent towards specific strategies (i.e. skimming textbook chapters, reviewing notes, working on homework questions, etc.), 3. Where/how points were lost (distributed across content-specific items such as 'trouble interpreting the problem' and 'trouble drawing system diagram'), 4. Two new strategies that will be implemented in preparation for the next exam, and 5. Suggestions to the instructors regarding how learning and preparation can be further supported. Exam wrappers were collected and redistributed back to the students one week prior to the next exam.

After the first exam wrapper was completed, an in-class discussion regarding comparison of learning/study strategies from two mock students was held. In this exercise, students were asked to read two scenarios that describe how two different students prepare for an upcoming exam. A class-wide discussion was then held to compare/contrast the strategies used, but also the role of self-regulation in study strategies.

A survey at the completion of the course was also administered for feedback on: (A) Level of value of exam wrappers; (B) Level of value of in-class discussion; (C) Self-reported effectiveness of study strategies used prior to course; (D) Self-reported changes in study strategies during the course; and (E) Impact in other courses.

### **Relevance and Takeaways**

Exam wrappers and an in-class discussion focused on study strategies were incorporated, and represent two methods that can be used to promote student self-reflection across a diversity of learners. Self-reported survey responses in regard

to overall value of these exercises varied in level of impact, and this study demonstrates a straight forward mechanism to potentially shape and enhance students' study strategies.

**Author Biographies**

Jennifer Choi is a faculty member in the Department of Biomedical Engineering at UC Davis. She received her Ph.D. in Biomedical Engineering from Tufts University, M.S. from Syracuse University, and B.S. from Cornell University. She is actively engaged in the integration of engineering design principles throughout the undergraduate program through team-based design experiences. Her scholarly interests include evaluating the impact of curricular activities on design thinking skills and student learning, understanding STEM problem solving across disciplines, and improving the transfer student experience.

## 17. Students' self-perceived benefits of weekly writing assignments

### Work in Progress

Mark Verbitsky

Political Science

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### Purpose

Legal case brief writing is a common assignment in law school classes, where the primary pedagogical purpose is to aid retention of essential facts. I modified the traditional case brief assignment to encourage higher-order thinking (critical evaluation and questioning) and to suit the logistics of larger undergraduate classes (120 students). In future classes I will test the impact of the exercise, but as a preliminary step, I surveyed students on their experience with the assignment. Identifying the perceived benefits and flaws of the assignment will help cater the assignment to future students.

### Main Findings

While a very small proportion of students would prefer only tests, most students (regardless of overall grade) preferred a weekly writing assignment. The primary benefits of the assignment were identified as instrumental (incentive to do the reading, preparation for tests) and intrinsic (thinking through the readings, taking positions, getting more from class lectures). Along with some logistical requests (preferring the assignment to be due later), the primary concern was that focusing on one reading for response could distract from other assigned readings.

### Description

I first describe the features of the assignment (scaffolded questions ranging from basic facts, outlining competing positions, supporting one view, raising further questions) and the logistics of the assignment (grading rubric, peer review). The survey itself was a mix of Likert-scale questions evaluating the assignment as well as open-ended questions on how the assignment was helpful and detrimental. The incentive for completing the survey was dropping the lowest score in the assignment and the completion rate was 88%. Survey responses are analyzed with qualitative coding and correlated with course performance. After presenting the students' perceived benefits, I address how I plan to modify the assignment to encourage further critical thinking and I also discuss ways that a future study could test the efficacy of the assignment.

### Relevance and Takeaways

The survey strongly suggests that students genuinely appreciate the opportunity for frequent writing assignments as opposed to a test-only course format. Furthermore, students see the value of these forms of assignments for their learning, which may in turn increase their overall appreciation of the course. The specific question prompts, as well as the peer review, rubric grading process of the scaffolded writing assignment offer a possible model that could be applied in other classes.

### Author Biographies

Mark Verbitsky is a LPSOE in the Political Science Department where he teaches Constitutional Law and American Political Theory classes. He has been a member of two CEE learning communities and he regular attendee of CEE + ATS workshops.

### Intended Format

Posters (45 Minute Session): An informative poster describing a research project, findings, or methods, intended to foster individual dialogue between the presenter and the posters'™s visitors. This is the preferred format for Work-In-Progress or Explorations of Concept.



## 18. What makes for an inclusive classroom? Student voices and perspectives.

### Work in Progress

Jeanette Ruiz, Alicia Garcia, Natalia Caporale

Communications Department (JR), Education Department (AG), NPB Department (NC)

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### Purpose

In recent years, there has been repeated national calls to increase the diversity of the STEM workforce. For this, it is necessary to increase retention and success of undergraduates from underrepresented minorities pursuing STEM majors. A sense of belonging to a classroom and community of practice has been shown to play a key role in promoting retention in STEM. However, there is no consensus as to what practices are more effective in promoting inclusiveness in the classroom, nor validated tools to assess this. The purpose of this study is to develop a survey instrument to assess inclusiveness in our UC Davis classrooms.

### Main Findings

All students participating in an online GE communications course answered two questions pertaining inclusiveness in online and face to face courses. Through bottom-up coding, we identified 6 emerging characteristics that students ascribed to inclusive classrooms: (1) Welcoming and respectful of diverse opinions; (2) Collaborative; (3) Faculty and TAs that are available in and out of the classroom; (4) Opportunities are created for students to engage with the course material in different ways; (5) Tools for success are easily available; (6) Relevant to students' life. We are currently collecting data from additional classrooms to test and improve this rubric as well as conducting student interviews. The results of these additional studies will be presented at the conference.

### Description

This poster is a work in progress poster that is part of a 3 stage process to develop a survey instrument to assess inclusiveness in UC Davis classrooms. The first stage is to collect student opinions on inclusiveness across a wide variety of STEM and non-STEM majors. These are collected through surveys and interviews. This will be followed by the development of a pilot survey to be implemented in Spring 2019 and the validation of this survey for its launch in Fall 2019.

This poster describes initial qualitative findings on student perceptions on what makes an inclusive classroom as well as a pilot rubric developed for coding of student answers. Initial data was collected from 67 students participating in a GE communications class. Students were asked to answer two open ended questions about inclusiveness and differences that may exist between online and in person courses in inclusiveness. Student answers were coded using a grounded theory approach to identify emerging themes. These themes were used to develop a rubric and student responses were independently coded by two researchers following the rubric. Coders practiced iteratively on a subset of answers until interrater reliability was above 80%. We are collecting additional data to further validate this rubric.

### Relevance and Takeaways

The development of inclusive classrooms that promote student success is an iterative process for which student input is key. Our pilot study identified 6 major themes that are consistent with existing literature on factors affecting sense of belonging and highlight students' awareness of the issues and their willingness to be involved in a conversation as to how to address them. The development and validation of a survey tailored to UC Davis students can be an invaluable tool to assess and guide our efforts as UC Davis strives for inclusive excellence.

**Author Biographies**

Jeanette Ruiz is a Lecturer (LPSOE) for the Department of Communication at UC Davis and a CAMPOS Faculty Scholar. She specializes in strategic communication with a specific interest in emerging practices and concepts in digital and social media. In addition to her appointment in the Department of Communication, she has served as a human resources and public relations consultant. Dr. Ruiz's research focuses on public health communication and the Internet as well as the globalization, structure and ownership concentration of the international Internet. Currently, she is working on assessing issues of assessment and student accessibility and inclusivity in higher education.

Alicia Garcia, is a PhD student in the Education. Her research focuses on the retention of underserved students in higher education. Specifically, Alicia is interested in the student experience through academic probation, academic dismissal, and reinstatement. Alicia currently serves as a member of the Hispanic Serving Institution (HSI) Taskforce and is the Graduate Student Researcher (GSR) for the Student Retention & Recruitment Center (SRRC) at UC Davis.

Dr. Natalia Caporale is Teaching Faculty in the NPB Department. In addition to teaching majors and non-majors human physiology and cell biology courses, Natalia is interested in (1) teaching strategies that promote student self-efficacy, resilience and sense of belonging; (2) identifying barriers to the success of underrepresented students in science and developing interventions to help students overcome them. Natalia received her B.S. degree (Licenciatura) in Biology at the Universidad de Buenos Aires and her PhD in Neuroscience from UC Berkeley. She was a postdoc at UC Berkeley and UCSF and then an adjunct lecturer at UC Berkeley and SFSU.



## 19. An Online Course meets Face-To-Face

Sattik Ghosh, Arnold Bloom, Stephanie Pulford

Center for Educational Effectiveness

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### Purpose

Because online courses increase convenience and remove pressures of transportation and scheduling, they are often touted as a means to increase equitable access to higher education. However, in recent studies, the outcomes of students enrolled in fully online courses tend to be poorer than those of their face-to-face counterparts. With this project, we seek to understand whether online courses preferentially attract, and then disadvantage, underserved student demographics--thus functioning as an access trap to vulnerable student populations.

### Main Findings

Within a sample of 1,482 students who were enrolled in a UC Davis course that has been offered since 2012, there were numerous statistically significant instances of student preference for the course's online format by demographic. For example, students who were women, or low income, or English language learners tended to opt for online courses when both online and face-to-face formats were available. When both formats were available, students in the online format had higher achievement gaps than those in the face-to-face format. However, during quarters when only the online course was offered, student performance in general tended to match the higher performance in face-to-face classes, thus suggesting that quarter availability may have a higher influence on students' choice of class than available format.

### Description

In this work we present an analysis of the performance versus attributes of 1,482 undergraduates of the University of California enrolled in either an online or face-to-face version of an introductory, multidisciplinary course about climate change. This course was taught, with one exception, twice a year by the same instructor over a six-year period. We introduce the idea of combined effects of a course format's attractiveness to students and its outcomes for students, such that a course may provide an adaptive situation (students are attracted to a course format that supports a better outcome) or a maladaptive situation (students are attracted to a course format that provides lesser outcomes). Through the lens of a single course that is offered online and face-to-face simultaneously, we isolate the effects of online learning, and consider cases in which choosing these courses may be maladaptive for students. We consider ways in which this knowledge can fuel innovations to improve online courses for students with risk factors.

### Takeaways

Online courses are often presented as outcomes-neutral choices that allow easy access to education for students; however, research at community colleges has suggested that online learning introduces lower outcomes and higher achievement gaps for at-risk students. With this study, we uncover a similar phenomenon at our university. Through this case, we hope to make other instructors aware of student difficulties in online coursework so that as a community we may take constructive steps to scaffold and improve online learning outcomes for our university's vulnerable student populations.

### Author Biographies

Sattik Ghosh

Sattik Ghosh is an analyst and graduate student researcher within the Center for Educational Effectiveness. He is also a graduate student in the School of Education.

#### Arnold Bloom

With a name like Bloom, many assume that I was destined to become a botanist, but my career path followed a circuitous route. Upon receiving an undergraduate degree in Physics from Yale University, I spent several years developing computer models of the spread of air pollution over cities in the United States and Germany. I received a Ph.D. in Biological Sciences from Stanford University, where I also completed a two-semester course in Environmental Legislation at the Law School. I conducted postdoctoral research on the temperature responses of plants at the University of Alaska, Fairbanks.

For nearly forty years, I have been on the faculty of the University of California at Davis. I have offered for over a decade a multi-media course about global climate change and, for the last four years, joined with Sue Ebeler and Mark Wilson to develop the course "Developing Digital Communication Skills.

#### Stephanie Pulford

Dr. Stephanie Pulford is the Center for Educational Effectiveness' Associate Director for Instructional Research & Development. Stephanie and her team conduct instructional innovation and discovery in support of teaching and learning at UC Davis. Additionally, Stephanie supports the growing community of scholarly educators at UC Davis through consultation, collaboration, and research support.

## 20. Using Surveys to Adjust Teaching Approach During the Quarter

### Work in Progress

Korana Burke

Mathematics

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### Purpose

Student class evaluations are a useful tool for improving teaching effectiveness. However, waiting for the end of the quarter to read student evaluations is not useful at all if one wants to improve the student experience during the quarter. In this work I show how one can use beginning of the quarter survey as well as a survey administered immediately after the first midterm to both gain understanding about the students habits and expectations and to implement meaningful changes to one's teaching approach.

### Main Findings

At the beginning of the quarter students expect to spend less time than required on the class. After the first midterm, they report spending even less time than they expected studying for the class. Students also tend to not be aware of all the campus resources available to them. Finally, as a result of the surveys, I have started posting practice problems for students and have had a long conversation about their midterm performance which both seems to have helped in overall student experience in the class.

### Description

Students were given two surveys: one the first day of classes beginning of the quarter and the second one right after they took the first midterm. In order to get good response from the students, the survey was mandatory and it counted as a quiz. The quiz was graded as "all-or-nothing" meaning that in order to get the full credit students had to answer all questions. Choosing to skip even a single question resulted in no credit. Surveys are a mixture of multiple choice and open ended questions. Some questions prompt students to show accountability for their performance in class while other questions ask students to propose improvements that would help them do better in class.

### Relevance and Takeaways

Surveys can be used to help the students do better in class and to make them feel that their voices are heard. They can also be used to advertise various campus resources and to gain insight into students perception of available resources. Furthermore, they can be used in large classes to understand how much time students are spending on the class during the quarter and which teaching tools and approaches they like or don't like. This data is useful for adjusting one's lecture while there is still plenty of time left in the quarter.

### Author Biographies

I am a lecturer in the Mathematics Department. As an active member of Society for Industrial and Applied Mathematics, I have always cared about better ways of teaching applied math and mathematical modeling to students.

## 21. A Mutually Beneficial Relationship between Students and Peer Learning Assistants in Course-based Undergraduate Research Experiences (CUREs)

### Work in Progress

Karina Targos, Ashley Vater, Annaliese Franz

Department of Chemistry

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### Purpose

Course-based undergraduate research experiences (CUREs) piloted through the first-year seminar (FYS) program provide opportunities to present a group of students with a research question with significance to the scientific community. In contrast to a traditional lab course consisting of mostly heuristic exercises, CUREs introduce students to the process of iterative research and emphasize data generation and critical thinking like a scientist. The goal of this project was to examine the involvement and role of more experienced undergraduate mentors serving as peer learning assistants (LAs) for FYS-CUREs. More specifically, this project focuses on determining the mutually beneficial relationship between students and learning assistants in CUREs, with an initial focus on a CURE offered in the Department of Chemistry. In brief, we assert that students benefit from concrete and approachable role models, while peer learning assistants build confidence while practicing mentorship and effective scientific communication.

