

# University of Waterloo Teaching and Learning Conference:

## Motivating Our Students and Ourselves

### 2018 Program

**Keynote: 8:30 – 10:05 a.m.**

**Motivating durable learning: focused attention through instructional design**

*Joe Kim, McMaster University*

Cognitive scientists have been systematically studying processes such as attention, memory and learning for more than 150 years. This rich resource of knowledge has been only recently applied to developing evidence-based interventions in education. A key focus of this research has been to promote learning that is durable – extending beyond short-term testing into long-term retention of information that remains with the student after the final exam. In this presentation, I will discuss three key factors that instructors can implement to promote durable learning:

1. Learning relies on sustained attention. In the class, instructors can implement methods to reduce mind wandering and students can engage in practices to promote effortful and focused attention.
2. Design of teaching materials directly guides learning. Perhaps the largest impact an instructor can make on learning is to offer thoughtfully designed class materials that adhere to multimedia learning principles. Slide design that reduces cognitive load can promote student learning.
3. Study habits such as retrieval practice strengthen long-term retention. Instructors can implement effective assessment design into the course structure and students can learn to take an active role in learning and testing.

A key message in applying cognitive principles to instructional design is that both instructors and students have important parts to play in developing habits that promote durable learning.

**Joe Kim** is an Associate Professor in Psychology, Neuroscience & Behaviour at McMaster University and is actively involved in the scholarship of teaching and learning. He co-ordinates the innovative [McMaster Introductory Psychology](#) program which combines traditional lectures with interactive on-line resources and small group tutorials. The program has been prominently featured in Maclean's, Globe and Mail, Toronto Star and numerous education media outlets.

He directs the Applied Cognition in Education Lab which aims to understand how cognitive principles such as attention, memory and learning can be applied to develop evidence-based interventions in education and training. He also organizes the annual [McMaster Symposium on Education & Cognition](#) which brings together cognitive scientists, educators and policy makers to explore how cognitive science can be applied to educational policy and instructional design.

Recent honours include: D2L Innovation in Teaching and Learning Award (Society for Teaching and Learning in Higher Education, 2017), Residence Life Campus Partner of the Year (2012), Innovator of the Year Award (McMaster VPR, 2010), and the President's Award for Excellence in Course and Resource Design (2010).

Follow him on twitter @ProfJoeKim

## “Igniting Our Practice”: 1:50 – 2:40 p.m.

### Live Teaching Showcase

**Brian Forrest, Pure Mathematics**

**Sarah Tolmie, English Language and Literature**

For this session, we asked two inspirational University of Waterloo professors to draw us into their disciplines and into the learning spaces they create for their students by teaching us a concept from their own courses. The methods they use are diverse, but the intention underlying them is the same: to ignite motivation in their learners about important disciplinary concepts and questions. We will reflect on and discuss the ways in which these methods might be adapted in our own fields and within our own classrooms.

**Brian Forrest** is a Professor in the Department of Pure Mathematics and is currently the Mathematics Faculty's Teaching Fellow. He came to the University of Waterloo in 1989 after completing his PhD at the University of Alberta and after spending two years as a Visiting Assistant Professor at Queen's University. In addition to teaching a variety of courses at all levels on campus, he has over the last 15 years been involved in the development and delivery of numerous fully online courses.

In his **Igniting Our Practice** session, Dr. Forrest will present a problem that he gives in the first lecture of his introductory Calculus classes that encourages students to use their intuition as a guide in approaching the content of the course.

**Sarah Tolmie** is an Associate Professor in the Department of English Language and Literature. She has a PhD from Cambridge and teaches medieval literature, general British literature, and creative writing in the English department at UW. She is the author of academic articles on Middle English and Middle Scots literature, but has concentrated since 2014 on creative writing. She has published three books of poetry: *The Art of Dying*, forthcoming from MQUP in 2018, *Trio*, published by MQUP in 2015, and *Sonnet in a Blue Dress*, a chapbook with Baseline Press in 2014. Her prose fictions include the dual-novella collection *Two Travelers*, the short story collection *NoFood*, and the novel *The Stone Boatmen*, published by Aqueduct Press in 2016, 2015 and 2014 respectively. A historical novel about the 17th-century microscopist Antoni Van Leeuwenhoek is now in the hands of her agent, and one about the 15th-century English poet Thomas Hoccleve is in progress.

In her **Igniting Our Practice** session, *Metaphors Are Us*, Dr. Tolmie will lead conference participants in two live, interactive exercises to prove that we make metaphors all the time, simply as part of thinking.

## **Session 100s: 10:30 – 11:30 a.m.**

### **Session 101 – Panel Discussion – Boredom, doodling, effortful concentration and smartphones in the classroom – distractors or motivators? The answers might surprise you!**

*Jhotisha Mugon, Psychology*

*Melissa Meade, Psychology*

*Tracy Duncan, Psychology*

*Jeremy Marty-Dugas, Psychology*

*Sarah McCrackin, Psychology*

Maintaining engagement and motivation in the classroom can be hard- especially when there are many emotions and distractors at play (Pekrun, 2006). In this session, we discuss current research and present alternate perspectives on factors affecting student engagement.

Our first talk stems from previous research that claims people often doodle to alleviate boredom or to boost concentration (Wammes, Meade & Fernandes, 2017). We will discuss recent research looking at the effect of different types of doodling on memory and attention.

Our second speaker examines the often-claimed reports of students losing concentration and engaging in mind wandering to a greater extent as time unfolds (Wammes et al., 2016). Recent research quantifying how effort and depth of concentration changes over time in live undergraduate classrooms suggest that this is not always the case.

Our final talk surrounds the controversial issue of using smartphones in education (Marty-Dugas et al., 2017). We discuss how different types of smartphone use relate to everyday inattention, mood, and the tendency to experience “Flow”. We also present preliminary findings on how one smartphone intervention involving restricting phone use during class impacts student engagement in university lectures.

During each talk, presenters will engage the audience with some discussion questions. Following each talk, audience members will have an opportunity to ask questions related to each topic and we will conclude with a panel discussion. Attendees will be able to demonstrate the benefits of boredom and doodling, examine how attention span varies across time and discuss the use of smartphones in classrooms. Implications for classroom application will be discussed.

#### References

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Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review*, 18(4), 315-341.

Wammes, J. D., Meade, M. E., & Fernandes, M. A. (2017). Learning terms and definitions: Drawing and the role of elaborative encoding. *Acta Psychologica*, 179, 104-113.

Wammes, J. D., Boucher, P. O., Seli, P., Cheyne, J. A., & Smilek, D. (2016). Mind wandering during lectures I: Changes in rates across an entire semester. *Scholarship of Teaching and Learning in Psychology*, 2(1), 13.

### **Session 102 – Workshop – Improving learning or motivating learners? Game-based learning approaches and course design considerations**

*Kyle Scholz, Centre for Teaching Excellence*

“A spoonful of sugar helps the medicine go down” – an old adage coined by Mary Poppins, yet also a point of contention when discussing gamification or game-based learning in educational settings. Is the intention of gamification/game-based learning to help students learn better through the accumulation of shiny badges or points, or is it to increase engagement and motivation by applying game-based principles to learning activities? This workshop will focus on the latter, concentrating on enhancing the fun that is inherent in learning, rather than trying to inject fun into traditional learning contexts (Charles et al., 2011).

By participating in a gamified course design workshop, participants will have an opportunity to work through an integrated, gamified course design model to begin considering approaches to introduce game-based learning into their own teaching. The gamified course design model considers the alignment of outcomes, assessments, and teaching and learning activities, but with a game-based learning lens influencing all elements of the design process. The workshop will explore core principles surrounding game-based learning in higher education – the provision of immediate feedback, learner experimentation and discovery, narrative assignment design, collaboration and competition, and more (Gee, 2003; Kiili, 2005; Papastergiou, 2009; Prensky, 2003) – and provide detailed examples of gamified courses, activities, and assessments. Throughout the workshop, participants will experiment with approaches to gamify their own learning contexts, and it will conclude with opportunities to further investigate game-based learning in participants’ own courses, including research and integrative course design opportunities.

#### References

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Papastergiou, M. (2009). Digital game-based learning in high school computer science education: Impact on educational effectiveness and student motivation. *Computers & Education*, 52(1), 1-12.

Prensky, M. (2003). Digital game-based learning. *Computers in Entertainment (CIE)*, 1(1), 21-21.

## **Session 103 – Panel Discussion – Using arts-based assignments for deep learning**

*Rachel Reist, Conrad Grebel University College*

*Michelle Jackett, Conrad Grebel University College*

*Jennifer Ball, Conrad Grebel University College*

*Kai Butterfield, Conrad Grebel University College*

Students in Peace and Conflict Studies (PACS) are required to engage in critical analysis around course material, but also in critical reflection around their own biases and assumptions. For instance, new understandings around power and privilege often shake the dominant narratives students have grown up with. There are times, for many of these students, when traditional learning strategies fail to capture the transformative learning they have done.

The PACS department integrated arts-based research assignments into many of its courses eight years ago as a means of addressing this, and encouraging deeper learning from students. Through arts-based research assignments, students have the opportunity to engage more deeply, and to express their learning in more complete ways. While instructors are marking the students’ ability to analyze their research findings, students can create something that represents the depth of their own intellectual transformation.

In his book, *The Moral Imagination: The Art and Soul of Building Peace*, peace scholar John Paul Lederach argues that the practice of building peace is a creative act – as much an art as a skill. Consequently, it makes sense that the PACS department create opportunities for students to think creatively – even artistically – about peacebuilding concepts. However, the benefits go beyond PACS. Howard Gardner’s Multiple Intelligence (MI) Theory advocates that intelligence needs a broader definition beyond the verbal/linguistic and mathematical/logical modes which

are traditionally more valued in higher education. The use of arts-based assignments engages the inclusive pedagogy of MI and invites students to engage with their learning on cognitive and metacognitive levels (Barrington, 2004).

In this panel presentation, PACS instructors will present alongside current students who have completed arts-based assignments, and we will further flesh out the practices and promises of this pedagogical approach so that participants could implement such practices in their classrooms.

#### References

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Wehbi, S. (2014). Arts-informed teaching practice: Examples from a graduate anti-oppression classroom. *Social Work Education*, 34(1), 46–59. doi:10.1080/02615479.2014.937417

Feland, C., Petrik, K., & Larson, J. (2016). Increasing Student Learning through Arts Integration. *Masters of Arts in Education Action Research Papers*, 199.

## Session 104 – Presentations

### 104a – Effects of a Fall Reading Break on First Year Students' Course Performance

*Carol Hulls, Mechanical and Mechatronics Engineering*

*Chris Rennick, Mechanical and Mechatronics Engineering*

*Mary Robinson, Engineering Undergraduate Office*

*Samar Mohamed, Centre for Teaching Excellence*

This presentation will present results from a study into the effects of a fall break on course performance and student motivation in 1A Mechatronics Engineering.

In 2016, Waterloo instituted a 2-day fall break on a 3-year pilot. The stated rationale for this break was to address student wellness and mental health issues, especially as this pertains to students transitioning from high school. There is very little existing literature studying the effects of a fall break on the undergraduate student population. Cramer and Pschibul looked at the impact on student stress levels and found the break may cause additional stress. Some institutions have made available their internal studies into fall breaks, which largely rely on student opinion, and fail to examine any empirical evidence that fall breaks produce the intended outcomes.

The researchers will present an analysis of course grades from MTE100, CHE 102, and GENE 121 along with start and end of term survey responses. Other first year engineering instructors have been contacted to provide additional data. Focus groups will be conducted with second year students who experienced the fall break in 2016, and with a first year group. These focus groups will be used to examine their perceptions of the purpose of a fall break, how they recall using their time during the break, and their reflections on how they used the break. In addition, the second year students will be probed as to how their study skills have changed in the intervening year.

The goal of this presentation is to spur discussion among educators around the purposes and unintended consequences of the fall break, and to encourage educators to gather the data needed to determine whether the fall breaks widely instituted across Ontario are achieving the desired goals.

#### References

University of Waterloo Fall Break Task Force, "Consideration of a Fall Break at the University of Waterloo: Report to the Vice President and Provost", Waterloo, ON, 2014.

K. Cramer and R. Pschibul, "Student Time Usage During Fall Reading Week," in *Collected Essays on Learning and Teaching*, vol. 10, 2017.