### Main Findings

We used surveys and student reflections to evaluate changes in student attitudes in association with LAs in these CUREs. Of the 24 CUREs offered between spring 2016 and spring 2018, 14 CUREs had LAs involved. Across all CUREs, students reported significant increases in Researcher Identity and Scientific Self-Efficacy (N=190, p-value=0.001). No significant differences in attitudes were found in FYS-CURE with LAs present in-class than those who did not have peer instructors. However, the current survey may not be capturing the effects that in-class LAs have on students as we have had positive qualitative feedback from both students and LAs about the impact of the peer-mentor relationship. Furthermore, specific survey questions designed to answer this question have not yet been included. We plan to use other instruments to look at sense of community and other elements of success for CUREs with and without LA involvement. In addition, we hope to quantitatively capture the effects that being an LA has on undergraduate researchers and scholars by implementing a survey for LAs.

### Description

The intent of this presentation is to provide (1) a description of the roles of in-class and out-of-class LAs in FYS-CUREs, (2) reflections from LAs who report positive outcomes from the peer mentoring experience, (3) survey-based changes in student attitudes for CUREs with and without in-class LA involvement, (4) ideas for future investigation into the effects on students and LAs from the peer-mentor relationship. In particular, the impact of LAs in the chemistry CURE Molecular Binding Interactions of Organic Molecules for Drug Discovery will be qualitatively reported. Quantitative investigation will focus on students participation in a pre- and post- survey measuring Research Identity and Scientific Self-Efficacy (Robnett, Chemers, & Zurbriggen, 2015). Students also responded to the internally developed set of post-questions. 20 of the 24 FYS-CURE sections with 190 matched pre- post- student's responses were analyzed. Differences in means between pre- and post- scores, in association with the variable: Learning Assistant participation were assessed by Tukey multiple comparison test.

### Relevance

Learning assistants are a vital part of the CURE instructional team that engage in student learning and assist in lab preparation. LAs report increased confidence in their scientific communication and value in helping their peers grow as

undergraduate researchers and scholars. Students in CUREs feel that LAs are approachable and provide guidance in the research discovery process. Overall, the impact of CUREs on students is robust and there is significant increases in attitudinal parameters in FYS-CUREs both with and without LAs. However, additional tools should be implemented to measure the effects of the mutually beneficial peer-mentor relationship and quantify the impact.

### **Author Biographies**

Karina Targos is a Chemistry major involved in undergraduate research in the Department of Chemistry at UC Davis. She has participated in the first-year seminar course-based undergraduate research experience (FYS-CURE) as a learning assistant (LA) for two quarters. The positive experiences of being an LA has inspired her investigation into the mutually beneficial relationship between students and peer mentors in undergraduate research.

Ashley Vater serves as a Curriculum Planner for the UC Davis First-Year Seminar Program. Ashley's primary project is to develop a series of experiential learning seminars in which students produce work that targets issues relevant to the faculty instructor's discipline. Ashley is interested in how these experiences impact students' motivation and career trajectories.

Annaliese Franz is an Associate Professor of Chemistry and also serves as the Faculty Director of the Undergraduate Research Center (URC) at UC Davis. She is the current director/PI of the NSF ChemEnergy REU program at UC Davis. She has taught two FYS-CUREs related to chemistry concepts, offered in the Department of Chemistry.

## 22. Collaboration Between Faculty and the Writing Support Center to Facilitate Quality Peer Review and Writing in a High Enrollment Biochemistry Lecture Course

Ariel Loring, Bridget Mabunga, Kevin Sitz, and Mona Monfared

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### **Purpose**

For six quarters there has been an exploratory writing assignment in the upper division biochemistry lecture course BIS102 (Structure and Function of Biomolecules) which often involves peer review. Observationally, students often struggle giving effective feedback, and developing feedback skills will help encourage scientific literacy. Survey results over this time indicated dissatisfaction with the peer review process and a lack of understanding for how the assignment is graded. In collaboration with Writing Specialists at the Academic Assistance and Tutoring Centers, we designed and implemented interventions to address these issues in Spring 2018.

### **Main Findings**

We implemented two main interventions in BIS102 in Spring 2018: (1) a class session led by writing specialists where students discussed two sample papers and applied the grading rubric and (2) a peer review workshop where students met twice in specialist-facilitated groups to discuss papers and grading. We observed statistically significant increases between the first and second assignments ( $p < 0.005$ ) in the rubric parameters pertaining to clarity, documentation, and connection to class for students who participated in the peer review workshops. Scores for documentation showed a statistically significant ( $p < 0.05$ ) increase while scores for length showed a statistically significant decrease ( $p < 0.05$ ) between the two assignments for students who did not participate in the workshops. Students who participated in the peer review workshops were also surveyed before and after the course about how comfortable they felt with writing assignments in general and assessing and being assessed by their peers. Notably, every opinion captured by survey questions changed in a statistically significant way between the start and end of the quarter, indicating a trend toward more comfort with writing and peer assessment.

### **Description**

During Spring 2018, when the peer review workshops were offered, students took pre and post surveys gauging several aspects of how they felt about the writing assignment, ranging from understanding of expectations to comfort with writing and being graded by peers. Peer- assigned grades in an online platform were also analyzed to detect impact of the interventions.

### **Relevance and Takeaways**

We want our students to achieve scientific literacy, and this can be facilitated by asking students to communicate scientific topics in their own words. However, writing assignments in large, non-lab upper division science classes pose some difficulties. To facilitate grading in a large class and provide students with valuable practice giving and receiving feedback, we used a peer grading online platform. We previously identified discomfort with the peer review process, so we implemented these interventions to see if we could address this issue. We found that the Writing Specialists' activities in the biochemistry course were instrumental in creating an increase in comfort and satisfaction with several aspects of this assignment. During the analysis phase of the project, a detailed rubric for evaluating the quality of feedback was created, which is a resource that can be given to students in the future at the start of the course.

### **Author Biographies**

Ariel Loring is a Writing Specialist in the Academic Assistance and Tutoring Centers where she teaches classes and workshops in writing support, summer bridge, and tutor training, and works with students one-on-one to improve their

writing. She has a Ph.D. in linguistics from UC Davis and conducts research in the areas of language discrimination, discourse analysis, and citizenship policies. She also holds a lectureship position at CSU Sacramento, where she has been teaching a linguistic anthropology course for the last 4 years.

Bridget Mabunga, a Writing Specialist in the Academic Assistance and Tutoring Centers, has taught college writing in the Sacramento area for ten years. At UC Davis, she offers individual meetings, in-class writing workshops, and EDU 98 lower division writing support and summer bridge classes to support undergraduate writers at all skill levels while emphasizing writing as a process. She also co-designs/facilitates writing tutor training, focusing on mentoring tutors as they develop their teaching pedagogies. She holds an M.A. in English with an emphasis on Creative Writing from CSU, Sacramento and is currently seeking publication for one novel manuscript and drafting a second.

Kevin Sitz is the Director of the Writing Support Center within the Academic Assistance and Tutoring Centers where he leads a team of specialists who support students in developing their academic writing skills. He holds an EdD in Education from the University of Southern California where he researched initiation into the academic discourse community of first-year composition. Prior to coming to UC Davis, he led the Writing Support Program within the Academic Resource Center at UC Riverside.

Mona Monfared is a Lecturer PSOE in the Molecular and Cellular Biology Dept. She teaches BIS102: Structure and Function of Biomolecules and BIS103: Bioenergetics and Metabolism. She received her PhD in Biochemistry and Molecular Biology at UC Davis and did postdoctoral research at the Plant Gene Expression Center at UC Berkeley/USDA. She has been a faculty member of Santa Clara University, St. Mary's College, Holy Names College, and UC Berkeley Extension.

## 23. Easing Transition to College Mathematics using ALEKS

### Work in Progress

Ka Wai Wong, Meryl Motika, William Tavernetti

Department of Mathematics and Center for Educational Effectiveness

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### Purpose

First-year students often encounter difficulties in their math courses due to the gap between high school and college-level mathematics. In this study, we provided online adaptive learning software called ALEKS to a group of incoming students for self-learning over the summer. We sent targeted invitations to a randomized treatment group and regular emails to all ALEKS participants indicating the students' performance in the course and resources available to them, such as contact information of faculty and brief motivational messages. We will analyze the benefits of ALEKS in improving students' performance in the math placement exams and in easing their transition to math courses at UC Davis.

### Main Findings

Hypothesis: ALEKS will help students perform better in the UC Davis math placement exam (MPE) and in their Fall math course. This hypothesis can be tested by comparing placement and grades of the students who received the targeted invitation (our treatment group) to those who did not (our control group). So far, we have found that the treatment invitations did induce a substantial number of students to sign up for ALEKS and each encouraging email is followed by an increase in activity. The students who were not eligible for free licenses but purchased their own have made the most progress.

### Description

We identified 1402 students whose demographic characteristics and MPE scores put them in our target group. The treatment invitation was sent to 751 of those students. Approximately 170 of those invited registered for ALEKS, and more than 100 have used it actively. An additional 30 chose to register for ALEKS without receiving an invitation. The Average Treatment Effect on placement will be calculated by comparing the final (highest) MPE scores of students from the control group with those from the treatment group. The Average Treatment Effect on the Treated can be calculated using instrumental variables with the invitation as the instrument. The varying degrees to which students use ALEKS can be taken into account by representing ALEKS use with a continuous rather than an indicator variable. At the time of the SOTL conference we will not yet have fall grades, but a similar approach will be used to estimate the effect of ALEKS on grades once the fall quarter concludes.

Among students who do use ALEKS, we will further compare progress and outcomes by demographic characteristics, background in math, and targeted math course in order to determine which groups find the software most useful. We will also examine the timing of ALEKS use to estimate the effects of the encouraging emails.

### Relevance and Takeaways

Our work can serve as a reference in improving the current support to students in their preparation for the UC Davis MPE and placement into calculus tracks. Improved success with mathematics courses and graduation rates are big picture goals. In the near term, we are assessing the efficacy of this type of summer preparation program, and in what capacity it should be offered in the future to incoming students to ease their transition to UC Davis. This program has the advantage over many other programs in that it is one of the lowest cost options to implement on a wide scale.

**Author Biographies**

Meryl Motika is the Lead Analyst for the Center for Educational Effectiveness (CEE) at UC Davis. Her background includes a BA in Public Policy Analysis from Pomona College and PhD in Economics from UC Irvine, nonprofit and research work, and a stint as a professor at St. Lawrence University. Her academic research relates motivation and self-control to productivity and long-term decisions. At CEE she contributes statistical expertise to projects ranging from small-scale pedagogical experiments to student success models for the university as a whole, with a particular focus on improving the outcomes of underserved student populations.

William Tavernetti has a PhD in Applied Mathematics from UC Davis and is currently a lecturer at UC Davis in the Department of Mathematics. William also works as a teacher fellow for the Introduction to Engineering Mechanics Cluster at the California State Summer School for Mathematics and Science (COSMOS).

Ka Wai Wong is a third-year PhD student at the mathematics department. Ka Wai has great enthusiasm and a strong desire in helping students overcome difficulties in their math studies.

## 24. Project Lockbox: An escape-room-style activity emphasizing collaboration over competition

Rachel M Doughty

Chemistry

[rmwelch@ucdavis.edu](mailto:rmwelch@ucdavis.edu)

### **Purpose**

The role of an educator is to teach students of all skill levels, including both high and low performers. Most active learning activities used in the classroom favor the prepared and leave struggling students exactly where they began. Collaboration-focused activities, on the other hand, not only emphasize an important soft skill, but also include every student in the learning process. The purpose of Project: Lockbox is to promote team and class collaboration during an exciting topic review.

### **Main Findings**

Five sections of students and one section of Teaching Assistants completed surveys containing Likert and open-ended questions after participating in the collaborative activity, Project: Lockbox. An overwhelming percentage of students noted the activity improved their comfort level with the reviewed topic (ICE tables) and thought it was fun to play. Teaching Assistants who tested the activity during a preview session helped to identify errors and estimate activity completion time.

### **Description**

During this activity, teams of 2 or 3 students compute quantitative (or qualitative) problems and use the solutions to unlock a 4-digit padlock. The team members are instructed to write independently but work together. Each team receives different versions of the same problems where the content is consistent, but the answers are not. One padlock for every team secures the lid of the lockbox with a prize inside. Once a lock is opened, that team is split up; one student liaison is assigned to each other team in progress to provide verbal guidance. The prize is revealed once all locks have been opened.

### **Relevance and Takeaways**

Project: Lockbox can be adapted easily to any topic or classroom size. An answer guide can be written to fit quantitative questions easily, but qualitative topics can be included as well, using numbered multiple choice or a numbered answer bank. Focusing on collaboration rather than competition helps students to feel included and empowers them to take ownership of their learning.

### **Author Biographies**

Rachel M. Doughty is a PhD candidate in the Chemistry Department at UC Davis, currently engaged in researching photocatalyst candidates for particulate solar water splitting. Rachel is a GAANN Fellow and the recipient of multiple chemistry teaching awards. She is well-known within the department for the active learning activities she designs for her general chemistry discussion sections and plans to continue educating students at the university level after graduation. Her scholarly education interests include active-learning activities, problem-solving, and the expert blind spot.

## 25. Visualizing the innovation education landscape at UC Davis: a preliminary review of campus educational resources, innovation insights, and entrepreneurial trends in higher education.

### **Work in Progress**

Ashley Vater, Bridgette Johnson, Bianca Medina, Kyeema L. Zerbe

Innovation Institute for Food and Health

[awvater@ucdavis.edu](mailto:awvater@ucdavis.edu)

### **Purpose**

Experiences that expand the innovative capacity of students have been gaining national and international attention as high impact practices in education. UC Davis is poised to lead such student engagement across health, science and humanities with its breadth of instructional innovation expertise. Here, we elucidate the opportunities for students in the region to access such an entrepreneurial education through insights from interviews with faculty, students, staff and managers that are presented as a resource network for student navigation. Deeper conversations about integrated programming can better inform our understanding of this educational landscape, and highlight opportunities for enriching entrepreneurial campus offerings.