University of Guelph Mental Health Advisory Committee (MHAC), "University of Guelph White Paper: Fall Study Break Expansion," Guelph, ON, 2017.

K. Pilato, "Exploring the Impact of a Fall Break on Student mental Health Outcomes: Year 1 Report submitted to Vice-Provost and Associate Vice President (Student Services)," Brock University, St. Catherine's, ON, 2014.

## **104b – Exploring the Impact of a Mindfulness Intervention on First Year Students' Writing Self-Efficacy, Writing Apprehension, and Writing Anxiety\***

\*This is a University of Waterloo [LITE grant](#)-funded project

*Wade Wilson, Kinesiology*

*Nicole Westlund-Stewart, Writing and Communication Centre*

*David Drewery, Centre for the Advancement of Co-operative Education*

Effective writing and communication skills are essential for students entering the workplace (Autman & Kely, 2017). However, students entering university tend to lack writing skills, resulting in writing apprehension (Stewart, Seifert, & Rolheiser, 2015) or writing anxiety (Lee & Krashen, 2002). One reason for writing anxiety is the fear of negative evaluation, which results in overall poor communication performance (Karakaya & Ülper, 2011) and can affect many areas of life (Lee & Krashen, 2002). Therefore, providing strategies to help students improve their writing and communication skills in academic settings, including their perceptions towards these skills, is imperative.

Mindfulness meditation is worth investigating with academic performance (Huppert & Johnson, 2010). Mindfulness-based practices have been linked to many positive psychological outcomes in the university population (e.g., Baer, 2003). Given that writing ability is becoming an increasingly crucial component of academic performance and the recent attention on mindfulness-based practices in the academic context, directing attention towards students' writing self-efficacy using mindfulness meditation seems beneficial for both short- and long-term academic and employment goals.

The purpose of this project was to determine how mindfulness meditation can modify and have a positive impact on writing self-efficacy, writing apprehension, and writing anxiety in a first-year communication-based course. A secondary goal of this project was to introduce mindfulness meditation to first year students as a useful strategy that can be applied to other courses, assessments, and general well-being.

Students from a first-year cohort Applied Health Sciences course were asked to participate in a term-long wellness activity. One section of the course received an eight-week mindfulness meditation activity and the second section received an eight-week progressive muscle relaxation activity. Pre- and post-intervention data were collected. Preliminary findings will be discussed in relation to how mindfulness meditation may affect students' overall perceptions toward their writing abilities and general well-being.

### References

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## **104c – A mixed blessing? Students' and Instructors' Perspectives about Off-Task Technology Use in the Academic Classroom\***

\*This is a University of Waterloo [LITE grant](#)-funded project

*Elena Neiterman, School of Public Health and Health Systems  
Christine Zaza, Centre for Teaching Excellence*

The widespread use of technological devices in an academic classroom brought with it many learning opportunities, but also posed a challenge of handling the off-task technology use in class. While technology enhances learning, it also distracts students and instructors (Sana et al., 2013) and negatively impacts learning (Junco & Cotton, 2012; Lee et al., 2012; Wood et al., 2012) and can be very de-motivating for instructors and students, alike. The literature on this topic is growing, but we still know relatively little about students' and instructors' perceptions regarding the off-task technology use in class. This paper addressed this gap by examining (1) how students and instructors perceive technology in the classroom, and (2) who they believe should be responsible for minimizing off-task technology use in class. Analyzing data from a mixed-method study with students and instructors in a Canadian university, we show that while students acknowledged that off-task technology use can be distracting, they considered technology-use to be a matter of personal autonomy, which can only be regulated when it creates distractions for others. The instructors had a more complex view and posed some challenging questions about the relationship between student engagement and technological distractions, the impact of technology on learning process, and the responsibility of educators in higher education. In conclusion, we reflect on some of these questions suggesting them as a starting point for developing an informed policy for handling technology in an academic classroom. This research was funded by a Learning Innovation and Teaching Enhancement (LITE) Grant.

### References

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Lee, J., Lin, L., & Robertson, T. (2012). The impact of media multitasking on learning. *Learning, Media and Technology*, 37(1), 94-104.

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## **Session 105 – Presentations**

### **105a – Making: space, practice, and identity in STEM disciplines\***

\*This is a University of Waterloo [LITE grant](#)-funded project

*Jen Rathlin, Mechanical and Mechatronics Engineering  
Eugene Li, Mechanical and Mechatronics Engineering*

“Our job [as engineers] includes creating things that have never existed before. And sometimes, the things we dream up are ourselves.”

- Mel Chua, *Express Yourself!*, 2017.

The diverse populations of our communities are underrepresented in science, technology, engineering, and mathematics (STEM) fields. In response, programs are working to attract more diverse populations, with some efforts showing improvements in the numbers of female students and racialized students entering STEM programs. However, disproportionately greater numbers of these minoritized students leave STEM programs before graduation than their peers. The combination of a lack of relatable mentors or role models, and a lack of attention to a student’s intersectional identity can negatively impact important factors, affecting the academic success of minoritized students. Negative effects can be seen in a student’s self-confidence, self-efficacy, and sense of belonging.

A range of strategies for addressing these important factors have been explored in North American postsecondary STEM programs. Strategies such as targeted activities, which provide exposure to STEM-related skill-building activities to minoritized students, and integrating active pedagogies, such as project-based learning, have been implemented in the classroom. These strategies have found early success in increasing engagement at postsecondary institutions by promoting an authentic student-driven experience. Academic makerspaces have also shown themselves to be an avenue where students have the freedom to learn, and develop through self-driven skill-building activities, and project-based learning, all while exploring the possibilities afforded by the intersection of their identities.

This presentation will discuss the framework for a LITE Seed Grant-funded project, to investigate the potential for WATiMake, a student-facilitated academic makerspace, to serve as a space where students have the opportunity to bridge their personal identities and their academic or professional identities through engagement with the design process.

## **105b – Adding the A to STEM in the Engineering Classroom**

*Matt Borland, Systems Design Engineering*

In Spring 2017 a new version of System Design 361: Engineering Design was developed to provide students more opportunity to develop practical hands-on prototyping, while learning Design Thinking skills. The course was based around students designing and prototyping electronic musical instruments; a design problem that requires knowledge of signal processing, user interface design, user research, sensor design, electronics prototyping, mechanical prototyping, and musical expression. Emphasis was placed on the interdisciplinary nature of the problem. Musicians were made available for students to interact with and learn from through in-class activities. By adding the Arts element to their STEM education, students were challenged to understand a new perspective (that of a musician), and to work as a team to solve a complex problem without a correct answer. How do you make an expressive musical instrument? Students worked in groups and were encouraged to select instruments that represented the diverse field of musical practice found throughout the world. This work will be introduced in the context of other STEAM approaches in education, particularly in terms of developing students with interdisciplinary capabilities. Key learnings from the instructional perspective included the need for flexible assessment and course structure in these kinds of design courses, the value of developing appropriate resources to support students that lack hands-on skills, the motivational value of a topic like music to engage student learners in the engineering classroom, and the pedagogical power of sharing your personal passions with your students. The presentation will discuss the course structure, workshops, and assessment approaches that made this course a success and earned it an EngSoc Teaching Excellence Award. Ethics approval for data collection from the course was not obtained prior to offering the course, so no data was collected. Informal feedback from course evaluations will be discussed.

### References

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## **105c – The Joy of Object-Based Learning**

*Scott Campbell, Systems Design Engineering*

How do we experience objects in our material world? Not, primarily, through books and lectures. We learn by direct interaction. We learn about objects by handling them, by looking at them, sometimes by listening to them and even tasting and smelling them. This form of learning, which we do as small children, continues to be an extremely effective way to come to an understanding of the physical world, and can be brought into the classroom by showing students how to "read" artifacts (Mahoney).

I teach STV courses about the relationships between society, technology and values and normally offer a "reading artifacts" workshop early in the term. Students are divided into small groups and given an unfamiliar object to examine and analyze with a version of the Winterthur Method that I have modified for classroom use (McClung). The workshop encourages students to reflect on classifications, relationships, and organizations in the made world, and motivates them to consider the connection between "things" and gender, users, skills, standards, educational practices and other related human behaviors and social constructions.

The workshop is rooted in developing curiosity and confronting assumptions, but learning how to interrogate material culture opens doors from practical lessons on contextualizing information and turning evidence into sources, to broader topics such as globalization or sustainability. Students get a group mark, but the grade is based on creativity and insight, clear explanation, and careful description—not on a preconceived correct answer. A workshop can last as little as 45 minutes, or be as long as several weeks.

In my presentation, I will quickly demonstrate how I typically begin a reading artifacts workshop, and explore how this method can be used in different disciplines at different levels.

### References

Mahoney, Michael S. "[Reading a Machine.](#)"

McClung, Fleming E. "Artifact Study: A Proposed Model." In *Material Culture Studies in America*, edited by Thomas J Schlereth, 162–173. Nashville, Tenn, 1982.

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## **Session 106 – Presentations**

### **106a – Motivating and Supporting Teaching Assistants: A Comprehensive Approach**

For departments that offer large courses, whether on-campus or online, motivating teaching assistants to be engaged, responsible, and enthusiastic about their teaching duties is an important task. TA engagement is important to a department in many ways: often the large courses serve first-year students, and the quality of TA interaction can be a factor in how likely those first-year students are to take more departmental courses or to declare a major. Furthermore, although TA work can be perceived by graduate students (and even their faculty supervisors) as a distraction from the main work of their degree, TA work, properly approached, can be an important element in graduate students' development as instructors and scholars.

Over the past five years, as the TA coordinator for the English Department, I have worked with faculty, administrators, and graduate students to put in a variety of processes and programs to monitor, develop, and support English TAs and the course coordinators who supervise them. These include the formation of ongoing teaching files for graduate students, organizing a beginning-of-year teaching orientation for incoming and continuing graduate students, creating an online teaching portal that describes teaching strategies and outlines policies around teaching for the department, meeting personally with students and providing open-door office hours for instructor inquiries, organizing teaching workshop series, supporting and fostering peer teaching initiatives, and forging close connections with CTE programs and events. In addition, for PhD students, the department offers a first-term pedagogy workshop co-instructed by a variety of English faculty.

This presentation will present some of the issues that led to the creation of the TA Coordinator position, describe in detail the strategies the department has used to deal with those issues, outline the outcomes of those strategies, and touch on some of the ongoing challenges we are still examining.

## **106b – Undergraduate student leadership in scholarship of teaching and learning projects**

*Suzanne Wood, Psychology, University of Toronto*

In their most powerful form, undergraduate research experiences are a high-impact learning practice (Kuh, 2008) that allow students to translate what they have learned in the classroom to a novel situation, closer to the "real-world". Benefits from these experiences include the refinement of critical thinking skills and clarification of career goals (e.g., Russell, Hancock, & McCullough, 2007; Seymour, Hunter, Laursen, & Deantoni, 2004), as well as enhanced motivation to complete academic programs (Graham, Frederick, Byars-Winston, Hunter, & Handelsman, 2013), particularly in underrepresented groups (measured by retention rates; Nagda, Gregerman, Jonides, von Hippel, & Lerner, 1998). Our projects related to the scholarship of teaching and learning (SoTL) provide a unique avenue for undergraduate involvement. I propose that the data gathered by undergraduates in some SoTL studies have more validity than if they were gathered by those who more typically generate research data at universities (e.g., graduate students or faculty). This is particularly true when we are trying to capture data as delicate as our students' perspectives on controversial or personal topics. In this presentation, both the benefits and pitfalls of undergraduate research assistant leadership will be discussed, with a recent undergraduate-led research project on the use of study drugs at a large university as a model.

Participants from all disciplines are encouraged to attend, and will have the opportunity to:

- walk through the steps for executing undergraduate-led SoTL projects
- weigh the benefits and drawbacks of undergraduate-led SoTL projects
- consider how undergraduates may be involved in or enhance their own SoTL projects

### References

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## **106c – Students as Partners: Motivating students and faculty as educational change agents through student-faculty partnerships.**

*Tom Haffie, Biology, Western University*

*Lindi Wahl, Applied Mathematics, Western University*

*Reza Naqvi, Western University*

*Ka Gordon Lo, Western University*

*Rosalyn Phung, Western University*

Post-secondary institutions around the world are recognizing the potential of mutually respectful student-faculty learning partnerships to identify, motivate and facilitate a broad spectrum of positive change in their educational enterprise [1,2]. We have initiated such a Students as Partners (SaP) project at Western University with the aim of integrating these collaborative approaches into educational programming and practices within the Faculty of Science.