### **Main Findings**

This poster presents findings to date regarding innovation capacity building activities at work on campus, presented as a visualization network that connects related programs for colleagues to refine, add depth and perspective such that we can improve this resource for student use. We aim to capture input from conference attendees on the structure and content of available instructional resources to better understand their utility and identify gaps or opportunities for enhancing student offerings. Supporting this central focus, highlights from arising literature themes and personnel interviews will reveal perspectives on innovation education that can further inform and contextualize the campus landscape.

### **Description**

This project engages a mixed-method design, where results are integrated across qualitative and quantitative data gathering and analysis. The project will draw from published literature to inform primary research in the form of interviews, which will then inform further literature investigation. Both the literature findings and interview themes will be reported on. Qualitative data supports and informs quantitative exploration of campus innovation resources available to students. Such resources will be identified from conversations, recommendations, online and published material, and generate key information for compilation into a visualization database. Network visualization software will be used to create supportive graphics, and act as a prototype for the development of an interactive web tool that targets UC Davis student users.

### **Relevance and Takeaways**

This project will provide opportunity to capture SOTL community input and offer a deeper understanding of the innovation landscape across campus that can serve as an ongoing resource, especially for directing students to these opportunities. This resource also has the potential to network campus instructors looking to integrate innovation education into their coursework, or collaborate with teams providing these enriched learning opportunities.

### **Author Biographies**

Ms. Ashley Vater is a UC Davis alumnus, having graduated in 2012 with a degree in Biological Sciences and in 2017 with a Masters in Integrative Pathobiology. She develops and manages a new series of courses at UC Davis for the First Year Seminar program in collaboration with the Innovation Institute for Food and Health, with the goal of increasing research and entrepreneurship accessibility to a diverse body of undergraduate students.

Bridgette Johnson

## 26. Developing students' writing skills through peer feedback on Canvas LMS

### Work in Progress

Heather J. Hether

Communication

[hjhether@ucdavis.edu](mailto:hjhether@ucdavis.edu)

Presentation Order: #26B

### Purpose

Providing formative feedback to students is an important teaching tactic that supports students' writing skills development. Not only is instructor feedback beneficial, but so, too, is peer feedback (e.g. Shute, 2008; Wingate, 2010). The current study examines students' perceptions of anonymous peer feedback and the impacts it has on students' writing skills and motivation. Moreover, the study identifies the kinds of feedback students exchange and the variables associated with their perceptions of it. Writing self-efficacy, liking writing, motivation and task value are examined as potential mediators of student perceptions of feedback. In addition, the study also explores the characteristics of feedback preferred by students.

### Main Findings

Students perceived moderate positive benefits of feedback exchange. Students exchanged the most feedback on the content and clarity of their ideas; followed by organization and structure; with the least feedback focused on writing mechanics. Interestingly, students scored lowest in writing ideation efficacy while their writing mechanics efficacy was the highest, and writing self-regulation efficacy was in between the two. Pearsons correlations indicate that receiving feedback on the paper's organization and structure was positively associated with students' writing skills development ( $r = .52, p = .001$ ), as was receiving feedback on the content of the paper ( $r = .58, p = .001$ ). Qualities of desired feedback were that it be honest, detailed, and provide specific suggestions for improvement. Students preferred constructive criticism to “nice” feedback, although students also indicated they did not want feedback that was too “nit-picky” or negative, either.

### Description

This study was based on a short writing assignment from an introductory public relations course offered in the Communication department. Students were assigned a chapter from the textbook from which they had to identify two key theories or processes, explain them in their own words, and apply them each to a real-world example. The writing assignment was approximately two pages long. As part of the assignment, students were paired anonymously through Canvas and asked to provide feedback on a draft version of their classmate's work. Students had the opportunity to revise their paper based on the feedback, prior to submitting the final assignment to the instructor. Immediately after students submitted the assignment, they were invited to complete a survey about their experience and perceptions of peer feedback. Survey data were analyzed with SPSS, V. 25. The survey sample size was  $N = 37$ . The feedback exchanged between all students ( $N = 58$ ) was also analyzed in aggregate with a computer text analysis program (LIWC, 2015) to examine its semantic characteristics. Where students provided consent, the semantic data were matched with respondent survey data to identify patterns in feedback characteristics and student perceptions of it.

### Relevance and Takeaways

Developing proficient student writing skills is a program learning outcome across many departments. With resource constraints limiting the amount of feedback instructors can provide, peer feedback can be a beneficial tactic that supports students' skills. However, students do not exchange all dimensions of feedback equally, nor do students perceive them all as equally beneficial. Integrating peer feedback, in a way that meets students' needs, is one more tool

for instructors to consider as they strive to facilitate stronger writing skills among their students. This presentation will encourage reflection on how instructors can best support student writing skills development through creative tactics, such as peer feedback.

**Author Biographies**

Dr. Heather J. Hether is a faculty member in the Department of Communication at the University of California, Davis. Her research interests focus on digital media in the health and education contexts; communication campaigns; and innovative pedagogy. Dr. Hether's work has been published in academic journals and books, as well as presented at national and international conferences. Dr. Hether has held previous academic and research positions at the University of the Pacific in Stockton and UCD's Center for Healthcare Policy and Research in Sacramento.

## 27. Lecture capture: if you have not heard about it ... give your students one more quarter.

### Work in Progress

Sean Collins<sup>1</sup>, Charlie Turner<sup>2</sup>, Simon Dvorak<sup>2</sup>, Jeremy Cook<sup>2</sup>, Robert Craig<sup>2</sup>, Silvia Carrasco<sup>3</sup>

<sup>1</sup>Microbiology and Molecular Genetics Department, <sup>2</sup>ATS Lecture Capture Team, <sup>3</sup>Molecular and Cellular Biology Department  
scarr@ucdavis.edu

### Purpose

As lecture capture becomes available in more and more classrooms in our campus, both students and instructors will encounter new challenges. It is our intention here to share our experience using lecture capture in a medium enrollment (145 students) upper division science course during Spring 2018.

### Main Findings

Our initial non-data driven observation makes us suspect that lecture capture was the cause for an increase in the percentages of F and D in the class in comparison with previous offerings of the same course, in which lectures were not video recorded. However, the preliminary analysis of the time students make use of the videos does not point in that direction.

### Description

When comparing with quarters in which lecture capture was not used, we observed the following different behaviors in the students: (1) attendance dropped, (2) student engagement in some of the collaborative activities designed to summarize and put into practice the content covered during the previous lectures was drastically reduced, affecting the flow of the class, and (3) students showed distress during class when the video recording was stopped for technical issues.

Based on these behaviors we decided to study the possibility that our students were cramming massively before the exams using the videos. We can certainly observe an increase in the hours spent watching the videos in the ~5 days before exams, peaking 1-2 days before the exams. We also observed a slight negative correlation between cramming behavior and final course grades and a slight positive correlation between regular use of the videos and grades. However, neither correlation was statistically significant and further study is needed.

### Relevance and Takeaways

Instructors should be prepared to accommodate changes in students' behavior due to lecture capture to make sure these do not affect their course. Lecture capture data also gives clear insight into student studying behavior that could be informative for the instructor. However, more analysis is needed to reach conclusions about how the use of the video recordings impacts students' success.

### Author Biographies

Silvia Carrasco Garcia, Ph.D., is a Lecturer PSOE in the Molecular and Cellular Biology Department at UCD, where she regularly teaches a high enrollment cell biology upper division class and an upper division genetics laboratory. Her scholarly activities are focused in developing new teaching materials and demonstrating their efficacy to allow students to develop the skills necessary to actively integrate, process and apply the knowledge that they tend to memorize.



## 28. Effective teaching strategies of building a productive Mandarin Chinese classroom

Jiao Li

East Asian Languages and Cultures

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### **Purpose**

Students may lose their focus of attention and achieve very little in a language classroom if the teacher doesn't know how to best utilize the 50-minute class time. A number of methods need to be applied to achieve a productive classroom. I am excited to share best practices with my fellow language lecturers with the aiming of addressing this problem.

### **Main Findings**

With the maximum cap being twenty-five, language classes are probably the smallest on campus. The amount of attention each student gets from the lecturer in a Chinese classroom is very beneficial for them to master a new language. The most vital aspect of teaching is to excite students about learning. The basic rule that I implement in my classrooms is the complete immersion in order to build a productive and positive learning environment. I will make sure to elaborate more below.

### **Description**

I think of my role as a teacher to be more like a designer of meaningful experiences. I want my students to not only comprehend materials on a range of topics, but to also have opportunities to use the language in a meaningful way and develop academic, communication, and social skills.

In aiming for full engagement, I use a multitude of teaching strategies to make sure my students are active learners, including integrating a popular social network APP called WeChat, proposing up-to-date and controversy topics to discuss, inviting native speakers (in-class tutors) to class to spark ideas, conducting roundtables and debates, and preparing students with the topic by assigning an episode of TV series or a movie clip to watch before class.

Teamwork and leadership skills are crucial for college students thus I want my students to be able to work effectively in a diverse group of peers and to have opportunities to learn with intellectual peers. Book club, end-of-quarter skit, and booklet project are projects that we have complete in Mandarin Chinese class.

### **Relevance and Takeaways**

Teaching strategies are useful for engaging students in the classroom, and for helping students to become active learners outside the classroom. The positive outcomes will be valuable not only in language classes but classes in all majors at UC Davis. I would like the main audience takeaways to be inspirations that they get from hearing a variety of class activities in my classes.

### **Author Biographies**

Jiao Li joined the Department of East Asian Languages and Cultures at UC Davis as a lecturer in 2013. She moved to the U.S. after receiving her M.A. in Linguistics and Applied Linguistics from Beijing Normal University. She is currently teaching Chinese classes of different levels. Her scholarly interests include integrating social media APPs in teaching and learning, helping heritage students to achieve excellence in all four aspects of language, experimenting immersion classroom management strategies.

## 30. Combining Theory, Experiments and Computer Simulations for STEM College Education

### Work in Progress

Mohamed Hafez, Aaron Shaw

Mechanical and Aerospace Engineering

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### Purpose

In many scientific and engineering problems, the associated formulations are based on sophisticated mathematical tools which present a stumbling block for the average student. On the other hand, experiments can be an easy tool to demonstrate clearly the cause and effect relation involved in the process. Moreover, computer simulations can also provide simple confirmation of the results. Here, it is argued, by example, that the combination of theory, experiment and computer simulations can be beneficial for STEM Education. The problem of vibrations of a rigid body, will be used to support the present claim, in qualitative and quantitative practical ways.

### Main Findings

Theory, in abstract sense, can be difficult to understand for many engineering students. Hands-On experience can help the student to see the concept at work and to avoid hypothetical cases which are irrelevant in practice. In addition, producing computer solutions in agreement with the experimental results will enhance the learning process, and will avoid the need for using complicated mathematical techniques, sometimes necessary to produce analytical solutions. Moreover, the students will not be limited to the rare special cases, where mathematical solutions, in closed forms, are available. On the contrary, useful practical cases will be amenable for examinations, with tangible procedures.

### Description

The governing equation of the simplest single degree of freedom model of vibration for a mass-spring system can be easily derived from the first principles using Newton's second law of motion: Force = mass x acceleration, where the force in the spring is proportional to the displacement and friction is ignored. Similarly, the equation for small oscillations of a pendulum can be derived and its solution is a simple harmonic motion with exchange of potential and kinetic energies. For small oscillations, the equation is linear but for large disturbances the equation is nonlinear and difficult to solve. However, both the small and large disturbance equations can be solved numerically.

First, the time domain is discretized using small time step increments. The differential equation is then replaced by its finite difference approximation and the discrete solution is obtained recursively. Marching step by step using EXCEL or MATLAB program.

The experiment apparatus, designed and manufactured by the students, consists of a board made of wood, and a rod with a hole. The rod is screwed in the board and oscillates around the pivoting point. The motion of the rod can be recorded by taking pictures or using a video camera. Complex dynamics can be detected if several rods, connected to each other, are disturbed.

### Relevance and Takeaways

The present approach can be easily introduced in several existing courses. In fact, the same apparatus was used in a project for COSMOS High School students, this Summer, at UC Davis. Effects of large disturbances can be demonstrated and for several degrees of freedom, chaotic behavior can be observed.

In the above example, gravity plays the role of a restoring force. If the rod is moved upside-down, the oscillations become unstable. However, a spring fixed between the rod and a vertical line on the board can be introduced to stabilize the motion providing an example of feedback control system.

**Author Biographies**

MOHAMED A. HAFEZ

Professor of Mechanical and Aerospace Engineering, since 1985.

PhD, Aerospace Engineering, University of Southern California, 1972

MS, Mathematics, University of Southern California, 1973

Fellow, American Institute of Aeronautics and Astronautics, AIAA, since 1994

Engineering Alumni Distinguished Teaching Award, 2000

Computational Fluid Dynamics Award, US Association for Computational Mechanics, 1999

UC Davis Prize for Undergraduate Teaching and Scholarly Achievement, 1998

Distinguished Teaching Award, 1993 Magnar Ronning Teaching Award, 1990

Book: J.J. Chattot, M. Hafez, Theoretical and Applied Aerodynamics, Springer, 2015

He is Co-PI of a recent NSF grant on STEM Education and he also has introduced a freshman Seminar entitled Computer Simulations for STEM Education

## 31. Going Virtual: Transforming Nutrition 10 into the 100% Online Nutrition 10V.

### Work in Progress

Debbie Fetter

Nutrition

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### Purpose

Nutrition 10 is a high-enrollment general nutrition class at UC Davis. To help establish UC Davis as the flagship UC campus for nutrition and accommodate additional students, Nutrition 10 received Innovative Learning Technology Initiative (ILTI) funds to support its development into a fully online course that would be available to students from all UC campuses. The objective of this project was to develop Nutrition 10V, the fully online version of Nutrition 10, according to effective instructional design principles, including aligning learning activities and assessments with student learning outcomes, reconfiguring in-person classroom activities for an online medium, and exploring innovative avenues for engaging students in an online class.