During this first year of the initiative, these partnerships have taken four forms: a student-faculty team designing and implementing the ongoing infrastructure of the project, several student-faculty pairs working on a variety of educational issues ranging from the scholarship of teaching and learning to course redesign to development of resources; student-led mentorship programs; and a faculty-student collaboratively designed course on university science education.

In this session, we will briefly outline the foundational principles of the global SaP movement. We will then share our insights, highlights and some possible pitfalls associated with realizing the potential of student-faculty partnerships. Practical take-home messages for faculty considering such a partnership, either in a course redesign or as a class-instructor partnership, will be included. Participants in the session will be engaged in generating and critiquing ideas for student-faculty partnerships in their own teaching and learning practice. Participants should leave the session with an enhanced understanding of SaP principles, as well as some pragmatic ideas for implementing these ideas in their own practice.

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## **Session 200s: 11:40 am – 12:40 pm**

### **Session 201 – Panel Discussion – Learning to Think, Thinking to Learn: Embedding metacognitive strategies in the classroom**

*Dave DeVidi, Philosophy*

*Heidi Engelhardt, Biology*

*Oscar Nespoli, Mechanical and Mechatronics Engineering*

*Erin O'Connell, Geography and Environmental Management*

*Erin Jobidon, Student Success Office*

*Erica McKellar, Student Success Office*

*Crystal Tse, Centre for Teaching Excellence*

*Monica Vesely, Centre for Teaching Excellence*

*Christine Zaza, Centre for Teaching Excellence*

When students feel capable of succeeding, they are more motivated to learn (Svinicki, 2004). It can be frustrating and de-motivating for students and instructors when students' hard work does not result in the outcomes they expected. For many students, this gap between effort and performance can be related to the fact that they are still developing metacognitive thinking skills. Metacognition includes the knowledge of cognition (knowledge about oneself as a learner, knowledge about learning strategies, and knowledge about why and when to use a given strategy) as well as the regulation of cognition (the ability to plan, monitor, regulate and evaluate one's own learning process) (Schraw & Moshman, 1995). Research shows that effective learners apply metacognitive skills and use strategic learning approaches to their studies (e.g., Ku & Ho, 2010; Miller & Geraci, 2011; Simpson & Nist, 2000).

When they arrive at university, many students are still developing into adult learners and would benefit from explicit instruction on metacognitive skills (Simpson & Nist, 2000). In this session we will present a variety of strategies that instructors can readily incorporate into their courses to foster metacognitive skill development in students. After a brief presentation on metacognition, our panel of instructors from Arts, Engineering, Environment, and Science will describe how they have embedded metacognitive strategies into their undergraduate courses. Participants will have the opportunity to think about how to apply these strategies to their own classes.

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### **Session 202 – Workshop – Motivating Students to Think Critically with Empirically Supported Strategies**

*Sarah McCrackin, Psychology*

Teaching students to think critically is undeniably one of the most important goals of university education. Increases in critical thinking are associated with better course outcomes, and more broadly, having citizens who can think critically is necessary for any successful society. Accordingly, much of the teaching literature is focused on how to improve critical thinking. Unfortunately, many of these papers contain anecdotal evidence or ideas which have not been supported by empirical data. These findings have big implications for professors trying to foster critical thinking in their classrooms; much of the literature on this topic is unverified, and may propose teaching strategies that fail to produce any measurable benefits. The present workshop will address this problem by discussing three teaching techniques which have been empirically tested and found to reliably illicit critical thinking gains across multiple investigations: 1) the use of higher-order questions, 2) promotion of peer-to-peer interaction, and 3) explicit critical thinking instruction. By the end of this workshop, you will be able to implement these three empirically supported techniques in your classroom, identify what critical thinking means to you, and think critically about pre-existing literature in this area. This workshop is intended for members of all disciplines seeking to work together to develop an empirically-supported framework for teaching critical thinking at the university level.

## **Session 203 – Presentations**

### **203a – What do we need to become better teachers?**

*Elena Neiterman, School of Public Health and Health Systems*

*Chris Vigna, Kinesiology*

*Zara Rafferty, Recreation and Leisure Studies*

The goal of this presentation is to examine what challenges UW course instructors face in striving to become better teachers and what supports should be put in place to help them on their quest to teaching excellence.

This paper is based on the needs assessment survey that AHS Teaching Fellows conducted with the AHS faculty members. A link to a 10-minute online survey was shared with AHS faculty in the summer of 2017. We asked faculty about the challenges that they face in their teaching and the supports that they believe would help them to navigate these challenges.

The survey was answered by 48 faculty members (roughly half of instructors). The majority of our instructors reported that they teach two (33%) or three (44%) courses in an average academic year. The next largest group (11%) reported that they teach six courses.

Large class sizes, lack of time for course development and preparation were cited as key challenges for preparing engaging classes. Many faculty members also raised their concerns about the current method of teaching evaluation that does not allow recognition for introducing innovative or experimental teaching practices into the classroom.

Faculty members who answered our survey provided several suggestions that they believed would help them enhance their teaching strategies. These included short, informative, applied sessions aimed at introducing a specific teaching strategy or skill to the faculty, departmental support for teaching and course development, enhanced training for teaching assistants, and creation of a teaching community that would enable instructors to talk about their teaching challenges and practices in an informal way.

We will discuss how we, as the AHS Teaching Fellow team, addressed these suggestions and open the discussion to other potential means of support that would enable instructors to improve their teaching.

### **203b – Early findings from the Active Learning Across Disciplines Community of Practice\***

\*This is a University of Waterloo [LITE grant](#)-funded project

*Sean Geobey, School of Environment, Enterprise and Development*

Prince defines active learning as "any instructional method that engages students in the learning process. In short, active learning requires students to do meaningful learning activities and think about what they are doing" (2004). Active learning approaches exist in different departments across the University of Waterloo campus but are often described in different ways, including collaborative learning, cooperative learning, problem-based learning, and workshop facilitation. The Active Learning Across Disciplines Community of Practice was established in 2018 to bring together faculty using active learning pedagogies to share teaching practices and critically evaluate opportunities for adopting them to different disciplinary contexts. This presentation will outline the preliminary findings from an environmental scan of on-campus organizations supportive of active learning methods that were used in the development of this community of practice as well as early results from this emerging community of practice. An interdisciplinary group of faculty has provided direction to this group, leading to a pivot away from an initial focus on workshop facilitation skills to its current scope and mandate focused on classroom-based active learning techniques. A few examples of techniques that have been explored will be presented to demonstrate how the community of practice has been operating. The objectives of this presentation are to outline the emerging agenda of this community of practice while connecting it to both academic research on active learning and perceptions of active learning at UW. This work is supported by a Learning, Innovation and Teaching Excellence (LITE) Seed Grant.

#### References

Prince, M. (2004). Does Active Learning Work? A Review of the Research. *Journal of engineering education*, 93(3), 223-231.

### **203c – Peer review of teaching: Can it motivate instructors to make changes to teaching?\***

\*This is a University of Waterloo [LITE grant](#)-funded project

*Cynthia Richard, School of Pharmacy*

*Elaine Lillie, School of Pharmacy*

*Kaitlin Mathias, Renison University College*

*Mary Power, Centre for Teaching Excellence*

*Thomas McFarlane, School of Pharmacy*

The University of Waterloo School of Pharmacy initiated a formal process for peer review of teaching in 2015, with over 30 instructors reviewed to date. In order to investigate whether the program impacted teaching practices or perceptions, instructors were invited to complete an online survey and participate in semi-structured interviews. Questions captured attitudes toward teaching, attitudes toward peer review, and changes in teaching practices.

Results from the survey indicated that instructors were supportive of the process of peer review of teaching, and viewed it as a development opportunity. Over half of instructors indicated that the review made them feel more confident that their teaching strategies were effective. Over half of the instructors also indicated that they planned to make changes to their teaching strategies as a result of the peer review. However, further probing using semi-structured interviews suggested that any anticipated changes were minor in nature. This appeared to be attributed to the fact that feedback on teaching was confirmatory in nature but not deemed to be critical enough.

In this session, we will give an overview of the peer review of teaching process used by the School of Pharmacy, as well as suggestions for changes to increase its impact on teaching practices. This will guide other teaching units that are considering adopting a peer review of teaching program.

This project was supported by a University of Waterloo Learning Innovation and Teaching Enhancement (LITE) Seed Grant.

## **Session 204 – Presentations**

### **204a – Engaging Physical Making for Digital Learning**

*David Correa, Architecture*

*Maya Przybylski, Architecture*

The practice of architecture has been radically transformed by the arrival of digital technologies. While some of these changes have simply shifted familiar practices, such as drafting, into digital environments, others, such as those supporting digital fabrication and computational design, have opened up entirely new ways of conceiving and executing design work.

While these technological affordances are incredibly exciting and engaging in and of themselves, they pose a challenge for design students and educators by overlaying yet another set of required skills and adding to an already intensive curriculum which tackles issues such as representation, building technology and cultural practice. Further, more intensive engagement with digital design practice has, somewhat ironically, shifted students' attention away from concrete, physical craft towards a reliance on abstract, virtual representations of their work. As educators, we consistently ask ourselves how to engage leading edge digital tools without losing students' connection to the physical side of architectural practice. Likewise, we challenge ourselves to view these digital capacities not as standing on their own but as being simultaneously informed by and informing the complex ways students approach project-driven, goal-oriented problems faced in their studio-based courses.

Through case studies, the presentation showcases a hybrid approach to teaching that, binds digital skill with physical making. The projects are designed not only to welcome and advance digital design practice but also to inextricably tie it to a practice committed to physical making. The cases studies, carried out at the University of Waterloo and beyond, and ranging in scale from table-sized experiments to full-scale architectural elements, are each developed to support inquiry-driven learning. While focusing on particular challenges within architecture, the teaching practices presented through the case studies foreground additional learning opportunities found in iterative development, learning through failure, curiosity-led inquiry, and embracing constraints as a productive practice among others.

## **204b – Engineering Design Days: Motivating Students With Authentic Problem-Solving\***

\*This is a University of Waterloo [LITE grant](#)-funded project

*Chris Rennick, Mechanical and Mechatronics Engineering*

*Rania Al-Hammoud, Civil and Environmental Engineering*

*Derek Wright, Electrical and Computer Engineering*

*Andrew Milne, Mechanical and Mechatronics Engineering*

The Engineering IDEAs Clinic has offered “Engineering Design Days” to various classes as a two-day, class-free, hackathon-based model to address student learning outcomes, and issues with student engagement and motivation. There is a growing body of work around the use of extra-curricular hackathons to promote engagement, innovation, teamwork, and problem-solving in engineers before, during, and after their undergraduate studies. Unfortunately, there are few examples of hackathons used as curricular learning opportunities.

We will describe one model for a class-integrated, curricular hackathon which has (of this writing) been deployed in five different undergraduate programs (Civil, Computer, Electrical, Mechanical, and Mechatronics Engineering) on eight separate occasions, with another two upcoming offerings (first and second year Environmental/Geological Engineering). The development of CivE Days was made possible through a LITE grant.

While each implementation has unique course-level objectives, all Engineering Design Days are designed to provide students with an opportunity to:

- engage with open-ended, authentic problems that integrate knowledge across multiple courses
- develop their hands-on skills by implementing an engineering system of their own design
- develop their identities as engineers while practicing their professional skills

We will discuss similarities and differences between the various offerings, as well as a general framework for other instructors to implement a similar concept in their own programs.

Students and course instructors from each implementation described in this presentation provided feedback through surveys, focus groups, and/or interviews. The results so far have been overwhelmingly positive from both students and instructors, with the adoption of this concept expanding across the Faculty of Engineering. Lessons learned from the different offerings, and strategies for ensuring the sustainability of large-scale curricular “interventions” like Engineering Design Days will also be discussed.