### Main Findings

To develop this course, a team was formed, which included the Nutrition 10 instructor, an instructional designer from Academic Technology Services, an education specialist from the Center for Educational Effectiveness, and two graduate students. Relying upon effective pedagogical and instructional design principles, the in-person Nutrition 10 course was translated into Nutrition 10V, a fully online course. Technology used during production and teaching includes Canvas, ATS' eLearning Studio, Aggie Video, PlayPosit, Piazza, Zoom, ProctorU, and social media. The course was offered to 100 UC Davis students in Winter 2018, began enrolling cross-campus students in Spring 2018, and enrolled 900 students (including cross-campus students) in Fall 2018.

### Description

This poster will outline the course development process, as well as the structure and features of this online course. As specified by backward design and according to good pedagogical practice, formative and summative assessments and learning activities were aligned with course learning outcomes. The course was built in Canvas and designed for students to be able to independently navigate the material. Students interact with each other on Piazza (an online question & answer platform), in virtual office hours using Zoom, and on social media for health-related challenges. Lecture videos were recorded in the Academic Technology Services studio. PlayPosit was used to embed questions throughout the lecture videos to engage students and give them a chance to check their understanding of the material. In this poster, I will also share the results of the ILTI/UCOP online course evaluation from Spring 2018. For future research, I aim to compare the in-person teaching environment with the online environment in regards to student learning. My research agenda also includes investigating whether elements of the course, such as performance on quizzes in the videos and the Canvas chapter quizzes, are correlated with performance on the exams and overall course grade.

### Relevance and Takeaways

#### Author Biographies

Dr. Fetter teaches Nutrition 10V and Nutrition 10, in addition to conducting research on education and pedagogy. She is passionate about helping people, especially with guiding students to make healthier nutrition and lifestyle choices. She also aspires to help bridge the gap between the science community and general public through teaching and writing

about nutrition in an engaging and relatable way. Dr. Fetter completed her Ph.D. at the University of California, Davis where she worked in the Zidenberg-Cherr and Scherr research group. Her research focused on how to incorporate technology in school-based, obesity-prevention programs to generate interest in nutrition and physical activity.

## 32. Enhancing Pathology Training for Medical Students with a Digital Image Bank (Whitecoat)

### Work in Progress

Elham Vali Betts, Kristin Olson, Steven

Department of Pathology and Laboratory Medicine

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### Purpose

Gross and microscopic images are an important means of training medical students in general and organ system pathology. Classically, pathology courses used microscopes and glass slides to relay this content. But in keeping with the increasing emphasis on the usage of technological tools in medical education, the pathology course directors at the UC Davis School of Medicine (UCDSOM) have introduced use of an online image bank hosted by Whitecoat Images (<https://whitecoatimages.org/>). Whitecoat Images is a web-based image resource with course content created, labeled, and peer-reviewed by the course faculty, allowing for asynchronous student review of pathology images.

### Main Findings

A survey was sent to all UCDSOM second-year students for the academic year 2017-2018. The survey consisted of 10 multiple-choice and free response questions. 42 responses (57.5%) were received. 14 respondents (33.3%) agreed Whitecoat Images were helpful with examination preparation, 19 respondents (45.2%) were neutral, and 9 (21.5%) disagreed. Students considered Whitecoat Images most helpful as a review for disease concepts (42.5%), as a supplemental tool when viewing online pathology lectures (20%), and as a supplemental tool during pathology team-based learning sessions (17.5%).

### Description

Technological tools can be incorporated into medical student education to improve the learning experience. Here, we have provided additional gross and microscopic images of relevant organs and tissues through Whitecoat Images as an additional optional resource for our medical students. A survey was sent to all UCDSOM second-year students toward the end of the 2017-2018 academic year. The survey consisted of 10 multiple-choice and free response questions. 71 students had signed up for Whitecoat, but the survey was sent to all the students to include those students who may have shared accounts with one another. Those students who did not log into or use Whitecoat Images were instructed not to fill out the survey. The sample size was small and the number of the respondents was limited, which constrains data interpretation. Student usage of Whitecoat Images appeared to be most focused on improving student medical image interpretation and less focused on examination preparation. As Whitecoat Images expands their offerings to include quizzes and formative feedback, we anticipate that student use of this resource will increase and that students will find it still more helpful in examination preparation.

### Relevance and Takeaways

Use of technological tools is increasing to improve medical student education. In courses such as pathology, the provision of additional captioned and tagged images through a resource like Whitecoat Images provides a valuable supplement to lecture and active learning sessions.

### Author Biographies

Elham Vali Betts, Department of Pathology and Laboratory Medicine, completed residency and fellowship at UC Davis with a focus on Hematopathology. She is currently the co-instructor of record for the pathology course at the School of Medicine.

Dr. Kristin Olson is the incoming Associate Dean for Curriculum and Medical Education and an Associate Professor of Pathology at the University of California at Davis School of Medicine (UCDSOM). A recipient of several teaching awards, Dr. Olson is co-Instructor of Record for the required PMD 410 General and Systemic Pathology course, which emphasizes active learning and has been highly ranked by medical students for the past several years. She regularly consults with other medical faculty locally and nationally about the structuring of their own courses.

Steven is a Co-Founder and the Chief Clinical Officer of Whitecoat, Inc. He attended medical school at UC Davis and is an Internal Medicine resident at the UC Davis Medical Center. He is passionate about innovation in medical education and hopes to become a professor in the future.

**Intended Format**

Talks (10 minutes, with 5 minutes for questions): A brief talk describing a research project, findings or methods, intended to disseminate results of interest to the campus community and foster future discussions.



### 33. Development and initial assessment of a new learner-centered upper division human physiology course: a CREATE course redesign and assessment project

#### Work in Progress

Victoria Farrar, Natalia Caporale

NPB

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#### Purpose

National reports have called for a transformation of undergraduate education, moving away from a transmissionist model to a constructivist approach, using student-centered and evidence-based instructional approaches. The Neurobiology, Physiology and Behavior Department at UC Davis has redesigned its major's core courses in such a manner. The new core of our major involves 3 courses that focus on physiology at the cellular level (NPB 110A), neurobiology (NPB 110B) and physiology at the systems level (NPB 110C). This poster describes the structure of the new NPB 110C, the new tools designed to assess the impact of the new teaching strategies on students' content learning, critical thinking and sense of belonging and discusses additional changes that could be made to the course with a focus on of student-centered teaching and inclusiveness.

#### Main Findings

67 students participating in NPB 110C during Winter 2018 completed all pre and post surveys. Survey questions spanned from basic knowledge key to physiology (diffusion, homeostasis) to class specific new content topics (role of ADH in kidney physiology, etc.). Analysis of a pilot offering of the course showed that students in 110C came in with a robust understanding of homeostasis (85% correct in the first and last week of class surveys) yet struggle with more basic concepts such as membrane permeability (first: 40.4%, last: 67.5%). While 76% of students found the course to promote their critical thinking skills, only 49% of students agreed with the statement in this class I felt we were a community learning physiology together. We are currently designing a new assessment tool that is better lined up with the course learning objectives as well as developing classroom strategies to increase inclusiveness and sense of belonging in our students. T

#### Description

through a collaboration of several NPB faculty. The structure of NPB 110C involves four 50 min lectures that include clicker questions and think-pair-share activities to promote student engagement and which serve as frequent formative assessment to inform students and faculty as to the state of the class. About 80% of all lectures involve one of these two activities. In addition, the class includes discussion sections that focus on application of course concepts to solve problems, analyze case studies and design experiments. Assessments include not only multiple choice questions but also open-ended questions focusing on problem solving skills. To increase student engagement, NPB 110C has also added more clinical relevant content, such as discussing Stress and Diabetes disorders. Pilot assessment of the course was conducted during Winter 2018 and Spring 2018 using survey and content-based questions priorly used in a departmental lecture-based course covering similar content. This assessment was used to develop a novel assessment tool focused on the new NPB 110C learning objectives and following the core principles of human physiology established by a large national survey (Michael J, et al., 2009). This new assessment tool will be deployed in Fall 2018. This is a work in progress abstract. Work is funded by the CREATE grant issued by CEE.

#### Relevance and Takeaways

As universities respond to the national call for more student-centered classrooms that are inclusive and that foster critical thinking and problem solving skills, assessment of these classrooms becomes key. While it is known that active

learning strategies help promote learning, little is known as to the mechanisms by which it does so, and initial studies have reported that active learning does not impact all student populations equally (Eddy SL & Hogan KA, 2014). Successful implementation of learner-centered teaching strategies requires several iterations of assessment and innovation until a structure best suited for the specific class population can be identified.

### **Author Biographies**

Dr. Natalia Caporale is Teaching Faculty in the NPB Department. In addition to teaching majors and non-majors human physiology and cell biology courses, Natalia is interested in (1) teaching strategies that promote student self-efficacy, resilience and sense of belonging; (2) identifying barriers to the success of underrepresented students in science and developing interventions to help students overcome them. Natalia received her B.S. degree (Licenciatura) in Biology at the Universidad de Buenos Aires and her PhD in Neuroscience from UC Berkeley. She was a postdoc at UC Berkeley and UCSF and then an adjunct lecturer at UC Berkeley and SFSU.

Victoria Farrar

## 34. The Mid-Quarter Inquiry: Leveraging Student Feedback to Support Graduate Instructors' Continuous Improvement and Reflective Practice

### Work in Progress

Sarah Silverman, Sergio Sanchez, Monica Christina Esqueda  
Entomology; School of Education; Center for Educational Effectiveness

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### Purpose

One overarching goal of educational development, a field that encompasses faculty and graduate student development is to engage and support graduate student and faculty participation in continuous improvement and lifelong learning processes. Different initiatives and efforts have been undertaken by and across institutions of higher education to achieve this goal. At UC Davis, graduate instructors (GIs) and faculty are able to schedule one-on-one consultations to discuss teaching and learning, attend workshops, participate in learning communities and/or utilize Just In Time Teaching (JITT) resources to improve instruction efforts and engagement in reflective practice. Mid-Quarter Inquiries (MQIs) are another option available to GIs and faculty. MQIs provide GIs and faculty with formative student feedback that can be used to modify course instruction for a course that the GI or faculty member is currently teaching. The overarching goal: improving teaching methods and facilitating instructor participation in reflective practice. The extent to which these goals are met has not previously been explored. In this vein, the current investigation explores the following research questions:

How do GIs use MQI feedback to improve teaching methods?  
How does participating in the MQI process encourage engagement in reflective practice?

### Main Findings

The current submission is a work in progress. As such, presenters will explore the following questions with conference attendees:

How do graduate instructors (GIs) use MQI feedback to improve teaching methods?  
How does participating in the MQI process encourage engagement in reflective practice?

### Description

Interview, focus group, and survey data for this project will be collected from undergraduate students and GIs during Summer/Fall 2018. Data will be collected as part of a broader program evaluation process. Participants will be informed in advance that data are being collected. For the purposes of the conference, presenters would discuss preliminary themes from the data collected and implications for research and practice.

### Relevance and Takeaways

Reflective practice is central to the process of continuous improvement for instructors. The proposed inquiry explores this connection. Results have implications for both educational development instructional improvement.

### Author Biographies

Sarah Silverman is a PhD candidate in the department of Entomology and the Coordinator of the Teaching Assistant Consultant Program at the Center for Educational Effectiveness (CEE). She earned her bachelor's degree from McGill

University in Montreal in Environmental Science, and conducted undergraduate research on the effects of climate change on solitary bees in alpine environments. Her current research pertains to the demographic structure of insect population in the wild. In her work at CEE, she coordinates the TAC program, supporting fellows in their work as consultants and workshop facilitators, and develops curriculum for graduate student workshops on online and hybrid teaching.

Sergio Sanchez is a PhD student in the School of Education and a TAC Fellow at the Center for Educational Effectiveness. Before moving to the United States from Argentina, Sergio taught English and Drama, English as a Second Language and Business English for about 10 years. His current research interests include teacher education, teacher inquiry, drama pedagogy, and culturally and linguistically diverse learners in K-12 education. Sergio applies a holistic approach to learning with a strong focus on experiential learning, where body, voice, and mind play important roles in teaching and learning.

Monica Christina Esqueda, Ph.D., is an Education Specialist in the Center for Educational Effectiveness (CEE). She is a member of the Learning and Teaching Support (LTS) unit. Prior to joining CEE, Monica was an Assistant Professor of Higher Education and Community College Leadership at Old Dominion University. Her research and teaching expertise include the conditions and contexts that promote access, wellbeing and success across secondary and postsecondary learning environments, undergraduate and graduate student development, underserved student populations, research design, quantitative research and mixed method research. She has published work in *Educational Researcher*, *Review of Educational Research* and *Teachers College Record*.



## 35. The Need for POCT Education in Schools of Public Health

### Work in Progress

Vidushi Razdan and Prianka Deshmukh

Pathology

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### Purpose

Point-of-care testing (POCT) is testing at or near the site of care. Our goal is to implement POCT curriculum in schools of public health, so that practitioners of public health can increase resilience to epidemic outbreaks through a focus on immediate diagnosis and preventative care. In this process we utilize asset reorganization to integrate the curriculum in a cost-effective manner.

### Main Findings

POCT diagnostic systems can easily adapt to community settings. For example, in the 2014 Ebola virus disease (EVD) epidemic, POCT was used to detect changes in neutrophils and lymphocytes--used to indicate infection--in Americans returning from Africa. In the 2018 Democratic Republic of Congo outbreaks, POCT was effective in rapid diagnosis, and is currently (August) used for care in war-torn provinces.

POCT can lead to a culturally amenable, yet efficient way to limit outbreaks and spread of disease from the forefront. POCT education would allow for the technology and professionals trained to use it to become increasingly more efficient in rapid detection and prevention of highly infectious diseases, which otherwise result in a significant economic loss. For instance, an outbreak in Southeast Asia could cost the US economy 40 billion dollars and 1.4 million jobs. A current survey of US schools of Public health showed that current curricula fail to integrate POCT, thus creating unnecessary risk abroad and at home.

### Description

This poster will include 3 sections, including a 5-year plan, a logic map, and a figure detailing the approach to integrating POCT in US Schools of Public Health, and by example, in other countries.

#### 5 YEAR PLAN

- Initiate response from public health educators
- Create POCT requirements in public health curriculum
- Develop hands-on training of POCT mechanics
- Create a system of certification and accreditation
- Foster opportunities for on site work experience

#### LOGIC MAP

Details the inputs necessary to achieve the goals of the POCT program, mapping the steps of POCT integration in order to maximize impacts.