#### References

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- J. R. Byrne, K. O'Sullivan and K. Sullivan, "an IOT and Wearable Technology Hackathon for Promoting Careers in Computer Science," *IEEE Transactions on Education*, vol. 60, no. 1, pp. 50-58, 2017.
- M. Komssi, D. Pichlis, M. Raatikainen, K. Kindstrom and J. Jarvinen, "What are hackathons for?," *IEEE Software*, vol. 32, no. 5, pp. 60-67, 2015.
- M. Calco and A. Veeck, "The Markathon: Adapting the Hackathon Model for an Introductory Marketing Class Project," *Marketing Education Review*, vol. 25, no. 1, pp. 33-38, 2015.

## **204c – Designing Hands-on Activities for Large Classes in Unconventional Spaces**

*Mary Robinson, Engineering Undergraduate Office*

*Eugene Li, Mechanical and Mechatronics Engineering*

*Jennifer Moll, Chemical Engineering*

*Cheryl Newton, Chemical Engineering*

Motivating students, especially in required courses that are not directly related to their major, is a challenge. This challenge exists in all areas of study, but especially when trying to encourage engagement with active learning activities. Active learning is a common solution to this problem and well explained in many sources [1,2]. Factors in designing an activity, such as clearly stating the intended learning outcomes and providing just the right amount of information, while still allowing students the freedom to explore and take risks, will be considered in this presentation.

Understanding the key elements that lead to a successful activity is important, especially when the activities involve physical artifacts in a science or engineering context. Additional considerations include giving students the opportunity to make mistakes (often analogous to making a mess) in a safe environment, to be challenged at a level appropriate to their skill level to promote engagement and to build self-confidence, and to connect concepts from class to real-world applications. [3,4,5]

Attendees to this session will see portions of the original 90-minute chemistry activity demonstrated, which was performed by over 200 first-year Mechatronics Engineering students, at the same time in a non-laboratory space, in October 2017 as part of “Tron Days”. The creators of the activity will unpack key considerations in designing it, such as connections to bottleneck concepts in the course, program graduate attributes, safety, cost, available space, support staff, time and fun. Student feedback, including post-survey responses, from the activity will be shared.

#### References

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## **Session 205 – Presentations**

### **205a – Experiential Learning with Riipen**

*Umair Shah, Management Sciences*

*Jane Chomyc, Centre for Extended Learning*

Experiential learning is becoming an increasingly important component of higher education. In September 2016, Ontario's premier mandated that the Minister of Advanced Education and Skills Development (MAESD) "... support the goal of ensuring that every student has at least one meaningful experiential learning opportunity by the time they graduate from postsecondary education".<sup>1</sup>

What are some ways in which we can include engaging and motivational experiential learning in our courses? Join us to find out! In Fall 2017, and continuing through Winter 2018, Umair Shah (Management Sciences) and Jane Chomyc (Centre for Extended Learning) have been piloting the services of Riipen (<https://riipen.io>) in a University of Waterloo Management Sciences online course. Riipen is a Canadian company that facilitates connections among students, educators, and employers.

We would like to share our experiences with instructors of any discipline who wish to provide their students with opportunities to solve real-life problems, with the potential added benefit of improving student employment prospects. Our discussion will be underpinned by two key ideas for stimulating student motivation to learn: active instructor involvement in orchestrating the activity, and student initiative in making the project personally worthwhile.<sup>2</sup> The material we'll present is relevant for both online and face-to-face courses. An activity-planning worksheet will be provided.

Takeaways from this presentation include:

- An overview of how Riipen is currently being used in MSCI 211 Online: Organizational Behaviour
- Benefits and challenges experienced by the instructor and students
- Experiential learning resources

#### References

<sup>1</sup> Government of Ontario. (2016). September 2016 Mandate letter: Advanced Education and Skills Development. <https://www.ontario.ca/page/september-2016-mandate-letter-advanced-education-and-skills-development>: Ontario.

<sup>2</sup> Mcinerney, D. & McInerney, V. (2002). *Educational Psychology: Constructing Learning*. Frenchs Forest NSW Australia: Pearson Education Australia Pty. Limited.

### **205b – Putting Soft Skills into Perspective: A WatPD Approach**

*Natalie Chow, Waterloo Professional Development Program*

*Easton Page, Waterloo Professional Development Program*

A student's motivation is a critical factor affecting learning in classroom and online learning contexts (Lim, 2004). Research areas such as mind wandering and attentiveness are becoming increasingly popular in the field of education (Szpunar, Moulton, & Schacter, 2013). While exercising engaging instructional strategies may prove challenging in an online context (Chen & Jang, 2010), we recognize the importance of optimizing online learning environments to inspire continuous learning.

The Waterloo Professional Development Program (WatPD) offers online courses to support undergraduate students' soft skills development and improve overall employability. Many of the courses include reflective assignments designed to encourage critical reflection and continuous learning. Despite the program's efforts to promote soft skills development, findings from initial program evaluation data have shed light on the gap between students' assumptions and overarching messages in soft skills literature.

In Fall 2017, we implemented a pilot project called "WatPD Perspectives" in response to common student beliefs regarding soft skills. This term, a total of 22 TAs are creating Perspectives. The Perspectives are text highlighting key messages from media sources to provoke connections between theories and the workplace. Drawing upon course concepts and personal experiences, TAs draft Perspectives using a three-layer approach (consisting of a widget, a website article, and an original source). In this session, we outline the rationale behind this approach and provide a live demo of the technical process behind creating a Perspectives item. We also explain how this initiative supports the foundational goals of WatPD. We welcome feedback on this work as it is currently being piloted across 12 courses.

Participants will gain an understanding of how to encourage students to self-assess their soft skills through an online learning platform. Participants will also leave with ideas for how to cultivate lifelong learners by explicitly connecting theories to real-life applications.

#### References

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## **205c – Scenario simulations for “playing” with course concepts**

*Erin Kelly, Waterloo Professional Development Program*

Some challenges that we face in WatPD include getting students engaged, and helping them apply course concepts. To help students test and experience content in a safe, low-stakes environment, we have turned to simulations. Simulations allow students to try out different scenarios without the repercussions that may exist in the real world. In some cases it allows students to see some of the potential outcomes from decisions they make, and can help demonstrate how certain choices may be better - or how there is no one right answer to a situation. Students are not graded on their path through the simulations, rather on sharing what they learned.

I will discuss some of the best practices for creating simulations (i.e. the first thing that we identify as which learning objectives we are hoping to help the students meet and determine whether we want this to be a formative or a reflective assignment; as we develop the simulations it is important to identify key places for feedback; summary pages are important to help students understand or reflect on their path through the simulation). There are three design models to choose from: linear, exploratory, and branching. I will touch briefly on each of these, and talk about organizing and storyboarding. We also recommend getting user feedback for improvement, and I will talk about some of the ways we have done that.

Finally, I will talk about some of the lessons we have learned. For example, one of the things we have found is that we need to make it clear that the actions may not align with what students would consider, and that the results in the real world will not always be the same. I will also share some highlights of our simulations.

## **Session 206 – Presentations**

### **206a – Rubrics & Motivation\***

\*This is a University of Waterloo [LITE grant](#)-funded project

*Gregory Andres, Philosophy*

*Chao Yang, Writing and Communication Centre*

Part of our job as university instructors is to assess and evaluate students. It is well demonstrated that rubrics aid in student understanding (Goodrich Andrade, 2005) and motivation (Black, Harrison, Lee, Marshall, William, 2004; Holmes and Smith, 2003; Marzano, 2000). But there are limitations to how successful rubrics are. For one, students might not read or understand the rubric provided for them by the instructor. But, what if students designed the rubric, would this aid in student learning and motivation?

In the current literature, there is no research studying whether student-centered rubrics – that is, rubrics designed and used by students – contribute to student deep learning and motivation. Based on a 2016 LITE grant, a study on four sections of a second-year course was conducted to examine the effectiveness of student-centered rubrics on students' deep learning and motivation.

In this session, we will present the results from our study on the effect of student-centered rubrics on deep learning, student motivation, awareness of learning, and student attitudes and perceptions toward rubrics.

Participants will

- Discuss the challenges or roadblocks that they have encountered using rubrics in the classroom
- Learn how to use student-centered rubrics to motivate student learning

References

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## **206b – Replacing Final Exams with Open-Ended Course Projects**

*Kevin Goorts, Civil and Environmental Engineering*

In recent years, assessment methods and procedures have garnered considerable attention for their critical role in evaluating desired learning outcomes and influencing student learning. Many researchers point to the recent paradigm shift in accreditation procedures, that is from reporting program inputs to demonstrating achievement of learning objectives, as the primary factor driving this change. High-stakes final exams have been, and still are, widely used as the primary means to evaluate student learning. Although considered particularly efficient for large class sizes and objective in evaluation, many shortcomings have been identified including the difficulty to properly evaluate learning outcomes and curriculum distortion caused by the tendency to assess knowledge that can be judged readily. Project-based learning (PBL) is a form of experiential learning affording students the opportunity to apply theoretical concepts while developing higher-order skills such as critical thinking, synthesis, and evaluation as well as soft-skills including communication, management, and teamwork. Studies have shown the use of course projects enhances student learning and better prepares them for their future careers while being perceived by students as a motivating and engaging assessment method. This presentation illustrates the importance of using appropriate assessment methods and exposes a number of flaws in high-stakes final exams. Open-ended course projects are introduced as an alternative method with emphasis on identifying where and how they can be used effectively. The main learning objectives of this presentation include gaining an appreciation for the influence of assessment methods, developing an understanding of the limitations associated with final

exams, and acquiring insight into identifying opportunities to improve student learning and motivation through the use of open-ended course projects.

## **206c – Differentiated Assessments as a Motivating Factor**

*Melanie Misanchuk, Centre for Extended Learning*

*Marie Lippens, Centre for Extended Learning*

We know that students take different courses for different reasons. Some are simply fulfilling a requirement and would like to get in and out as easily and painlessly as possible. Others need to know the base material, but aren't interested in anything beyond the basics. Still others have already taken this material, but need this course on their transcript. Then there is the student we all want in our course: the engaged, motivated student who is really interested in delving into your material and enthralled with the tasks and skills of the discipline.

Are the needs of the first three kinds of students the same?

Is the rationale or approach of one of the students more valid than the others? Is it ok to "just get through" some courses while really engaging with others? Are some students inherently unmotivated or unengaged, or do they behave differently and have different needs in some courses than in others?

But what about the student who doesn't know she's interested in the material and enrolls in the course because she has to, and then changes her major because she falls in love with the discipline? If we treat her as part of the "just getting through" bunch, how do we bring her into the "engaged and dedicated, maybe will change my major" fold?

How do we, in one class, address all of these different needs and support the path the student wants to take? Can we have differentiated assessments for these different groups? Can we have differentiated content and/or outcomes for these different groups?

This presentation will not offer any answers, but aims to engender a lively discussion about large, structural changes in assessment and content to motivate students.

Can we motivate you to become part of this discussion?

### References

Mark Watson, Michelle Mcsorley, Cheryl Foxcroft & Andrea Watson (2004) Exploring the motivation orientation and learning strategies of first year university learners, *Tertiary Education & Management*, 10:3, 193-207.

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Joshua Howard, Marylene Gagne, Alexandre J.S. Morin, Anja Van den Broeck (2016) Motivation profiles at work: A self-determination theory approach, *Journal of Vocational Behavior*, 95-96, 74-89.

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## **Session 300s: 2:45 – 3:45 p.m.**

### **Session 301 – Panel Discussion – Fear and Loathing in the Library: Why Students Struggle with the Motivation to Do Effective Research (And How we can Support Them)**

*Kari Weaver, Library*

*Laura Bredahl, Library*

*Jane Forgay, Library*

*Beth Sandore Namachchivaya, Library*

*Dennie Park, Arts*

Research-based assignments are often a struggle for students. Depending on their familiarity with a topic and their prior preparation to do research, students can experience high levels of uncertainty, vagueness of thought, and feelings of confusion, frustration, impatience, and self-doubt around their ability to successfully navigate the academic research process (Kulthau, 2004). This is compounded by a tendency to revert to known research strategies that feel comfortable, like Googling information (Head, 2013). These affective experiences lead to, or exhibit themselves as, a lack of motivation from students on research work.

Join this panel of librarians from across academic disciplines and one of our Library Student Ambassadors for this lively interactive discussion of the experiences and concerns students have engaging in research. Scholarship on libraries and student motivation will be shared in tandem with the personal and professional experiences of the panelists. The discussion will also address how faculty, through collaborative pursuits with librarians including, co-teaching, integrated assignments, and reinforcement of library workshop content, can influence student research persistence, thereby improving experiences and outcomes for all.

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### **Session 302 – Workshop - Quiet (But Engaged) Participation**

*Rachel Milner, Environment*

*Christine Zaza, Centre for Teaching Excellence*

In many small classes, students have a chance to share their thoughts by engaging in class discussions. While this is motivating for some, it can be terrifying for others. Nonetheless, it is common for instructors to gauge understanding and assign grades by assessing students' verbal contributions to class discussions. This way of measuring participation raises several questions about inclusivity. For example, what about students who, for a variety of reasons, struggle with speaking up in class but excel in other ways of contributing to discussion? Is there an assumption that quiet students have less to contribute than those who are comfortable with, and able to negotiate, the demands of verbal discussion? Is it fair to base participation grades on the ability to speak up in class in front of peers? How can instructors engage students in discussion and measure participation in ways that account for diversity?

In this workshop we will describe how instructors can apply Universal Design principles to the design of class discussions. We will present, and model, examples of alternatives to discussion and provide instructors with tools to design a course that does not rely on verbal discussion as the only means of grading participation. Participants will have the opportunity to experience some of these alternatives during the workshop.

### **Session 303 – Presentations**

### **303a – Bridging the "Articulation of Skills" Gap through WatCV Career and Competency ePortfolios: a research study and a teaching and learning intervention\***

\*This is a University of Waterloo [LITE grant](#)-funded project

*Jill Tomasson Goodwin, Drama and Speech Communication*

*Katherine Lithgow, Centre for Teaching Excellence*

*Joslin Goh, Statistics and Actuarial Science*

Does integrating reflection into existing course activities increase students' ability to articulate the professional skills that they tacitly acquire while completing coursework?

In this session we will share the findings from our LITE Full grant research study, Bridging the Articulation of Skills Gap through WatCV: Career and Competency ePortfolios, as well as how we developed WatCV as a teaching and learning classroom intervention.

Building upon our 2014-2015 LITE Seed grant study, the WatCV project responds to 2013 research findings that suggested that "to increase new graduates' employability, university programmes and courses should focus on learning outcomes linked to the development of soft-skills," including such professional skills as written and verbal communication, interpersonal, leadership, critical thinking, and problem solving. (Finch, Hamilton, Baldwin & Zehner, 2013).

Carried out during the 2016-2017 academic year, the WatCV ("Waterloo Curriculum Vitae") ePortfolio initiative was a cross-campus research project that involved 18 instructors, 23 teaching assistants, and 1700 students in 22 courses, and that produced 4500 student ePortfolio reflections about the professional, transferable employability skills they were tacitly acquiring while completing coursework.

WatCV is also a teaching and learning intervention that makes these professional skills explicit and visible to instructors, students and next-stage stakeholders such as employers. We will show how the WatCV classroom intervention increased students' ability to articulate their skills by comparing a non-WatCV control group (1716 students) and a WatCV experimental group (1682 students) on their ability to articulate professional skills six months after course completion. Our results are promising: the WatCV experimental group showed strong evidence of retention, articulation, and transfer of learning.

We invite conference attendees to review our newly-launched [WatCV website](#) for additional background.

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### **303b – Expanding on Kolb's Experiential Learning cycle for competency development**

*Paige Stirling, Psychology*

*John Michela, Psychology*

Many undergraduate students lack professional competencies that are required for career success (Atkins, 2011; Cassidy, 2006). Educators agree that experiences (e.g., in co-op), contribute to competency development (Bartkus & Stull, 2001) yet how these experiences produce competencies is unclear. We seek to advance understanding of

this process of experiential learning, by presenting an expanded theoretical analysis based on review of educational and human resources literature, which may promote later empirical testing.

Kolb's (1984) Experiential Learning Theory posits that learners repeatedly cycle through four steps or stages: action, consequence, reflection, and reconceptualization. For example, the learner's action should be one chosen among options on the basis of prior conceptualization of situational requirements and likely consequences. Also, information about consequences must be available to the learner (which, at work, is not always so). Also required are time for reflection and, ideally, knowledge of how to reflect.

Previous writings by Kolb (including 2012) have focused on describing learning styles tied to the stages. We identify recommended activities as in how employers should adjust their methods and frequency of feedback so that co-op employees' consequences of actions are better known. Management literature provides specific recommendations (Kluger & DeNisi, 1996)—some tied to our theory and others, less pertinent. University courses should include more explicit, conceptualized content about teamwork, professional communication, problem-solving, and so forth. Our theory predicts that as students learn this kind of content in their courses or in other activities within the university, they become more able to choose effective actions when in the workplace, and become more able to learn from ineffective actions through reflection in relation to previously acquired concepts and understandings. Our theory also emphasizes the totality of the cycle and likely benefits of promoting all stages in all significant encounters requiring exercise of competencies.

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### **303c – Ideas Clinic Teamwork Module Series: Targeted experiential modules to develop student teamwork skills\***

\*This is a University of Waterloo [LITE grant](#)-funded project

*Maria Barichello, Student Success Office*

*Mehrnaz Mostafapour, School of Public Health and Health Systems*

*Rania Al-Hammoud, Civil and Environmental Engineering*

*Ada Hurst, Management Sciences*

The Ideas Clinic Teamwork Working Group is a team of faculty and staff representatives from various engineering departments, the Student Success Office, and the Centre for Teaching Excellence [1]. With the support of a LITE Grant, the working group has developed a set of six stand-alone modules that provide experiential learning opportunities to support undergraduate engineering students in developing their teamwork skills. The experiential modules have been integrated into courses from first through fourth year, and consist of three Introductory modules (Team Membership and Coordination, Team Communication, and Understanding Conflict), two Reinforcement modules (Giving and Receiving Feedback, Conflict Resolution), and one Mastery module (Team Health Assessment)[2,3]. Each module also includes assessment activities that serve to evaluate student learning and module effectiveness.

Each module has the flexibility to run in either 50 or 80 minutes, with delivery occurring during lecture or lab time. Modules typically consist of a short presentation along with hands-on activities that allow students to apply and practice their new skills. Each module provides opportunities for students to engage in authentic team dialogue and team building experiences as well as enables the instructor to integrate the modules with minimal time and effort. These modules are most impactful when integrated into courses that have students working in teams on lengthy, course-specific projects.

All modules developed to date have been piloted in first to fourth year courses in various engineering programs. Our next step is to expand these modules into more courses in all engineering programs. While the modules were intended for and targeted at engineering students, they can be seamlessly adapted to courses and students from other disciplines.

Our presentation will provide a brief description and assessment of each module. In addition, some of the instructors that have incorporated these modules into their classrooms will share their insights and experiences.

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## Session 304 – Presentations

### 304a – Intrinsic Motivation Through Service-Learning

*Jessica Van de Kemp, English Language and Literature*

In this session, participants will consider how to “intrinsically motivate” (Bieg, Reindl, and Dresel 667) students through experiential learning. Experiential learning can be broadly understood as “learning by doing” (Western University 3) and can be incorporated into university courses of any discipline. Working in collaboration with the community to advocate for others, conduct research, deliver outreach, or develop resources intrinsically motivates students to pursue their interests while meeting the extrinsic goal of earning course credit.

In this talk, I aim to demonstrate that the challenge of meeting students’ “desire to perform learning activities that are interesting to them” (Bieg, Reindl, and Dresel 667) can be met through placement-based “service-learning (SL)” (Fleck, Hussey, and Rutledge-Ellison 232). Placement-based SL differs from project-based SL in that students complete work on-site by applying course-based knowledge and learning objectives within community organizations.



I use an example of a teacher education practicum to explore the question of how to encourage students to take charge of their own learning. I argue that tapping into strengths and interests is key to nurturing intrinsic motivation. Furthermore, placement-based SL helps students reflect upon course content, personal growth, and social responsibility by connecting their academic development with their personal development.

At the end of the presentation, participants will be able to explain how participating in experiential learning creates positive change, builds strong connections between academic content and hands-on experience, and teaches to the whole person by celebrating different learning pathways and styles.

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Western University. "[Student Guide to Community Service Learning.](#)" The Student Success Centre. Web. N.d. 1-18.

### **304b – From grades to community-building: Service-learning as a source of student motivation**

*James Nugent, Environment*

This paper analyzes the relationship between service-learning, assessment and student motivation. I review the literature on service-learning as potential source for student motivation and draw on my practical experiences teaching a third-year service-learning course on social movements and social change. Service-learning calls on educators to rethink dominant assessment strategies and techniques, from grading practices that focus on evaluating rigid, homogenizing and pre-determined "outputs" towards a recognition of service-learning as a process that is highly contingent, differentiated, exploratory and frequently subject to "failure." I argue for open-ended (praxis-oriented) assignments coupled with process-oriented assessment that prompt students to fundamentally rethink the purpose of education and its role within personal and societal transformations.

Many service-learning courses centre on major group projects. While peer assessment is commonly used as a technique for deriving students' grades from group work, I argue that peer assessment is an inappropriate assessment tool for service-learning courses that aim to foster solidarity and empathy as key learning objectives. The merits and challenges of two alternative assessment techniques for service-learning courses are reviewed: offering courses on a "credit/no-credit"; and the use of specification grading (derived from contract grading). These techniques are well-suited to meeting inherent limitations of service-learning courses (e.g., their one-semester duration). I also argue for service-learning courses to move towards "class discussion" led by different groups throughout the term rather than output-driven powerpoint presentations at the end of term.

I conclude by discussing how weekly self-reflections within service-learning courses fits well with CR/NCR assessment or specification grading and frees-up time for instructors to focus on written feedback rather than enumerating marking rubrics. Self-reflections cultivate deeper personal bonds between students and their instructor motivating students through targeted individual feedback. I conclude with some concrete methods for teaching students how to write self-reflections—a skill that should not be assumed.

### **304c – Assessing Lifelong Learning Characteristics Using Students' Written Reflections**

*David Drewery, Centre for the Advancement of Co-operative Education*

*Judene Pretti, Centre for the Advancement of Co-operative Education*

*Bob Sproule, School of Accounting and Finance*

Developing students into “lifelong learners” is an increasingly important goal for post-secondary educators. The literature (e.g., Candy, 1991; Candy, Crebert, & O’Leary, 1994; Knapper & Cropley, 2000) suggests that there are several attributes and skills that characterize lifelong learners, including: epistemic curiosity, proactivity, transfer of knowledge, resilience, and self-reflection. Collectively, these lifelong learning characteristics play an important role in academic contexts and are believed to be desirable from an employability perspective. The challenge for educators is to align curriculum, including teaching and assessment, with these characteristics. In this presentation we focus on one aspect of that challenge, namely the current lack of tools to assess such characteristics. We begin with a review of the literature to characterize lifelong learners and to position lifelong learners’ characteristics in the broader conversation of lifelong learning. We then present a tool – a rubric – that educators can apply to students’ written reflections to assess lifelong learning characteristics. We detail the process through which the rubric was created and discuss opportunities for its use in several scenarios. Insights from the presentation are relevant to those who are interested in developing students into “lifelong learners” and especially to those interested in assessing teaching and learning practices in relation to lifelong learning.

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## **Session 305 – Presentations**

### **305a – Motivating Students with Teaching Resources**

*Steven Forsey, Chemistry*

*Gabriel Lee, Chemistry*

*Jason Thompson, Centre for Teaching Excellence*

The words “Organic Chemistry” can strike fear into the hearts of science students because of its reputation as being one of the most difficult courses that they will encounter at University. The course is difficult because it is a new language that involves not only memorizing nomenclature and terminology but also understanding and applying chemical concepts.

Many students thus come to the first class with a negative mindset and it is up to us, the instructors, to not only motivate students in the class room, but to also provide them with resources that they can utilize to be successful. Many resources and teaching strategies have been introduced into the Introductory Organic Chemistry course at the University of Waterloo, such as, using in-class student response systems, flipping the classroom, in depth course notes with questions that are completed by either the professor or the students, teaching assistants in the classroom, assignments, videos of lectures, and an online interactive textbook.