#### PUBLIC HEALTH SCHOOL ASSET RELOCATION FIGURE

Illustrates a cohort of public health schools lacking a POCT program while having the resources to implement these programs through pre-established departments focused on laboratory medicine and outbreak prevention. This figure also compares the UC Davis Public Health Program to the schools of public health further showcasing the ease of integration. In fact, campus interaction at SOTL will benefit the proposed teaching model through live feedback.

**Relevance and Takeaways**

Education in POCT in public health schools would effectively introduce a new form of preventative medicine which obviates the cost of an epidemic and improves standards of community living. Schools of public health may find it inconvenient to integrate POCT education because of the cost. However, this education will be cost effective not only because it detects and prevents the start of an outbreak, but also because most schools of public health already have the assets to teach POCT among their faculty. Thus, the efficiency of POCT will outweigh the original investment into these programs. If patients are tested, given results, isolated, and treated in one visit, it is less likely for the disease to spread. Furthermore, there is a direct improvement in patient care as the patient is alleviated of wait times. Overall, POCT establishes a system where both cost and patient care are addressed while promoting preventive medicine.

**Author Biographies**

Vidushi Razdan, a student research associate at UC Davis, is an undergraduate sophomore majoring in Neurobiology, Physiology, and Behavior. She pursues her passions of medicine, service, and education by volunteering at a local hospital and tutoring students. Vidushi plans to pursue a career as a pediatric physician.

Prianka Deshmukh, a student research scholar at UC Davis, is an undergraduate sophomore majoring in Neurobiology, Physiology, and Behavior. She spends her time partaking in clubs actively involved in fundraising and volunteering for the Davis community. Prianka is interested in pursuing a master's in Public Health before continuing on to a career in the medical field.

## 36. The benefits of joining a Summer Institute on Scientific Teaching

Talitha van der Meulen

Neurobiology, Physiology & Behavior

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### **Purpose**

To bring attention to the existence of Summer Institutes on Scientific Teaching and encourage people interested in the scholarship of teaching and learning to attend one sooner rather than later. The goal of the Summer Institutes themselves is to "empower and inspire college and university instructors to transform STEM education through evidence-based teaching practices".

### **Main Findings**

Since their inception in 2004, the Summer Institutes on Scientific Teaching (<https://www.summerinstitutes.org/>) have helped hundreds of faculty and other instructors at universities across the country to improve their teaching. With each iteration, this number grows and more people are finding a community within and outside their own institution that helps them to design, implement and publish evidence-based teaching practices. Many of the participants are fairly new to the scholarship of teaching and learning (SOTL) or are looking for ways to formalize the SOTL practices they already apply in their teaching. Many of the instructors are former Summer Institute participants.

### **Description**

I will present an overview of an example Summer Institute. Throughout the week, interactive lectures on SOTL-related subjects such as inclusive teaching, backwards design and Bloom's taxonomy for educational objectives are presented. A group assignment to create a teachable tidbit, with formative assessments by other groups, allows for the implementation of newly learned information and results in an immediate and tangible reward of the week's work. I'll present an example of a teachable tidbit, on "Understanding the mechanisms driving genetic variability in a population". You can use any of the tidbits created in Summer Institutes since 2004 in your own teachings, and you are guided towards the publication of your own tidbit on <https://www.coursesource.org>, a peer-reviewed platform.

### **Relevance and Takeaways**

The Summer Institute is a great way to get introduced to the Scholarship of Teaching and Learning. You learn about the concepts relevant to SOTL, but also have instant access to diverse SOTL-minded instructors from institutions all over the States. Finally, you help design a teachable tidbit. Participation in a Summer Institute is particularly beneficial for those who are at earlier stages of their SOTL careers. As you advance, a better option is to become/come back as an instructor. It will help foster new collaborations, and provides an opportunity to pass on your SOTL knowledge to a new generation of colleagues.

### **Author Biographies**

Talitha van der Meulen is a part-time unit 18 lecturer and is passionate about the "hands-on" and "minds-on" experience that labs and working at the bench bring to students and is looking for ways to implement more of this experience in the curricula offered at UC Davis. She has a diverse scientific background, ranging from developmental biology and biomechanics of fish muscle, to biochemistry of cell signaling, and most recently to physiology in the context of diabetes. She participated in a Summer Institute on Scientific Teaching in 2017.

## 37. Will Video Kill the Anxiety Star? Multi-Modal Writing and Writing Apprehension

### Work in Progress

Amanda R. Modell

Center for Educational Effectiveness and Cultural Studies Graduate Group

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### Purpose

The proposed study examines the relationship between multi-modal writing (specifically essays that incorporate text, audio, and/or video) and students' writing apprehension. Writing apprehension or writing anxiety inhibits performance, dissuades effort, and steers students away from writing intensive courses and fields. At the same time, the available research offers only a handful of evidence-based recommendations on how to mitigate this situation. Multi-modal writing is proposed, in part, because of its relevance to today's undergraduates, as it mimics the formats in which they access much of their media (YouTube videos).

### Main Findings

Future findings of this work-in-progress will include quantitative and qualitative results on students' levels of writing apprehension, motivation toward multi-modal and traditional writing assignments, and affective experiences with writing. Is multi-modal writing more attractive than traditional essay writing to students with higher writing apprehension? How and to what extent does multi-modal writing influence students' writing apprehension levels, in comparison to traditional essay writing? And how do demographic factors influence potential changes and outcomes?

In this research design, students will have the option to complete their final project as a traditional (text-only) essay, or a multi-modal, audiovisual essay that incorporates video and audio clips along with writing. This will afford the research team the opportunity to compare the writing apprehension levels of students who chose each modality, and track changes in both populations over the course of the quarter. Participants will be administered a version of Daly and Millers' Writing Apprehension Survey at the beginning and end of the quarter; they will also complete qualitative reflections throughout the quarter on their affective writing experience.

### Description

Students with lower writing apprehension are more likely to approach writing tasks, exert more effort, and produce higher quality writing. From this poster, UC Davis educators can learn about writing apprehension and evidence-based approaches to alleviating it, as well as multi-modal writing as a potential new avenue to relieving writing apprehension in our students.

### Author Biographies

Amanda Modell's work in teaching and learning is focused in graduate student professional development, pedagogy programming and resource innovation, and education research that supports instructional advancement. She has received support from the American Philosophical Society and you can read her work in *Media Fields*, the proceedings of the *American Society for Engineering Education*, and *New Directions in Teaching and Learning* (forthcoming). Amanda is finishing her PhD in Cultural Studies with a Designated Emphasis in Feminist Theory and Research. As an educator, she facilitates classes within feminist, student-centered, and contemplative frameworks.

## 38. Sentence optimization for the global workplace: An innovative teaching method for improving engineering writing while leveling the playing field for ESL learners.

### Work in Progress

Brad Henderson

University Writing Program (UWP)

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### Purpose

The sentence optimization teaching method offers a sequence of twenty opportunities for improvement (OFIs) for engineering writers to learn and apply in industry communications. The OFIs are divided into four progressive groupings sequenced so that the imperfections that most critically impair a reader's comprehension and reading speed are addressed first, with more minor errors in the later groupings. The final error is one that particularly challenges ESL students and writers. The first nineteen apply equally to both native and multilingual speakers. While the method can help all students and writers, it also addresses an equitability issue in teaching and evaluating writing by ESL students.

### Main Findings

Teaching students in writing classes a set of twenty or so common errors to know and avoid is a longstanding practice, from Strunk and White's *The Elements of Style* to Stanford professor Andrea Lunsford's seminal Twenty Common Errors. Sentence Optimization's approach describes its 20 errors as opportunities for improvement using math-based metaphors and engineering diction and content for all examples. The system distinguishes OFI #20 as unconventional phrasing errors, which typically appear in the writing of second-language speakers who are proficient in English but not fluent. Because this error type stands out to native English speakers, much like an accent, these errors often carry more weight for readers than errors typical of native English speakers, although they are no more wrong.

For example, a common error made by ESL students (OFI 20) might be using the word "equipments" rather than "equipment." This error is on a grammatical par with using "it's" as a possessive pronoun rather than "its." But because the former sounds foreign whereas the misused apostrophe is familiar, the accented error is often judged more harshly. By creating a teaching system that locates accent errors on par with similar, but more familiar, grammatical errors common among native speakers results in an inclusively fair grading rubric. Both ESL and native English speaking students benefit from a leveling of the playing field.

### Description

My poster will present a narrative of the system's front-end development--origins, proof-of-concept, and initial assessment--and continue through its current version 1.0 development, test teaching, responses to obstacles, and adjustments. I will also present future plans for version 1.0 assessment in UWP 102E Engineering Writing classes at UC Davis in 2019.

### Relevance and Takeaways

My project invites educators and students to consider a new paradigm for assessing the quality of written English. The sentence optimization method is particularly relevant for educators at UC Davis because our student body contains a growing number of ESL students, many with baseline competency in spoken and written English, who often can write text that clearly and effectively communicates the writer's intended content, but that contains non-critical errors. These errors may sometimes be judged too harshly as compared with similar errors by native English speakers. The sentence optimization method provides a new, more inclusive and equitable tool for evaluating the quality of spoken and written English used as a workplace language in global industry and culture.

**Author Biographies**

Brad Henderson has a B.S. in mechanical engineering from Cal Poly San Luis Obispo and Master's in Professional Writing (MPW) from USC. He has worked as a design engineer for Parker-Hannifin Aerospace and technical education specialist and diversity program manager for Hewlett Packard's World-Wide Inkjet Operations. Henderson is a continuing lecturer for the University Writing Program at UC Davis, and teaches engineering, science, and business writing classes. His latest book, *A Math-Based Writing System for Engineers: Sentence Algebra and Document Algorithms*, is forthcoming from Springer Nature, spring 2019.

## 39. Anatomical Misconceptions Among Undergraduates in a Systems-Based Human Gross Anatomy Course

### Work in Progress

Jennifer Weil, Natalia Caporale

Department of Cell Biology & Human Anatomy and Department of Neurobiology, Physiology, and Behavior  
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### Purpose

Across academic disciplines, identification of student misconceptions is a powerful method for critically analyzing educational efforts and can help guide future teaching approaches. With an evidence-based understanding of the concepts and applications with which students most often struggle, curricula to combat these confusions may be developed in a meaningful manner through the lens of the student perspective.

Cardiovascular (CV) misconceptions have been identified in K12 education and many endure all the way to college. Over the years of teaching anatomy, we observed students struggling with the CV system, particularly within the context of understanding the relationship among the vasculature, nutrient requirements (including glucose and oxygen), and organ perfusion. In this study, we developed a tool that assessed student misconceptions regarding blood supply across several organ systems." Initial results showed 80% of students identified at least one organ as not requiring its own blood supply. After a semester of anatomy, this decreased slightly to 75%. The frequency distribution for the number of choices shifted, showing an overall reduction ( $x = 1.61$  to  $1.34$ ,  $p < 0.05$ ,  $\chi^2$  test). The organs most frequently cited as not needing vasculature were the stomach (pre = 52.17%, post = 34.96%), intestines (51.09%, 33.33%), and arteries (30.43%, 43.90%). Student open-ended responses further showcased their misconceptions. In contrast, less than 5% of the students selected the brain or heart as not needing blood supply.

### Main Findings

We collected qualitative and quantitative data via purposeful sampling of undergraduate students taking an upper division human gross anatomy course at a large public university (over 25,000 undergraduate students) in the United States. In this course, anatomy is taught following a systemic approach, where students learn about the body one system at a time, both in lecture and the laboratory. Data was collected in the classroom using a novel written instrument designed specifically for this study during the first ( $n = 107$ ) and last weeks of the semester ( $n = 137$ ). Quantitative data was analyzed using Excel and Matlab, while qualitative data was analyzed using a grounded theory approach to identify emerging themes surrounding vasculature and organ perfusion misconceptions. These themes were used to develop rubrics and two researchers coded all the student response data according to these rubrics. For coding, initial and final student answers were mixed together and the coders were blind as to their identity. Interrater reliability was calculated over a subset of the data to a minimum of 80%. Comparative statistics were performed between the initial and exit assessments using Pearson's Chi-squared test.

### Description

While there has been considerable research into physiology misconceptions, there is limited literature detailing misconceptions in the anatomical sciences. As such, this study offers insight into both modifiable and persistent gross anatomy misconceptions and illuminates unexpected misunderstandings. While this anatomy course was taught following a systemic approach, UC Davis' undergraduate (CHA 101 & 101L: Human Gross Anatomy Lecture & Laboratory) and medical school (CHA 400: Developmental, Gross & Radiologic Anatomy) human gross anatomy courses approach anatomical education from a regional perspective. Future research directions may include comparative

assessment of systems-based versus regional gross anatomy instructional methodologies and their differential effects on student misconceptions.

### **Author Biographies**

Dr. Natalia Caporale is Teaching Faculty in the NPB Department. In addition to teaching majors and non-majors human physiology and cell biology courses, Natalia is interested in (1) teaching strategies that promote student self-efficacy, resilience and sense of belonging; (2) identifying barriers to the success of underrepresented students in science and developing interventions to help students overcome them. Natalia received her B.S. degree (Licenciatura) in Biology at the Universidad de Buenos Aires and her PhD in Neuroscience from UC Berkeley. She was a postdoc at UC Berkeley and UCSF and then an adjunct lecturer at UC Berkeley and SFSU.

Jennifer Weil works for the Department of Cell Biology and Human Anatomy. Having taught as a Lab Aide and TA in the UC Davis Human Gross Anatomy Laboratory (CHA 101L/EXB 106L) since 2008, she is interested in effective lecture and lab-oriented educational approaches for gross anatomy, including prosection and dissection-based teaching methodologies. A graduate of UC Davis in psychology (BS, 2008) and biotechnology (BS, 2015), she is now completing her MS in Kinesiology at California State University, Sacramento.

## 40. Integrating social justice themes, arts and humanities skills, and collaborative learning principles into an introductory environmental engineering course through scaffolded, problem-based learning activities

### Work in Progress

Colleen E. Bronner

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### Purpose

This project examines the impact of four problem-based learning modules in a sophomore-level environmental engineering course on student attitudes about collaborative learning, student motivation to learn, and awareness of non-technical components of environmental engineering. The project will also assess student abilities to comprehend and communicate technical concepts as it is posited that adding the modules will improve student understanding. "The first iteration of this course, offered in fall 2017, used collaborative modules to introduce students to environmental engineering topics while emphasizing examples of past environmental injustice and the role of works from the arts and humanities on shaping the environmental engineering field. A preliminary assessment of the 2017 course revealed that many students were motivated to learn by social justice themes, found group dynamics and challenges easier to navigate as the quarter progressed, and valued how works from arts and humanities disciplines influenced specific environmental engineering areas.

### Main Findings

The results of the 2017 offering in conjunction with the instructors participation in the CREATE program, led to increased use of scaffolding on assignments and improved assessments for the 2018 course. It will include additional assessment to view change in attitude towards social justice, the importance of the arts and humanities knowledge for engineers, and collaborative learning. Multi-part module assignments and weekly check-in surveys will be the primary assessment tools for examining communication skills, awareness of the complexity of some social justice issues and appreciation of tools/skills used in the arts and humanities fields. The modules correspond to four units in the course, include group and individual components, address a topic with social justice issues and require use of skills more commonly associated with arts and humanities fields. Modules are supported by interactive lectures, supplementary material for students to work outside of class, and time in class for group work or asking specific questions to the professor. The first module will require increasing student independent learning as the course progresses. Collaborative learning will also be assessed using the CAME power evaluation tool.

### Description

This project is relevant as it will examine an approach for incorporating social justice topics into STEM field. It will hopefully provide additional input on student motivation and attitudes on topics that extend beyond engineering interest. If the author's hypothesis is correct, it could demonstrate additional strategies for improving communication skills of students. I would like people to walk out thinking about how they can use collaborative learning in their courses and wondering what is the best way to demonstrate the importance of non-major fields. I would also like people to be questioning whether it is their responsibility to cover social justice issues in their courses.

### Author Biographies

Dr. Colleen Bronner is a LPSOE in the Department of Civil and Environmental Engineering at UC Davis. While earning her doctorate at SUNY Buffalo, she taught her first course and spent hours thinking about how to improve her teaching and experimenting with different approaches. She taught at CSU Chico before joining the UC Davis faculty in 2015. Her

teaching and research are motivated by a goal of creating inclusive and effective learning environments in engineering. She enjoys advising the UC Davis Engineering Without Borders and OSTEM chapters, and designing course activities that promote the intellectual and social growth of students

## 41. Development and Integration of a Learning Assistant Program for Organic Chemistry

### Work in Progress

Jenna McCarthy, Viktoriya Chmil, Shannon Lu, Hana Minsky, Taruna Neelakantan, Claire Filloux

Department of Chemistry

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### Purpose

Discussion sections in CHE 118A have the potential to be extremely useful to students: they provide increased exposure to content and critical thinking opportunities. Although students only spend 80 minutes in discussion each week, they spend 720 minutes in discussion sections over the course of one quarter. Used effectively, the 720 minutes spent in discussion could greatly enhance the student's comprehension of the subject matter. Implementing the UC Davis Learning Assistant Program in CHE 118A could help students maximize their time in discussion sections by decreasing the student-instructor ratio and providing additional resources.

### Description

Five learning assistants were introduced to CHE 118A in fall quarter 2018. Each learning assistant works in one to two discussion sections each week, which amounts to approximately 240 students with a learning assistant in their discussion section. Midway through the quarter, an optional, online survey consisting of nine multiple choice questions and one free response question was provided to all ~320 students in the course. Students were told their responses would serve as data to support continuation of the learning assistant program.

### Main Findings

Results from an optional survey suggest that students perceive the learning assistant program to be effective. Students overwhelmingly indicated that learning assistants are successful in aiding comprehension during discussion. 50 students provided responses, most of which were very positive. 61% of students who responded strongly agreed that their learning assistant aided their comprehension during discussion. Additionally, 75% of students who responded agreed that their learning assistant provided resources they could not access elsewhere. In the optional free response question, one student remarked that their learning assistant provides an "immediate advantage" and their contributions are "crucial." Ongoing analysis investigates the implementation of pedagogical techniques suggested by students in the survey. Future exploration will include an end-of-quarter correlational study comparing the success of students with learning assistants and those without.

### Relevance and Takeaways

Identifying disparities in CHE 118A discussion sections prompted the creation of a learning assistant program for the course, which was accomplished by Dr. Claire Filloux and a team of five undergraduates. Students have responded very positively to the program and indicate that the learning assistants have aided their comprehension of course content. Although there are several undergraduate courses use learning assistants, the success of the CHE 118A program could prompt instructors to consider incorporating a similar program in their course. Further, undergraduate students could consider working with an instructor to develop a learning assistant program in a course where they identified teaching disparities from their own experience as a student. Finally, instructors could consider integrating learning assistants into more upper division coursework, such as the entire CHE 118 series, since the program is typically employed in lower division classes.

### Author Biographies

Jenna McCarthy is a 4th-year undergraduate student studying human development with plans to attend dental school. After serving as a learning assistant in BIS 2C in 2017, Jenna proposed and created a learning assistant program for CHE 118A and worked with Dr. Claire Filloux to implement the program in 2018. Jenna is very passionate about preventative health and health education. In her future career as a dentist, she hopes to draw from her educational experience as a learning assistant to educate patients. Currently, Jenna enjoys teaching oral health to young students in Yolo County elementary schools. In addition to teaching, Jenna is a clinical intern for Dr. Kristina Wiley, where she assists in diverse dental procedures.

Viktoriya Chmil is a 3rd-year biological sciences major who plans to pursue a career as a physician's assistant after graduation. She is passionate about addressing health disparities in underserved communities and hopes to incorporate this mission into her career as a P.A. Last summer, Viktoriya served as an intern at the UC Davis Medical Center where she gained invaluable hospital experiences. Currently, she enjoys volunteering at underserved elementary schools with R.I.V.E.R. at UC Davis, a public health organization, to teach children about nutrition and exercise.

Shannon Lu is a third-year undergraduate majoring in biochemistry and molecular biology, and minoring in Japanese. She discovered her passion for chemical biology while taking organic chemistry, and is currently conducting research on miRNA inhibition via the use of synthetically modified oligonucleotides in the Beal Lab. She hopes to attend graduate school after graduating from UC Davis and plans to pursue a career in either academia, pharmaceutical chemistry, or forensics.

Hana Minsky is majoring in global disease biology, and taking a minor in Spanish. She is interested in entering the medical field after graduation. She hopes to integrate her knowledge and skills gained from biology coursework into the medical field through research and critical thinking. She is a member of Challah for Hunger, the Emergency Medicine Research Associate Program and the Joan Viteri Memorial Clinic. Hana is also passionate about plant biology and has conducted research in the Plant Transformation Facility and Dr. Philip Zerbe's laboratory group.

Taruna Neelakantan is a 3rd-year undergraduate student pursuing pharmaceutical chemistry. She began her journey in undergraduate research as a freshman, conducting research in inorganic chemistry under the guidance of Dr. Louise Berben. Since then, she has conducted research in the UC Davis Medical School's Department of Pharmacology under Dr. Igor Vorobyov and will be completing her honors thesis this winter. Taruna is very passionate about undergraduate outreach, teaching, and increasing diversity within the STEM field. She hopes to pursue a Ph.D. in chemistry and ultimately become a professor.

Claire Filloux earned her A.B. degree from Princeton University in 2007, where she performed undergraduate research in organic synthesis. In 2008, Claire moved to Colorado State University, and she earned her Ph.D. in 2015. While pursuing her Ph.D. Claire investigated the mechanisms of two catalytic, asymmetric reactions. In more philosophical independent work, she examined the importance of precise language in scientific inquiry. Interest in language informs Claire's current research at UC Davis. She investigates the hypothesis that students' conceptual understanding and our assessment of it may be obscured by students' inadequate fluency in rudimentary symbolic tasks like curved arrow formalism or representational translation. By parsing complex learning objectives into discrete symbolic and conceptual components, Claire hopes to identify interventions that help students master functional language with minimal cognitive burden.

## Resource Tables

## 1. Translating Research-based Learning Principles into Learning Strategies: Helping Students Study Smarter

Annalisa Teixeira

Success Coaching and Learning Strategies, Office of Educational Opportunity and Enrichment Services (OEOES)  
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### **Purpose**

This resource table highlights services provided to campus through Success Coaching and Learning Strategies, part of the Office of Educational Opportunity and Enrichment Services in Student Affairs. At this resource table we will provide a theoretical framework that informs our approach to developing self-regulated learners among our undergraduates, as well an overview of our services supporting effective and efficient student learning.

### **Main Findings**

Success Coaching and Learning Strategies is a re-imagining of the previous services Success Coaching Program and Study Skills. It is a product of a year's worth of research and review, collecting evidence-based approaches to developing self-regulated learners, and a review of best practices and academic support services at other public research universities. Fall 2018 will be the first quarter we are launching our new and expanded curriculum, and our findings (assessment outcomes) are forthcoming. Our workshop series and appointments support self-management and academic skill development (productivity, studying, reading, note taking, test taking, etc.).

### **Description**

We will provide a visual of our theoretical framework, an overview of our student appointments and workshop series, materials such as our workshop schedule, handouts, and sample slides for our most popular workshops. We look forward to dialoguing with faculty to explore referral processes and possible partnerships to support the academic performance of students.

### **Relevance and Takeaways**

We look to partner with faculty to help bring our learning strategies curriculum into the classroom, which can include adding Success Coaching and Learning Strategies to a course syllabus, a 5-minute overview of our services, or a 30- or 50-minute workshop that we deliver during class. We additionally look to partner with faculty to help infuse assignments, prompts, and/or exams with evidence-based learning strategies content, leveraging our understanding of student habits and strategies through our direct work with undergraduates. Ultimately, we would like to increase awareness of our services among faculty.

### **Author Biographies**

Dr. Annalisa Teixeira is the staff coordinator of Success Coaching and Learning Strategies. She has a passion for helping students unlock their full potential through awareness building, strategic designing, and action planning. With a background in cognitive learning science, she works to translate research-based learning principles into practical study strategies for students, helping them to be most effective and efficient in their learning at UC Davis. She is an alumna of UC Davis (Ph.D., '15) and a graduate of UC Davis Extension's Professional Coaching for Life and Work certificate program.

## 2. Integrating Global Learning Outcomes in the Classroom

Nathan Camp, Nancy Erbstein, Zachary Frieders

Global Affairs

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### **Purpose**

To share recent developments, opportunities, and resources regarding integrating global learning outcomes in UC Davis classes across disciplines.

### **Main Findings**

This resource table is designed for UC Davis instructors interested in transforming their courses in small or large ways to integrate global learning outcomes for their students. Global learning outcomes are concrete points of focus that can supplement the standard learning outcomes in a class, regardless of topic matter. The successful integration of global learning outcomes will help prepare students to succeed in their personal, academic and professional lives.

### **Description**

UC Davis has the potential to provide every student with the transformational experiences, applicable skills, nuanced perspective and specialized knowledge to operate effectively in an interconnected world. The Global Education for All initiative, a campus-wide Big Idea, has identified multiple pathways toward ensuring that 100% of our graduates be they international students or domestic, undergraduate, graduate, or professional, and regardless of discipline are provided vital intercultural preparation and a globally-oriented education.

The campus-wide Global Education for All steering committee has developed a set of Global Learning Outcomes to inform course planning, and Global Affairs has launched a Curriculum Enhancement for Global Learning faculty professional development program to work with interested individual faculty-members on integrating these outcomes into their course curricula and teaching methods.

### **Relevance and Takeaways**

Information about Global Education for All, the campus-wide Global Learning Outcomes, and the Curriculum Enhancement program will be made available at the table, along with an annotated bibliography and additional resources for instructors interested in making their classroom experience inclusive of all and responsive to global dynamics, challenges and opportunities.

### **Author Biographies**

Nathan Camp is International Training and Educational Outreach Manager at UC Davis, where he launched a Faculty and Staff Ambassador program and a Curriculum Enhancement for Global Learning professional development series for faculty. He is part of the Global Affairs academic programs and communication teams and the Fulbright Strategy Committee. He also has programming experience with international graduate students and volunteer and service-learning programs in Southeast Asia. He received his Master of Arts from the University of Hawaii in Southeast Asian studies.

Nancy Erbstein is assistant researcher in human ecology and the academic assistant to the vice provost and associate chancellor of Global Affairs. She is also the director of Global Education for All and instructor for the UC Davis Seminar Abroad program Nepal Community, Technology, and Sustainability. Her academic work focuses on place and the production and disruption of disparities in adolescent well-being, with a particular focus on disparities associated with race, ethnicity, immigration and socio-economic status. She received her Ph.D. from Brown University in Social and Cultural Studies in Education.

Zachary Frieders is director of UC Davis Study Abroad, a part of Global Affairs. Frieders has been with Study Abroad since 2005 and has served as its director since 2014. A longtime member of NAFSA, he won the Lily von Klemperer award in 2018 and serves as a coach for the association's Academy for International Leadership, providing mentorship in an intensive year-long professional development program. He holds two UC Davis degrees: Bachelor of Science in agricultural and managerial economics, 2001; and Master of Arts in education policy, 2016.

### 3. Strengthening peer review practices while fostering a helpful online community through Eli Review

Sarah Faye

University Writing Program

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#### **Purpose**

Peer reviews are an essential component of successful writing, but unguided reviews can lead to useless comments and potentially create an environment of mistrust towards peer comments. Eli Review is an online program that helps structure peer reviews so that students are encouraged to follow the habits of effective peer reviewers. During this presentation, I will share the benefits that Eli Review can have for our classrooms. I will demonstrate how to use Eli Review to create peer review tasks, how to check on student progress, and how to interpret Eli Review data.

#### **Main Findings**

Some of the main benefits of Eli Review for our classrooms:

It creates an online community (even in face-to-face courses);

It fosters strong peer review strategies, guiding and encouraging students to respond in useful manners;

It produces stronger reviews, as well as stronger papers;

It levels the playing field between international students and native speakers.

Its cycle of write, review, revise leads students into a useful strategy to improve on their writing habits.

It collects data on the habits of students as peer reviewers, which can be used for pedagogical or research goals.