Comparison of students’ grades from 2004 to 2017 has showed that the introduction of the resources has improved the grades of mid and high performing students. To determine how the resources were being utilized an ethics-board-approved student surveys were performed in the Fall term of 2017, to identify correlations between student performance and their perception of the learning resources. Students were asked to fill out a survey before and after their final exam and their answers and comments were linked to their final grade. We will present the results of the survey and compare how the higher and lower performing students are using each of the resources before and after the final exam. We will conclude by asking the question; how do we motivate the lower performing students to take advantage of these resources and how can we make them better?

### **305b – A Flipped Laboratory: A New Model for Hands on Teaching**

*Julie Goll, Chemistry*

*Laura Ingram, Chemistry*

Undergraduate laboratories provide students with many unique opportunities for experience-based learning. Traditionally, many science labs follow the same format: a short pre-lab assignment or quiz, the in-lab hands on portion, and a formal or informal lab report submitted after the lab. Over the last few years we have become increasingly concerned that this traditional format is not meeting the needs of our students. We have noticed a decline in both student preparedness and knowledge retention, and have observed that many students mechanically follow a stepwise procedure with very little thought or insight into the key concepts being taught.

To address these concerns, we are implementing the flipped-approach in some of our undergraduate chemistry laboratories. In this model, students submit and receive feedback on their lab report prior to the experiment. A significant portion of this pre-lab assignment focuses on experimental design. This format allows us to move away from stepwise procedure manuals, providing students with opportunities to make informed decisions about their experimental design and approach.

Our ultimate goals are to improve student preparedness, comprehension and knowledge retention, while providing students with a more realistic “research-like” experience in the undergraduate laboratories.

In this presentation, we will discuss our flipped model approach that is currently used in a selection of our undergraduate chemistry laboratories, and share both the successes and challenges we have encountered in the implementation of this teaching model.

### **305c – From Evaluating Program Efficacy to Enhancing Student and Instructor Motivation**

*Julia Williams, Renison University College*

*Agnieszka Wolczuk, Renison University College*

In this presentation, we make the link between assessing program efficacy and increased instructor and student motivation. As a communication skills unit dedicated to improving communication outcomes for multilingual English language learners, and embedded in several communication skills initiatives, English Language Studies has undertaken a series of projects designed to evaluate whether course outcomes are being met. Our goal is to build a case for program efficacy that simultaneously provides data to support improved alignment between course objectives and student academic and workplace needs.

We believe that program assessment is a “socially-situated cycle of enquiry, dialogue and action” (Kiely, 2009, p. 99), and triangulation of data from a variety of projects builds the strongest case for program accountability and effectiveness (Fouché, van Dyk, & Butler, 2016). We are also attentive to the conditions that promote transfer of communication skills to disciplinary contexts (James, 2014). Using these frameworks, we have established a systematic approach to program evaluation.

In this presentation, we report on our use of several evaluation tools that produced data indicating which program objectives are fulfilled and what student needs our program could consider in the future. By allowing our students to draw on their academic and work-related experiences and voice their views on how our courses affected their communication abilities, we have been able to fit course design more accurately to students’ disciplinary and workplace needs. In this way, we strive to focus student and instructor motivation.

We conclude our presentation by inviting participants to share their opinions on how program assessment projects can become student and instructor motivational tools.

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## **Session 306 – Presentations**

### **306a – Professional Rapport Strategies to Enhance Motivation, Communication, and Learning Effectiveness in the Classroom**

*Lena Ahmadi, Chemical Engineering*

*Mahdi Abbasi Iranagh, Crosslinx Transit Solutions*

The skill to retain pleasant relationships between students and professors based on affinity is defined as rapport. Rapport does not result in learning, but it certainly helps to create conditions conducive to learning - things like higher motivation, increased comfort, and enhanced communication. Teaching doesn't always result in learning either, but, like rapport, it is one of those factors that can contribute positively to learning. The main objective of this presentation is explaining students-professors rapport, the measurement, and strategies. First, a brief introduction is mentioned about: What is rapport and why it is important to learn to build rapport with your students? How does rapport affect students' consideration of teachers' effectiveness? What do they measure? What are their criteria and challenges? Then, four main strategies of building rapport and higher motivation in the classroom are identified. Moreover, from both students' and professors' perspectives, the values in different strategies resulting in higher motivation, effective learning conditions and their emotional phenomena are discussed. Finally, methods for measuring how successful we are in building rapport in our classroom through KANO methodology are identified. Through all the steps, authors will share the results of their own experiences of before and after employing these strategies in 1st, 2nd, 4th-year undergraduate as well as graduate level classes.

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### **306b – Mens Agitat Molem: From Student-Teacher Rapport to Sincerity**

*Ned Huang, Mechanical and Mechatronics Engineering*

The topic of motivation in today's educational settings has never been more important. In the midst of psychological complexity, rapport between teachers and their students has emerged as a key motivator (e.g., Estep and Roberts 2013). The need to understand how rapport is established along with the associated positive outcomes has fueled the research at a noticeable momentum in the 21st century.

This presentation will illustrate a two-dimensional model (Lowman 1995) for effective teaching. Extending from the two dimensions, intellectual excitement and interpersonal rapport, a summary of recommendations/strategies for teaching large classes based on a literature survey will be discussed. Participant will be engaged in one or two activities to develop their own strategies.

Granitz et. al. (2009) proposed a model where rapport is a medium linking the antecedents and subsequent effects

(benefits). This framework will be modified for leading the participants to the psychological and spiritual realm of education. Personal arguments will be used to demonstrate the importance of authenticity of a teacher's teaching practice.

A list of tools such as rapport scales (e.g., Wilson and Ryan 2013) and recommended readings will be provided. The objective is to motivate the participants to establish rapport with their students and look into their "inner intention" or "sincerity" in their motivation strategies in teaching. Or, in terms of a motivation theory (Ryan and Deci, 2000), teachers need to internalize/integrate values and behaviours and help their students do the same.

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### **306c – Peer interaction as motivating factor in a foreign language online course\***

\*This is a University of Waterloo [LITE grant](#)-funded project

*Grit Liebscher, Germanic and Slavic Studies*

*Ruediger Mueller, School of Language and Literatures, University of Guelph*

*Elizabeth Milne, Germanic and Slavic Studies*

This paper examines aspects of motivation in an online course as part of a project supported by a recent LITE grant entitled "Online language learning to foster transcultural understanding through an overseas collaboration." Combining research and practice-based questions, we focus on the role of peer interactions specifically designed for the intermediate German language course "Interactive German Language and Culture." The learning outcomes of this co-designed online course are intended to lead learners to evaluate critically and negotiate successfully intercultural aspects, differences and similarities, to interpret a variety of texts (news media, music, literature etc.) to identify their implicit and explicit perspectives, and to gain and formulate a sophisticated understanding of German culture and society. Students in the course communicate with each other and with a group of learners of English at a German university via discussion boards and face-to-face channels. We are interested in how these communications may contribute to student motivation and engagement in the course.

We begin with an overview of the course and the conceptualization of certain course elements for motivation, e.g. the communication with speakers in a country of the foreign language's origin. The main part of this paper draws on a qualitative content analysis of the peer interactions, research interviews with students and particular assignments, especially reflection papers. The goal of this analysis is to investigate which aspects of the peer interactions motivate (or demotivate) students. This investigation helps us understand how peer interactions motivate students to take charge of their own learning, an aspect of particular importance in online learning. The analysis will also demonstrate whether and how the focus on the diversity of cultural identities, perspectives, and experiences can be a motivating factor. Our discussion is contextualized through research on motivation in the online environment (e.g. Lee Russell 2013; Price 2016).

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## Session 400s: 3:55 – 4:55 p.m.

### Session 401 – Workshop – Picking Ourselves Up after a Teaching Stumble: An Open Chat

Carolyn MacGregor, Systems Design Engineering

Maud Gorbet, Systems Design Engineering

Igor Ivkovic, Systems Design Engineering

Course evaluations are a reality, and with them comes negative feedback. Whether they do or do not reflect the actual skills of the instructor, the results of course evaluations generate emotional response - from the giddy feeling when scores are better than expected to the self-doubt when scores are low, even when expected. We often forget to acknowledge that instructors, like students, are emotional beings; and both novice and experienced instructors are impacted by negative feedback [1, 2].

There is much in the literature championing the need for care and support for the emotional well-being of students facing academic stumbles and disappointment [e.g. 3]. It is harder to find practical advice on how to provide emotional support and mental health strategies for the instructor who has had a teaching stumble. Teaching stumbles can range from a botched lecture, to an unfortunate interaction with a class, to a series of instructional missteps that translated into a less than favourable collective course experience. One can find advice on how to analyze course evaluations for improving future teaching delivery [1]; however, data analysis does not address emotional impact or feelings of self-doubt after a teaching stumble. Arthur [4] suggests four basic approaches to dealing with negative feedback: blaming, shaming, taming, and reframing - all dealing with rationalization strategies - but not emotional strategies. How can we better acknowledge our emotions and regain motivation after a teaching incident or a course evaluation catastrophe?

Join us for an Open Chat session to share personal stories, practical tips, and reality checks based on over twenty years of teaching. From the good, the bad, and the ugly, we hope to get you sharing, thinking, laughing, and contributing to positive paths forward.

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### Session 402 – Panel – What is Problem-Based Learning?

*Jeff Nagge, School of Pharmacy*

*Oscar Nespoli, Mechanical and Mechatronics Engineering*

*Steve Balaban, School of Accounting and Finance*

*Scott Anderson, Centre for Teaching Excellence*

A review of the literature reveals that Problem-Based Learning (PBL) lacks one single agreed upon definition (Barrows, 1986; Harden and Davis, 1998; Hung 2011). Despite the many flavours of PBL, it can be very succinctly defined as “an active learning method based on the use of ill-structured problems as a stimulus for learning” (Hmelo-Silver & Barrows, 2006; taken from Barrows, 2000). PBL encourages students to take responsibility for

their learning and be self directed as they explore authentic, messy real-world problems.

In this session, we will focus on Closed-Loop Problem-Based Learning (CL-PBL) the type of PBL used by McMaster Medical School, a PBL pioneer. CL-PBL involves small groups of students being presented with an ill structured problem, they identify issues they do not understand, research those issues individually (outside of class), and in the next class discuss their findings, reflect on their learning and provide feedback to each other. We will define what Closed-Loop PBL is and what it isn't, how it differs from Case-Based Learning, resources required to support CL-PBL and consider ways to move towards integrating Closed-Loop Problem-Based Learning into courses. We will also share how students have reacted and performed and been motivated using this different method.

Three instructors from different disciplines and with varying degrees of experience using closed-loop PBL will share their experience and expertise. Jeff Nagge will share his many years of experience with CL-PBL ranging from participation in PBL as a student to integrating CL-PBL in his Pharmacy course. Oscar Nespoli will review his use of Case-Based Learning and his motivation for moving more towards CL-PBL in Engineering. Steve Balaban will tell us about his first attempt at moving towards CL-PBL in an Accounting and Finance course and his experience developing a new course using CL-PBL with Scott Anderson.

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## Session 403 – Presentations

### 403a – Can assignments using social media outside of the classroom enhance student learning and instructor engagement?\*

\*This is a University of Waterloo [LITE grant](#)-funded project

*Miriam Price, School of Public Health and Health Systems*

*Karla Boluk, Recreation and Leisure Studies*

*Elena Neiterman, School of Public Health and Health Systems*

*Sharon Kirkpatrick, School of Public Health and Health Systems*

Social media has been identified as a potentially promising means of supporting learning among students. Our objective was to examine whether students in a large public health nutrition course perceived that a multi-stage Twitter assignment fostered their learning. In fall 2016, 146 students participated in the image-driven assignment, rotating between 1) posting images and captions illustrating interactions with the food system and 2) responding to their classmates' posts. Posts were identified using the hashtag "URWhatUTweet". Select tweets were displayed in class to demonstrate application of concepts. Subsequently, students completed reflections on the influence of the assignment (if any) on their learning; 115 students provided consent for their reflections to be analyzed. Thematic analysis revealed that some students felt the assignment encouraged them to revisit course materials; one student noted: "It's not often that I comb through course content looking for connections [...], but this activity fostered an active and engaged mindset with the concepts we covered...". Students indicated they interacted with one another in ways that helped make concepts, such as the cultural aspects of food, 'real'. However, other



students indicated that the assignment did not make a meaningful contribution to their learning; for example, because they felt unable to demonstrate critical thinking in 140 characters or perceived the content of the posts to lack depth. Examination of the posts will be conducted to assess whether the degree of critical thinking illustrated increased over the course of the term. From the instructor perspective, gathered via a semi-structured interview, the assignment enhanced feelings of connectedness with students, but significant participation and ongoing feedback was critical to foster meaningful engagement. Our analysis provides evidence that social media can foster application of course concepts, at least for some students, but its use to enhance teaching and learning is not without its challenges.

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## 403b – Incorporating Virtual Reality into Classroom Design

*Yousef Sawires, Electrical and Computer Engineering*

*Monisha Naik, Mechanical and Mechatronics Engineering*

*Elaine Huang, Systems Design Engineering*

*David Wang, Electrical & Computer Engineering*

Universities are starting to recognize the importance of classroom design and its impact on learning [1]. As education pedagogy undergoes a revolution with respect to teaching methods, the need has increased to build new classrooms or renovate old classrooms to reflect these changes. Finkelstein et al in [2] provides an overview of principles for designing such spaces. Some of the key principles, inspired by the National Survey of Student Engagement [3], are that these classrooms should help actively engage students with the content (eg. using appropriate technology), permit both collaborative and individual work, allow faculty-student interaction and allow High Impact Practices (such as flipped classrooms). The key influencing factors were identified as the layout of the room, the furniture, the technology, the acoustics and the lighting/colour of the classroom [2].

As classrooms are constructed, these key factors can greatly influence the learning potential of the space.

Mistakes are costly after the construction of a teaching space is completed. These can occur because it is difficult to translate blueprints and pictures of furniture/seating into the reality of having to work or learn within the completed teaching space.

The Teaching and Learning Space Committee at the University of Waterloo has been studying the use of Virtual Reality (VR) as part of the classroom design process. Building the virtual classroom is a cost effective way to actually experience the classroom. The VR simulator allows all the above key factors to be manipulated. The use of a VR simulation makes it easier for all stakeholders to participate in giving feedback about the classroom design at any stage, allowing changes to be made and implemented without virtually any cost incurred.

This presentation will demonstrate the case study of a classroom at the University of Waterloo which is currently under construction, Biology 350. An inexpensive VR google paired with an Android phone will be used to demonstrate the efficacy of using this technology to validate classrooms. Making changes in the key factors will be demonstrated. It will be demonstrated how to implement simple changes in the classroom in the virtual reality environment and the usefulness of being able to visualize and hear in the virtual classroom before the physical space is constructed.

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### **403c- Integrating academic integrity education in the curriculum: Motivating students to learn with mobile technology**

*Amanda McKenzie, Office of Academic Integrity*  
*Alice Schmidt Hanbidge, Renison University College*  
*Tony Tin, Renison University College*  
*Kyle Scholz, Centre for Teaching Excellence*

Engaging students and instructors in academic integrity (AI) education is of widespread concern to the quality of post-secondary education. Universities often struggle to determine the best way to introduce tenets of academic integrity into pedagogical content. Although many institutions rely on instructors to educate learners about academic integrity (Bertram Gallant, 2011), the inconsistency and quality of this instruction is questionable. Furthermore, AI education should progress beyond simple recall of factual information, and instead be engaging, immersive, and provide immediate feedback to learners (East, 2016).

To address this challenge, we developed an open access, mobile e-learning AI tool, supported by an eCampusOntario grant. The AI tool encourages integrity through foundational value-based active learning to inspire change that supports student success. Six AI lessons aim to educate students about the values of honesty, trust, respect, responsibility, fairness and courage that form the basis of academic integrity (The Fundamental Values of Academic Integrity, 2014). Lesson content, applicable across post-secondary institutions, includes diverse student life scenarios, animated videos and interactive exercises.

In this presentation participants will have an opportunity to try out the mobile academic integrity application with their own cellphone. Afterwards, through a guided discussion, participants will consider approaches to implement the study of AI (assisted by the use of the mobile application) directly into their own courses or a broader program-wide curriculum. Considerations include whether or not the AI modules are directly embedded into the course, or a particular assignment, or if the motivational features of the app are sufficient to encourage students to complete their academic integrity training outside of the classroom context. Our intention is to make the integration of AI less of an unknown factor, and instead one that can directly benefit an instructor and help students be better prepared and motivated to meet the demands of higher education.

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## **Session 404 – Presentations**

### **404a – How developing an online course impacts face-to-face teaching**

*Emily Christofides, Library*

*Aldo Caputo, Centre for Extended Learning*

*Domenica De Pasquale, Centre for Extended Learning*

The literature on online learning examines a number of impacts of online programming including the academic impact on students (Siemens, Gasevic, & Dawson, 2015), ability of online learning to support access to post-secondary education (Lee, 2017; Shah, Goode, West, & Clark, 2014), and practices to improve the effectiveness of online instruction (Garrison & Cleveland-Innes, 2005). However, relatively little research explores the ways that developing and teaching online courses impacts instructors. Our research examined the broad impacts of online learning at Waterloo, drawing from program evaluation theory and using a mixed-methods approach. This presentation will focus on some of the impacts that are specific to course authors and instructors, as discovered through in-depth interviews and a survey. The survey questions gathered data such as the impact of teaching online on development of teaching abilities and instructors' feelings about being able to teach effectively online. We analyzed the qualitative data from the interviews and open-ended questions in the survey for themes relating to impacts of online teaching and course development more broadly. Course authors described the process of online course development as more time consuming than expected, which can be challenging if unexpected. However, this preparation process also resulted in certain benefits. Specifically, when authors developed their online course, they thought through the content in much more detail in advance. This more considered approach, while taking more time, led them to think more explicitly about pedagogy and the alignment between learning outcomes, course materials, and assessments, leading to a well-designed course. Additional benefits to instructors included: 1) ability to reuse online strategies and materials in a face-to-face context, 2) acquisition of transferable knowledge of course design and technology, and 3) feeling well-supported through course development and teaching. We will discuss the impact these experiences and benefits have on overall instructor motivation.

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### **404b – Blended, Interprofessional Model Addresses Harassment in Experiential Settings\***

\*This is a University of Waterloo [LITE grant](#)-funded project

*Elaine Lillie, School of Pharmacy*

*Margo Mountjoy, School of Medicine, McMaster University*

Sharing data from a pilot providing healthcare students with instruction about harassment, the presentation will offer participants lessons about the relevance of the content and desirability of a blended learning approach. Graduation survey data and anecdotal reports at Waterloo Pharmacy and McMaster School of Medicine identified clinical practice environments as particularly prone to harassing behaviors. Supported by a LITE grant, the schools partnered to create a blended learning program to offer tools and increase knowledge, confidence and positive attitudes towards proactively managing harassment. An online module was accompanied by a workshop featuring cases and a resident sharing her story.

Patterns of abuse in healthcare education are well documented. Research confirms that healthcare students experience harassment in clinical placement settings, often without reporting it (AFMC 2016, Rees et al., 2014). Mistreatment in training is associated with negative impacts on mental health, higher levels of burnout, and even

symptoms of post-traumatic stress disorder (Cook et al., 2014). These outcomes can have a significant demotivating influence on student performance and aspirations.

Surveys and a focus group provided data about learner response to the module and workshop. 86% of respondents reported feeling more confident in seeking support and 93% agreed that they have a greater understanding of the impacts of harassment. Students from both programs appreciated the opportunity for interdisciplinary discussion that promoted sharing common experiences.

While the pilot's focus is medical and pharmacy learners, the intention is to share the module with other programs. The emergence of "Me Too", anti-bullying and similar movements makes the discussion timely for all educators and students. The Q&A section will ask audience members to consider where their students are vulnerable, what reporting mechanisms are in place, and how availability of supports can motivate our students.

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### **404c- A Study of Blended Learning in a First-Year Chemistry for Engineers Course\***

\*This is a University of Waterloo [LITE grant](#)-funded project

*Jason Grove, Chemical Engineering*

*Eline Boghaert, Chemical Engineering*

Chemistry for Engineers is an introductory chemistry course taken by most incoming engineering students. The course has been redeveloped in a blended format (with pre-class study material delivered online) in an effort to: i) create time for more valuable instructor–student interactions, allowing the instructor to reinforce challenging concepts, focus on problem-solving strategies and lead experiential learning activities, and, ii) allow students to explore content at their own pace, thereby accommodating the diversity of students' high-school chemistry preparation. Our study aims to compare and contrast student experience, satisfaction and performance between a blended learning and traditional lecture model of instruction through data from surveys and grades.

A 2016 pilot study using a mixed blended/traditional format motivated several significant changes for the 2017 offering; in particular: i) more careful and explicit communication around the course format, its rationale, and student expectations each week, and, ii) tailoring of the in-class content based on student responses to reflection questions submitted prior to class. During Fall 2017, four instructors teaching five of the twelve lecture sections of the course used a blended learning model for the entire course.

Preliminary analysis indicates no substantial difference in course performance (based on grades) as a result of the mode of instruction. Student satisfaction with the blended format was mixed. The instructors felt that the implementation was much improved and encountered much less student resistance. One major weakness of the blended model is the capacity of students for self-directed learning and we have identified a need for the course to address metacognitive outcomes – in essence, the course needs to provide support to help students "learn how to learn". Detailed analysis will be available by the time of the conference.

## **Session 405 – Presentations**

### **405a – Motivation in Mathematics: Motivational Strategies for Post-Secondary Math Classes**

*Nickolas Rollick, Pure Mathematics*

University-level math offers a unique set of motivational challenges. The increased emphasis on abstraction, formality, and rigorous proof often leaves students struggling to see the value of course content. In addition, many students enter university lacking strategies for being resilient in the face of mathematical setbacks.

The strategies outlined in the research literature addressing these motivational deficits may be grouped into three families: instructor-centred, student-centred, and history-based. Amongst the instructor-centred strategies, we highlight the responsibility of instructors to "model" the behavior of professional mathematicians as accurately as possible, showing students that mistakes are commonplace, and demonstrating what resiliency in problem-solving looks like. From the student-centred strategies, we single out techniques for encouraging student metacognition, leading our students toward setting attainable learning goals and identifying personally relevant reasons to value course content. As for the history-based methods, we focus on two quantitative quasi-experiments demonstrating the academic benefits of introducing historical anecdotes and "struggle stories" of famous figures from the subject area.

Although this research is drawn specifically from the observations of mathematics educators, these strategies are applicable far beyond mathematics. The ideas behind this discussion will be useful in any discipline where student resiliency is lacking, and seeing the "bigger picture" behind course material is difficult. As such, instructors from a wide range of backgrounds will find something to take away from the discussion.

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## **405b – Writing Outside the Discipline: Math Students, Communication Instruction, and Literary Analysis**

*Fraser Easton, English Language and Literature*

It is a common practice at many universities for students in STEM disciplines to be offered communication courses tailored to the kinds of writing required by their professions: technical reports for engineering students, actuarial reports for actuarial students, and lab reports for science students. A strong case can be made for the importance of teaching STEM students these sorts of genres. Such courses fill a practical need, and it makes sense that if a student is going to have to do a lot of a certain kind of writing, the student should practice it.

In this presentation, however, I want to suggest that we can do more to motivate the learning of our STEM students. In addition to offering instruction in writing within the discipline, opportunities to write outside the discipline may (counter-intuitively) motivate improved student learning. I will argue this by discussing my teaching practice in sections of "ENGL 109: Introduction to Academic Writing" offered as part of the Math Faculty's communication initiative. I will review the major writing assignments my students undertake--an argument, a research report, and a literary analysis (a comparison of two sonnets)--and discuss student attitudes to each as expressed in class discussion, in course questionnaires, and in the final portfolio. Why, I will ask, is the literary analysis assignment the one most frequently included in the final portfolio? Why do many students write about enjoying it the most in their questionnaires? Based on a review of how the literary analysis assignment is structured, presented, and executed, as well as its place in the course as a whole, I will argue that literary analysis, rather than detracting from disciplinary learning, can both enhance it and motivate student learners in the writing and communication classroom.

## **405c – Creating comics for the classroom**

*Giuseppe Sellaroli, Applied Mathematics*

*Amanda Garcia, Systems Design Engineering*

Sequential art (e.g., comics and graphic novels) has been shown in empirical studies to be beneficial to learner understanding and motivation in fields as diverse as medicine [1], management [2], biology [3,4], and chemical engineering [5]. According to dual coding theory, presenting information in a way that engages both verbal and non-verbal systems improves its comprehension and retention [6]; the comic medium naturally lends itself to this multi-modal stimulation.