#### **Description**

I will share my Eli Review page on my laptop to demonstrate how I structured the peer reviews for my course. This will include:

How Eli Review works (students post their drafts online and are assigned their peers' drafts to peer review; writers read the comments, rate their usefulness, and create a revision plan);

How to create prompts for peer reviews, using all the different types of prompts that Eli Review recommends;

How students have responded to peers while using Eli Review;

How the usefulness ratings and revision plans can be used to reinforce strong peer review habits;

How to interpret the data that Eli Review gathers in terms of word count, reciprocity, and helpfulness.

I will also have handouts to help other instructors get started with Eli Review and to help our discussion on how Eli Review can be used to foster useful and productive peer reviews. I will show how Eli Review can be a useful tool to keep track on student progress, and I will share some strategies on discussing peer review comments with students to help them improve during their journey into becoming strong peer reviewers.

#### **Relevance and Takeaways**

I have used Eli Review in small writing classes, but Eli Review can easily be adapted to large classes with a writing intensive emphasis. The peer reviews take place outside of class, therefore they do not create more work for instructors and they foster an online community that can help students connect in larger classrooms. Participants will learn how to use Eli Review, understand its benefits in terms of helping students become stronger writers and peer reviewers, and learn how to collect data from Eli Review that can be used for both pedagogical and research goals.

**Author Biographies**

Sarah Faye is a lecturer for the University Writing Program. She teaches all types of writing classes: upper and lower division, writing in the disciplines and in the professions. She is also the Assistant Director for Expository Writing.

## 4. The Teaching Assistant Consulting (TAC) Fellows Program

Monica Christina Esqueda

Center for Education Effectiveness

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### **Purpose**

The purpose of this resource table submission is to share information about the teaching resources and supports available to graduate students and postdoctoral scholars at UC Davis via the Teaching Assistant Consulting (TAC) Fellows Program.

### **Main Findings**

The Teaching Assistant Consulting (TAC) Fellows Program supports the professional growth of UC Davis TAs and AIs. TAC Fellows work closely with graduate student instructors and postdoctoral scholars to strengthen teaching practices and enhance learning for all students via peer facilitated workshops and one-on-one consultations. The TAC Program also encourages dialogue and collaboration among fellows to broaden perspectives about the purposes and practices of higher education beyond individual disciplines and approaches, promoting the development of fellows as instructors, consultants, and leaders in the learning and teaching community.

### **Description**

Teaching Assistant Consulting (TAC) Fellows will be present to discuss teaching resources and supports available to graduate students and postdoctoral scholars at UC Davis, including peer facilitated, certificate-bearing\* workshops and one-one consultations (e.g., mid-quarter inquiry, classroom observation, presentation skills, statement of teaching philosophy) with conference attendees.

\* = certificates offered for select workshops series only.

### **Relevance and Takeaways**

Conference attendees will leave knowing more about the teaching resources and supports available to graduate students and postdoctoral scholars at UC Davis, along with information about upcoming workshop offerings and contact information for the Teaching Assistant Consulting (TAC) Program.

### **Author Biographies**

Monica Christina Esqueda, Ph.D., is an Education Specialist in the Center for Educational Effectiveness (CEE). She is a member of the Learning and Teaching Support (LTS) unit. Prior to joining CEE, Monica was an Assistant Professor of Higher Education and Community College Leadership at Old Dominion University. Her research and teaching expertise include the conditions and contexts that promote access, wellbeing and success across secondary and postsecondary learning environments, undergraduate and graduate student development, underserved student populations, research design, quantitative research and mixed method research. She has published work in *Educational Researcher*, *Review of Educational Research* and *Teachers College Record*.

## 5. Get Curious: Program Learning Outcomes Assessment

Kara Moloney

Center for Education Effectiveness

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## 6. Deep Dives and Ripple Effects: Two approaches to enhancing teaching at a research-intensive university

### Work in Progress

Patricia Turner

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### Purpose

The key role of higher education in the provision of social mobility, a well-prepared workforce and an engaged citizenry is well-recognized (Labaree, 1997). Accordingly, we have recently seen calls for key shifts in the way we educate undergraduates away from traditional modes to evidence-based teaching practices incorporating student-centered learning approaches (e.g., Fry, 2014; CFUE, 2017). This table explores an approach to teaching enhancement that 1) provides targeted opportunities for faculty to take deep dives into pedagogy through an education-based course redesign initiative and 2) provides 15-minute teaching workshops to give large numbers of faculty teaching tools they can use immediately in their classrooms.

### Main Findings

This exploratory discussion will introduce participants to two programs offered by the Center for Educational Effectiveness (CEE): the Course Redesign and Teaching Effectiveness Program (CREATE) and Spark Sessions. In doing so, it will engage participants in questions around the topic of teaching effectiveness, for example:

1. What are the needs and challenges of faculty when it comes to implementing evidence-based teaching practices?
2. How can centers for learning and teaching support campus-wide implementation of evidence-based teaching practices?

### Description

Participants will discuss report recommendations coming from national educational bodies calling for a shift to student-centered teaching and will explore one approach to supporting teaching enhancement that uses a breadth-and-depth model to support faculty teaching innovations.

**Breadth (Ripple Effects):** Spark Sessions are 15-minute interactive, teaching-focused demonstrations given during department meetings. Spark Sessions are designed to introduce to larger numbers of faculty a teaching technique they can use in their courses immediately. They feature evidence-based teaching practices that focus on student learning.

**Depth (Deep Dives):** CREATE is a year-long program designed to support faculty innovation in course design and promote learner-centered, evidence-based teaching practices that foster success for all students on the UC Davis campus. Faculty spend a year redesigning a course using student-centered learning. The course redesign is supported by participation in monthly workshops, consultations and reflection on pedagogy, as well as by funding from the Center of Educational Effectiveness.

### Relevance and Takeaways

Participants will discuss how UC Davis' efforts around teaching and learning fit into the national conversation on undergraduate education. They will also learn about two CEE programs designed to support faculty's use of innovative, learner-centered pedagogies.

**Author Biographies**

Patricia Turner works as an Education Specialist at the Center for Educational Effectiveness (CEE). Patricia earned her Ph.D. in Applied Linguistics from UCLA and has taught at all three tiers of California's system of higher education, teaching undergraduate and graduate courses at UCSD, San Diego State University and Santa Monica College. At CEE, Patricia enjoys collaborating with faculty, graduate students and staff on the design and implementation of engaging, student-centered instruction with the goal of providing educational experiences that result in deep learning for diverse groups of students.

## 7. Introduction to team-based learning

Heather J. Hether

Communication

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### Purpose

This resource table will introduce participants to team-based learning (TBL), an innovative pedagogical approach in which students spend the majority of class time engaged in small-group learning (Michaelsen, Knight, & Fink, 2004). However, TBL is not simply group work, instead, this approach is highly structured and relies heavily on student preparation and participation. Through this method, students spend class time ensuring they understand the material by applying it to solve problems as a team. Instructors move away from traditional lecturing and focus more so on facilitating learning through productive teamwork.

### Main Findings

Across higher education, there has been a movement in favor of active learning, with some research suggesting that it is associated with better student learning outcomes than traditional lecture (e.g. Garside, 1996). Team-based learning is an approach to active learning that can radically transform a quiet classroom into a lively, engaged learning community. This approach is highly structured and it follows a specific format; however, instructors may consider integrating only some of its key elements to understand better the potential impact this method can have on student learning.

### Description

At this resource table, participants will be introduced to the fundamentals of TBL. The core elements of a TBL classroom will be discussed and sample materials will be shared. The fundamental elements of TBL include student at-home preparation, readiness assurance tests and application activities. Readiness assurance tests begin the start of every new course module and they help identify gaps in student understanding and provide opportunities to clarify course concepts. These tests are completed both individually and then as a team with a special type of scoring card that provides immediate feedback. Beyond these tests, the majority of class time is spent with students working in their teams solving application problems together. Mini lectures are used as needed to clarify any student misunderstandings and/or heighten student learning. This teaching method can be used in a variety of class sizes and studies have shown it is effective at increasing student engagement and learning outcomes. While it is effective, it can be challenging to implement as instructors cannot rely on prepared lectures and instead they must learn to facilitate an interactive, dynamic discussion. Moreover, the formation of productive teams is critical, as well as ensuring individual accountability for student work and fair grading practices.

### Relevance and Takeaways

Active learning is a pedagogical approach that offers new opportunities to enhance student learning, particularly when compared to traditional lecture. TBL is one such method that can dramatically alter the classroom environment by offering students a dynamic experience that focuses on developing applied understanding, problem-solving skills and teamwork. Attendance at this resource table will provide participants with an understanding of the key elements of TBL, as well as insight into how instructors might take small steps toward creating a more active classroom environment that fosters classroom community and student learning.

### Author Biographies

Dr. Heather J. Hether is a faculty member in the Department of Communication at the University of California, Davis. Her research interests focus on digital media in the health and education contexts; communication campaigns; and innovative pedagogy. Dr. Hether's work has been published in academic journals and books, as well as presented at

national and international conferences. Dr. Hether has held previous academic and research positions at the University of the Pacific in Stockton and UCD's Center for Healthcare Policy and Research in Sacramento.

## 8. IRB Resource Table

Marisol Quintana, Jessica Ramirez

IRB

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### **Purpose**

Analysts from the Institutional Review Board administration will be present to answer questions related to the IRB submissions process, review, ethics, and approval for SOTL projects.

Faculty, staff, and students can ask questions related to the IRB submission process, the requirements for proposal and approval, timelines, and other questions related to IRB approval for human subjects research, as it relates to SOTL projects.

### **Author Biographies**

Marisol Quintana, MA, CIP (Analyst/IRB Member) - Marisol's main role at the IRB is to review social/behavioral/educational research protocols that are no greater than minimal risk. Marisol has been with the IRB Administration for over 6 years, and an employee of UC Davis since 2005.

Jessica Ramirez, MA, CIP (Analyst/IRB Member) - Jessica's main role at the IRB is to review social/behavioral/educational research protocols that are no greater than minimal risk. Jessica has been with the IRB Administration for over 6 years, and an employee of UC Davis since 2010.

## 9. E-Learning for Equity, InnoVation, and Teaching Effectiveness (ELEVATE) Fellows Program (ELEVATE)

### Work in Progress

Cecilia Gomez

Center for Educational Effectiveness

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### Purpose

The E-Learning for Equity, InnoVation, and Teaching Effectiveness (ELEVATE) Fellows Program is a year-long program designed to support the creation of new, innovative elearning environments (e.g., hybrid and online courses) and guide the transformation of face to-face courses into hybrid courses, based on learner-centered, evidence-based online teaching practices and with a particular focus on promoting learning for all students and bridging the opportunity gap for underserved students.

### Main Findings

The benefits of being an ELEVATE Fellow include intensive professional development in learner-centered and digital pedagogies, instructional strategies, and reflective practice on teaching for equity and inclusivity, as well as individualized assistance from CEE and ATS and funding to support each Fellow's hybrid course redesign.

### Description

ELEVATE Program Structure

- 8-16 Participants, each supported with a project grant
- 8 workshops of 12-16 hours over Winter and Spring 2019 quarters.
- We plan to make ELEVATE a regular programmatic offering beyond AY 2018-2019.

Prospective Session Topics

- Understanding Learners in Hybrid Settings / Welcome to Canvas
- Hybrid Course Design for Diversity and Inclusivity / Organizing Learning Materials with Modules, Pages, and Integrated Content
- Assessing Student Learning in Hybrid Setting / Assignments, Quizzes, and Rubrics
- Inclusive, Universal Design: Building Content for Accessibility Teaching and Learning / Accessible Technology Practices
- Fostering Active Learning For All Students in a Hybrid Course / Active Learning Tools and Practices
- Promoting Engagement in Synchronous and Asynchronous Settings / Webinar and Communication Tools
- Creating Inclusive Learning and Supporting Student Collaboration / Utilizing Groups, Discussions, and Collaborative Tools
- Seamless Hybrid Teaching and Learning / One-on-One Participant Consultations

Sample of proposed deliverables

- Active faculty participation in at least 7 out of the 8 workshops
- Secure departmental commitment of support for the hybrid course designation
- Submit and/or revise course for COCI approval

- Submit the following program deliverables by the end of Summer 2019 (e.g., redesigned syllabus, hybrid lesson plans, course map, course assets, program reflection)
- Teach the hybrid (or online) course between Fall 2019 and Spring 2020

### **Relevance and Takeaways**

ELEVATE seeks to support faculty and their projects focusing on:

- creating equitable, e-learning experiences for diverse student populations;
- redesigning a traditional, face-to-face course as a learner-centered, hybrid course;
- building on teaching practices in e-learning environments for inclusivity, improved learning, and increased student engagement
- increasing student engagement and student collaboration in e-learning learning environments in ways that serve to bridge the opportunity gap
- aligning desired learning outcomes, activities, and assessments when teaching in a hybrid format in order to serve all students and create equity in the classroom
- developing or enhancing instructional material creation, production, and tool integration in elearning environments

### **Author Biographies**

Cecilia works as an Education Specialist at CEE, the Center for Educational Effectiveness, at UC Davis. She received her Ph.D. in Education from the UC Davis School of Education in 2013. Originally from Argentina, Cecilia has work experience in the academic, government, and private sectors in the US and Latin America, including working at the Federal Department of Education in Argentina, developing online and hybrid courses, and teaching at the graduate and undergraduate levels.

Margaret Merrill, PhD, an Instructional Designer and Educational Technologist in Academic Technology Services, supports faculty as they consider how to use technology in pedagogically sound ways in online, hybrid, or face-to-face courses. Previously, Margaret has developed and implemented faculty support programs at UW-Madison and BYU, created technology-supported foreign language learning materials for university and government projects, and held a boom mic for the filming of a movie in Romania.

## 10. Writing Across the Curriculum Resources Table

**Melissa M. Bender**

University Writing Program  
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### **Purpose**

Writing Across the Curriculum (WAC) is an educational reform movement that began in the 1970s and is now operating on university campuses throughout the U.S. and internationally. Since its start, WAC has also become a significant area of research within the discipline of Writing Studies.

The WAC program on the UC Davis campus is housed in the University Writing Program. The purpose of this resources table is to:

Discuss the ways in which writing can be used to encourage student learning and critical thinking.

Present the WAC services that are available to UC Davis students and instructors.

### **Main Findings**

The WAC program at UC Davis is rooted in the following principles derived from the "WAC Statement of Practices and Principles":

Writing should be an integral part of the learning process throughout a student's education, not merely in required writing courses but across the entire curriculum.

Writing is highly situated and tied to a field's discourse and ways of knowing.

Writing in the disciplines is most effectively guided by those with expertise in that discipline.

### **Description**

The WAC team at UC Davis is comprised of faculty consultants and graduate writing fellows. At this resources table, a WAC faculty consultant will discuss with attendees any aspect of writing instruction, including research-based pedagogical practices, and provide information on the services that the UC Davis WAC program offers, including the following:

Faculty-led services:

Writing workshops for graduate students and postdocs.

One-on-one consultations for faculty on incorporating writing activities into their undergraduate courses, developing effective writing assignments and rubrics, and using writing-to-learn activities to help students master course content.

Workshops for TAs on commenting on student writing and grading papers.

Graduate Certificate in Writing Theory and Practice.

Graduate Writing Fellow services for graduate students:

One-on-one writing consultations.

Writing retreats.

The Writing Partner Program.

### **Relevance and Takeaways**

Takeaways:

Discuss common challenges in creating writing assignments and evaluating student writing.

Learn about WAC research.

Find out about the WAC resources that are available to educators on the UC Davis campus.

Schedule an appointment to meet one-on-one with a WAC faculty consultant.

**Author Biographies**

Melissa M. Bender (Ph.D. English, 2009, UC Davis) is a continuing lecturer in the University Writing Program and Assistant Director of Writing Across the Curriculum. She is the co-author, with Karma Waltonen, of *Twenty Writing Assignments in Context: An Instructor's Resource for the Composition Classroom* and *Who's Your Source? A Writer's Guide to Effectively Evaluating and Ethically Using Resources*. At UC Davis, she teaches a range of writing in the professions courses, including *Writing in the Health Professions*, *Writing in Science*, and *Writing in History*. Her research interests include writing pedagogy, visual rhetoric, popular culture, and American Studies.

## 11. GradePal: An Intuitive, Internet-Based Application for Gradebook Analysis

### Work in Progress

Joel Ledford

Plant Biology

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### Purpose

We present GradePal as an internet-based application that provides instructors with a dedicated tool to quickly analyze student performance using course gradebook data. GradePal is free, easy to use, and secure with the ability to generate a variety of statistical summaries and plots tailored to needs of educators.

We use metadata collected from users in conjunction with survey results to assess whether or not analysis and visualization of student performance impacts instructional practices. More broadly, our research is focused on how, when, and to what extent instructors use data to inform their teaching.

### Main Findings

We provide a tool that supports data-driven teaching by enabling instructors to quickly produce analyses of student performance using gradebook data. Results of these analyses may be used to evaluate the effects of instructional changes or, provide insight into course dynamics over time. GradePal may also be used to explore patterns and trends in student performance leading to more focused questions in education research.

### Description

For many instructors, analysis of student performance is limited to basic statistics (mean, standard deviation) and/or histograms using an Excel-based gradebook. Deeper analyses are infrequently pursued largely due to time constraints, but also because the learning curve associated with applications capable of more robust statistical analyses (such as R or STATA) is high. We view the lack of more detailed analyses as a lost opportunity; especially for high-enrollment courses where results often reveal patterns that potentially inform instruction.

GradePal is an intuitive, internet-based analysis application designed to work directly with gradebook data collected as part of any course. A live demonstration of its functions will be provided using examples based on actual gradebook data. This will include summary statistics, data tables, bar plots, box plots, histograms, and density plots. Current results of metadata collected from users will also be discussed, including analysis of survey results.

### Relevance and Takeaways

We intend to use this presentation as an opportunity to showcase the functions of GradePal using a live demonstration. We hope to connect with other instructors interested in data-driven teaching and recruit new users to participate in our study. Additionally, we seek feedback on existing functions and ideas on new functions for future revisions.

### Author Biographies

Joel Ledford is a Lecturer with Potential Security of Employment (LPSOE) in the Plant Biology department at UC Davis. His research interests include the development of intervention strategies for at-risk students and computational resources that promote data driven teaching. Prior to joining UC Davis, he was a postdoctoral fellow at the California Academy of Sciences working on spider phylogenomics and cave biology.

## 12. Just-in-Time Teaching Resources

Stacy Wittstock, Kem Saichaie  
 Center for Educational Effectiveness  
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### **Purpose**

CEE has developed a number of "just-in-time-teaching (JITT) resources to help instructors learn more about a number of relevant topics related to learning and teaching at UC Davis.

### **Main Findings**

The JITT resources are research- and evidence-based and are designed to give instructors practical strategies on a variety of teaching topics, in an effort to support sustainable and equitable pedagogies at UC Davis.

### **Description**

We propose to have a one-page flyer with a quick description of each JITT as well as printed JITT resources for participants to take with them and a laptop/monitor to show participants the JITT resources on the CEE website.

### **Relevance and Takeaways**

We hope that participants will review our resources, consider the content, implement (as appropriate), and engage CEE in further conversation about the resources.

### **Author Biographies**

Stacy Wittstock is a graduate student in the School of Education at the University of California, Davis. She is currently completing a PhD in Education with an emphasis in Learning and Mind Sciences, and a designated emphasis in Writing, Rhetoric, and Composition Studies through the University Writing Program. Stacy has taught university-level writing and composition for over seven years and was the coordinator of a writing support program at Washington State University before coming to UC Davis. She has also presented at numerous local and national conferences in the fields of Education, English, and Rhetoric & Composition. Her research interests include basic and entry level writing, peer response, and both classroom and programmatic writing assessment.

Kem Saichaie is Associate Director of the Center for Education Effectiveness (CEE) and a Lecturer in the School of Education at the University of California, Davis. He leads the Learning and Teaching Support unit in CEE. His experience in higher education includes roles as a faculty member, and in academic technology, admissions, evaluation and research, and instructional development. Kem has published in a variety of outlets including, *The Journal of Higher Education*, *International Journal for the Scholarship of Teaching and Learning*, and *New Directions in Institutional Research*. He is the co-author of *A Guide to Teaching in Active Learning Classrooms: History, Research and Practice*.

## 13. Developing Digital Communication Skills through a Video about One's Undergraduate Major

Arnold J. Bloom

Plant Sciences

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### **Purpose**

We have developed an undergraduate course in which each student develops a short (less than 2 minutes) video about his or her major that can be posted on the UC Davis website for the major. In this course, we emphasize authenticity rather than highly polished production values. Students learn not only about the rudiments of videography (storyboarding, script writing, lighting, camera angles, audio engineering, video editing, transitions, music soundtracks, and rolling credits), but also about intellectual property (IP) rights, conducting interviews, and project scheduling. An added bonus is that students become more familiar with their own majors and with staff advisors and faculty.

Staff from the UC Davis Advanced Technology Services provide an introduction to equipment and software. A librarian provides information about IP and assistance in finding resources in the public domain. The students in the class and the instructors provide comments and suggestions on a weekly basis. The course is focused on the final video, but there are weekly milestones that keep students progressing steadily.

### **Main Findings**

The videos have become very popular among students, staff, and faculty. They address routine questions that advisors must answer repeatedly. Moreover high school students, transfer students, and their parents find the videos provide a brief introduction to the academic programs at UC Davis. Each video provides a unique viewpoint of the student creator, and so even videos about the same major provide different perspectives.

Nearly half of the students suffer a crisis of confidence at some point during the quarter. We work individually with the students, outlining clearly what they have done and what they need to do and when. We introduce the students to the appropriate staff and faculty for advice and interviews. During the four years that the course has been running, we have never let a student be left behind.

### **Description**

Our submission will emphasize the use of videos as medium for information transfer. This medium is becoming increasingly important in our society, but training in this medium is limited at UC Davis. Nearly all the students who enroll in our class have no previous experience in videography, but still develop a valuable product. Our submission will feature the 22 videos that derive from the class with notes about some of the difficulties that the students encountered and how they overcame them.

A major issue is that students obtain little experience with working in groups, and video production usually benefits from having many hands participate. We will discuss how we attempt to address this issue.

### **Relevance and Takeaways**

More and more of instructional materials include videos. This presentation will provide a point of entry for many in the UC Davis community who would like to generate such materials but have not done so. Our students, as always, can provide inspiration and motivation to move in new directions.

### **Author Biographies**

With a name like Bloom, many assume that I was destined to become a botanist, but my career path followed a circuitous route. Upon receiving an undergraduate degree in Physics from Yale University, I spent several years developing computer models of the spread of air pollution over cities in the United States and Germany. I received a Ph.D. in Biological Sciences from Stanford University, where I also completed a two-semester course in Environmental Legislation at the Law School. I conducted postdoctoral research on the temperature responses of plants at the University of Alaska, Fairbanks.

For nearly forty years, I have been on the faculty of the University of California at Davis. I have offered for over a decade a multi-media course about global climate change and, for the last four years, joined with Sue Ebeler and Mark Wilson to develop the course "Developing Digital Communication Skills."



## 14. Community Engaged Teaching and Learning: A View from UC Davis

Ingrid Behrsin, Michael Rios

Office of the Provost

### **Purpose**

Engaged scholarship exemplifies excellence in research, teaching, and creative practice that focuses on issues of public concern and is useful to, and developed in concert with, diverse audiences beyond the university. It helps us achieve our highest academic aspirations as a public institution to serve society and make a positive difference in the world. This type of scholarly activity takes many forms and ranges from collaborative relationships with local communities to provide access to university resources, to intellectual pursuits and organized research that inform and shape public policies and debates, to scientific and technological breakthroughs that improve people's lives. Collectively, these activities have impact at different geographic scales, across sectors, and between disciplines that aim to improve the wellbeing of individuals, communities, and the planet.

In these listening sessions, participants will provide feedback on ways that engaged scholarship can be better supported at UC Davis. Participants will be led through a collaborative design exercise meant to generate interventions around engaged scholarship and learning on and off campus. Participant-driven ideas will inform the strategies that the Office of Public Scholarship and Engagement pursues for better supporting engaged learning and engaged scholarship on campus. These strategies will be presented in a draft Implementation Framework to be released in early 2019.

### **Author Biographies**

Michael Rios is Professor of Human Ecology and Faculty Advisor to the Provost, Engaged Scholarship and Engaged Learning. He has many years of organizing, teaching, and evaluating community-engaged learning experiences. Related publications include "Learning from informal practice: Implications for urban design in American cities" in *The Informal American City* (2015); "Operative sites for dialogue and reflection: The role of praxis in service learning in Beyond Boundaries: Service Learning in Design and Planning (2011), and "Where do we go from here? An evaluative framework for community-based design" in *From the Studio to the Streets: Service Learning in Planning and Architecture* (2006).

Ingrid Behrsin is the Provost's Postdoctoral Fellow in Engaged Scholarship and Engaged Learning, University of California, Davis. Ingrid earned her PhD from UC Davis' Geography Graduate Group in June 2018, and holds a M.Sc. in Community and Regional Development from UC Davis. As a 2016-2017 Professors for the Future Fellow, she co-convened a workshop for fifty UC Davis campus and external community members to discuss the benefits of, and obstacles that emerge in, pursuing engaged scholarship and learning.



## 15. New UC Davis Study Abroad Faculty-Supported Models: Less Time, Less Travel

Ashley Arvanites, Brianne Holden

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Study Abroad (Global Affairs)

### Purpose

Study abroad is not possible without faculty involvement. In traditional UC Davis Study Abroad faculty-led programs, UC Davis faculty travel with students for a month or a quarter and live and teach on site. UC Davis Study Abroad is expanding the opportunities in which faculty can facilitate study abroad programs with a lesser time commitment and limited or no international travel. The purpose of this resource table is to introduce faculty to the nontraditional faculty-supported study abroad models available at UC Davis, including Seminars Abroad, Partnership Programs, Summer Abroad Internships, and Departmental Exchanges.

### Main Findings

We understand that many faculty members are interested in getting involved but cannot make the time and travel commitments required by the traditional Summer Abroad model. UC Davis offers a number of new ways to support students and act as the instructor of record for the following program types:

Seminars Abroad\*: ~2 week faculty-led programs offered during campus breaks.

Partnership Programs\*: 4-5 week Summer Abroad programs taught by host institution with limited UCD faculty oversight.

Summer Abroad Internships\*: 4-8 week internship programs with remote faculty support.

Departmental Exchanges: Quarter- to year-long student exchanges where all courses are taught by host institution.

\* Faculty receives additional compensation.

### Description

Seminars Abroad: Faculty travel with students to teach pre-fall or winter break programs that are connected to Fall quarter. Supplemental coursework may be offered during the Fall quarter to prepare students for a winter program abroad, or to extend learning after students return from a September program abroad.

Partnership Programs: UC Davis courses are taught by local faculty at an overseas institution in the summer with remote academic oversight by UC Davis faculty. The partner institution manages program activities and student support/safety. The UC Davis faculty will be on-site for the first few days to facilitate the launch of the program.

Summer Abroad Internships: These are cohort-based internship programs in specific subject areas that include remote oversight by UC Davis faculty through weekly electronic communication. Internship placements are coordinated by a local organization with experience handling onsite logistics and student services.

Departmental Exchanges: UC Davis Faculty collaborates with host institution during program development to identify course equivalencies. Faculty and department advisors support both outgoing and incoming students. No international travel is required.

### Relevance and Takeaways

There are many ways for faculty to get involved in study abroad including the new models presented today. The benefits of these study abroad models may also include:

- Building or expanding existing cooperative relationships with colleagues at international institutions
- Facilitating international research collaboration
- Utilizing the knowledge or expertise of an academic department at an international university
- Being compensated for additional involvement

Next Steps: Review the current program offerings on the Study Abroad website and access the proposal packet which includes the timeline, process, and requirements. Contact the faculty director if you have questions or to schedule a consultation appointment.

### **Author Biographies**

Ashley Arvanites, Study Abroad

Ashley recently joined the UC Davis Study abroad team as a Program Coordinator and Advisor. She has participated in the development of new departmental exchanges, short-term seminars, and partnership programs, and coordinates a diverse portfolio of programs around the world.

Brianne Holden, Study Abroad

Brianne has been a Study Abroad Program Coordinator and Advisor at UC Davis for a year and a half. During her tenure with the department, she has coordinated a range of different study abroad programs and has played an integral role in the establishment of a number of our Internships Abroad programs.