The goal of this presentation is to help participants develop an appreciation for the potential of this lesser-known pedagogical tool. The main learning outcome is for participants to be able to identify some of the pedagogical advantages of comics.

The presentation will review some of the relevant literature regarding the use of comics in classrooms. Examples from the literature as well as from the authors' personal experiences will highlight the benefits of comics both as learning tools and as positive influences on the students' attitudes towards course content. Specific examples of comics created for mathematics courses at the University of Waterloo by the presenters will be shown [7]; student feedback and preliminary empirical data will also be discussed.

A list of useful hardware/software resources will be provided to the participants to help them create their own comics. Individuals from all faculties and disciplines are welcome. No artistic skills or experience required!

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## **Poster Session: 4:55 - 5:55 p.m.**

### **501 – You're a novice, I'm an expert: Individual differences matter when applying learning strategies**

*Yichu Zhou, Psychology*

*Colin MacLeod, Psychology*

Novice learners—people who have no prior knowledge of the topic at hand—experience high working memory load as they try to learn new information and integrate it with their existing knowledge. Learning strategies directed toward novice learners should therefore offer a high degree of guidance to reduce their cognitive load during encoding. In contrast, using the same strategies for expert learners—people who already possess some background knowledge about the topic at hand—may interfere with their integration process: If the experts' existing knowledge is not taken into account, too much guidance will reduce automatic processing and increase extraneous cognitive load. The current educational literature as well as teaching practices do not always account for these knowledge differences. Recent evidence suggests that, relative to testing, simply restudying the information at hand benefits encoding for novice learners whereas the opposite was true for expert learners (i.e. only expert learners showed a testing effect). Presumably, testing does not offer enough guidance for the novice learners. The present study aims to extend these results by examining how people learn computer programming. We predict that, after initial learning, novice learners will perform better on a subsequent test if they restudy the information relative to completing a practice test, whereas the opposite will be true for expert learners. Individual differences matter: Additional study helps novices to acquire the information; additional retrieval helps experts to recover the information.

### **502 – Motivating Factors for Students' Involvement in Professional Development Activities**

*Grant Stebner, Psychology*

*John Michela, Psychology*

Employability skills such as for communication, teamwork, and problem solving are highly valued by employers and their professional associations. CPA Canada (2012) calls such skills “enabling competencies,” distinct from technical competencies for accounting work. However, “only about one-quarter of four-year college graduates are perceived to be excellent in many of the most important [employability] skills” (Casner-Lotto & Barrington, 2006). Such shortcomings of undergraduates exist specifically in professional fields including accounting (Kavanagh & Drennan, 2008) and engineering (Sid Nair et al., 2009).

Undergraduates' development of these competencies necessarily is a long-term, effortful matter, given even lower levels of proficiency upon entry to university (Casner-Lotto & Barrington, 2006) and given these skills' or

competencies' complex nature. In professionally oriented programs, where students may feel they must focus all their efforts on acquiring technical competencies, time and focus for development of other (e.g., enabling) competencies readily may suffer. While some students may intrinsically enjoy such development, others will require considerable motivation specifically toward it.

Our poster describes a theoretical model, in the form of a path diagram, which identifies key factors in motivation for competency development. The model integrates two "cognitive" theories of motivation—Bandura's (1986) Social Cognitive Theory and Vroom's (1964) Expectancy Theory. A student's motivation towards a prescribed professional development behaviour (e.g., attending an available workshop) is a function of (a) her self-efficacy for that specific behaviour, (b) how effective she expects the developmental behaviour to be and how capable she feels of developing the targeted competency, (c) her perceived utility of that competency as a means toward achieving desired career outcomes, and finally (d) how strongly she values that ultimate career outcome.

The poster also describes implications of these factors for educators' practice, again using and extending prior work that applies cognitive-motivational theory to learning and development.

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### **503 – Beyond the "Right" Answer – Motivating Students through Problem-Based Learning**

*Alison Scott, Chemical Engineering*

What motivates engineering students? The primary motivation often seems to be obtaining high marks, which can only be achieved by getting the "right" answer. However, in focusing on the final result, students often ignore (or undervalue) the rest of the solution process.

Problem-based learning (PBL) encourages students to take ownership of their education, so that they see learning as a continuous process. Open-ended engineering questions shift students' focus to the solution procedure; the final answer is only one small component. Additionally, PBL provides immediate application of key concepts; real-life relevance acts as a motivator for many engineering students. Although student motivation is difficult to measure, the MUSIC Model of Motivation suggests that students are more motivated when they are eMpowered, content is Useful, they can be Successful, they are Interested in the outcome, and they feel Cared for by their instructors (Jones, 2009).

In looking at this list of motivating factors, the majority are addressed by PBL. Students are empowered to make their own decisions throughout the solution process. They can immediately see the usefulness of PBL, especially since course content may be extremely interactive. When students have a good understanding of the problem (and appropriate opportunities for feedback along the way), they are able to visualize steps for success. Hopefully, the real-life relevance will improve student interest in the course content. Finally, regular check-ins with the course instructor will ensure that the students feel cared for; their instructor is available to help them succeed.



Increasing student motivation is only one of many benefits of PBL (Woods, 2012). By increasing motivation, students may be more inclined to engage throughout the learning process, thus focusing on the entire solution process. Instructors can use PBL to encourage their students to look beyond the “right” answer.

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### **504 – Overcoming Challenges of Independent Team Projects in an Ecology Laboratory Course**

*Kateri Salk, Earth and Environmental Science*

Team projects help students develop key skills in inquiry, cooperation, and application of disciplinary concepts. Facilitation by the instructor is a key component of successful projects, yet instructors often fall short in this role (Chapman and van Auken 2001). This presentation focuses on the challenges faced by upper-level undergraduate students in an independent team project for an ecology laboratory course and the strategies employed by instructors to overcome these challenges. The general objective for the independent team project was to employ disciplinary concepts and practices in a research project conducted from start to finish. Feedback from 16 groups of 3-5 students was collected through formative and summative assessments, namely informal group consultations, peer reviews, and course evaluations. Data were analyzed qualitatively and evaluated with respect to existing and supplemental facilitation tools. The challenges students encountered throughout their projects generally fell into four categories: (1) perceiving the value of independent projects, (2) project management, (3) interpersonal interactions, and (4) reconciling disparate goals. Several strategies were employed by instructors to overcome these challenges, some of which were already included in the curriculum and others that were developed for projects in subsequent semesters. A key strategy related to logistical support, providing structure (e.g., deadlines, team contracts, rubrics, check-ins) without stifling student creativity. An additional strategy created opportunities for students to reflect on their progress while promoting accountability, which was achieved through low-stakes informal assessments completed in a collaborative setting. These strategies are consistent with studies in other disciplines (Hye-Jung et al. 2012, Brame and Biel 2015), demonstrating the value of these tools across the undergraduate curriculum. Overall, while challenges still persisted during the course of independent group projects, the strategies employed by instructors allowed students to more effectively develop skills and practices relevant for a wide range of educational and career goals.

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### **505 – "Breaking" Under Pressure: The Effects of the Fall Break on Student Stress**

*Ashley Avarino, McMaster University*

*Alyssa Smith, Psychology*

*Heather Poole, Psychology, University of Ottawa*

*Ayesha Khan, Science, McMaster University*

*Jamie Sheidow, McMaster University*

Undergraduate student stress and mental health disorders have increased significantly in recent years at universities across Canada (American College Health Association, 2016). Stress and mental health disorders impact students' ability and motivation to learn: student stress negatively impacts academic success (Ahern & Norris, 2011), while decreased motivation may manifest as a result of mental health disorders such as depression (Smith, 2013). In 2015, McMaster University implemented a week-long Fall Break as an intervention to support student mental health and reduce stress. The University of Ottawa and the University of Waterloo also have Fall Breaks within their academic calendars, however their length and timing differs from McMaster. While McMaster's break is a week long, Waterloo's pilot Fall Break is two days. Meanwhile, the University of Ottawa offers their week-long Fall Break approximately two weeks later than McMaster's. Our aim is to evaluate the effectiveness of the Fall Break on reducing student stress and to investigate whether it differs by scheduling. Students were administered an online survey before and after the Fall Break which assessed two measures of stress: the number of stressors that students experienced and their perceived level of stress. Across universities, students reported fewer stressors following the break. Additionally, perceived stress levels slightly differed following the break, however perceived stress at each institution did not decrease significantly. These findings have implications for students and instructors, as well as for administration and support staff who are responsible for developing the academic calendar. Given the widespread adoption of the Fall Break, it is pivotal to discuss how the Fall Break is currently impacting student stress, and possible strategies to improve the effects of the Fall Break on student stress moving forward.

## **506 – Fall reading breaks: A first step in supporting student stress and well-being**

*Amanda Stypulkowski, McMaster University*

*Heather Poole, Psychology, University of Ottawa*

*Ayesha Khan, Science, McMaster University*

Recent reports suggest an increasing prevalence of anxiety, depression and suicide among post-secondary students in Ontario (1). Mental health among university students represents an important challenge for academic success, with mental health conditions associated with lowered GPAs and higher dropout rates (2). In recent years, many post-secondary institutions across Canada have implemented fall reading breaks to support mental health and well-being among students (3). Our study investigated how students' self-reported social network corresponded to stress levels before and after a fall reading break at three Canadian universities. The buffering hypothesis refers to the protective effect that social support has on psychological well-being, whereby positive social supports can minimize or eliminate the negative effects of psychological distress including stress, anxiety and depression (4). Consistent with the buffering hypothesis (4), it was predicted that students who reported being adequately- or well-connected would have lower levels of perceived stress compared to students who felt disconnected or those who preferred to be alone. Results from mixed-design ANOVA (N=598) revealed that while fewer stressors were reported post-break than pre-break, perceived stress did not decrease. Social network interacted with these effects. Socially-disconnected students reported more stressors than those who reported feeling adequately-connected or who preferred to be alone. Furthermore, socially disconnected students reported higher perceived stress than adequately- or well-connected students. These effects were observed at McMaster University and the University of Waterloo despite differences in the length of their fall reading breaks. Two major implications follow: 1) fall reading breaks are not sufficient to fully support students' mental well-being. Universities need to further foster resiliency and support student success around academic breaks. 2) Such strategies should target subgroups which are vulnerable for social isolation, as they may be more greatly affected by stress than their well-connected peers.

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## **507 – Work book based flipped classroom implementation for introductory physics.**

*Joseph Sanderson, Physics and Astronomy*

*Firas Mansour, Physics and Astronomy*

A flipped classroom can be achieved in a number of ways, generally online material in the form of introductory lecture modules are the starting point, with a variety of in class activities taking the place of traditional lectures. The aims of the in class activities is to stimulate active learning through exercises, demonstrations and discussions. Deslauriers et al [1] found a significant increase in conventional examination performance for students from a flipped classroom compared to those from a traditional approach.

The part that the flipped approach plays in increasing student motivation has been less well studied, but it seems plausible that by bringing the real learning segment of a course into class and increasing the social aspect compared to the traditional model, which involves sitting in a library or study space to review lecture material before embarking on problem solving, it may be that the flipped approach motivates through peer-pressure. Even less focus has been put on their class materials for a flipped classroom, indeed it is difficult to find a recipe for the activities which should fill the lecture time.

In an effort to provide a sound and conveniently accessed base of challenging exercises, designed to stimulate an enquiring attitude amongst students and importantly motivate skeptical instructors to become involved in flipped classroom delivery, we have produced a work book for the first-year course Physics 111, an introduction to Classical Mechanics for the bio sciences. We will describe some of the exercises, their pedagogical inspiration, and include comments from students enrolled in the course as well as instructor and potential instructors who have sat in or participated in the classroom activities.

## **508 – The Science Library Project: Making and Using Children’s Literature as a High Impact Practice (HIP) for Non-major STEM Courses**

*Sarah E. Ruffell, Biology, University of Pittsburgh*

*Tommy Mayberry, Centre for Teaching Excellence*

To emphasize the importance of public outreach and science communication within Biology, and to foster in students a greater understanding and appreciation of the scientific content within their courses, the Science Library Project at the University of Pittsburgh had students creating children’s books about key course content. At the Fall 2017 end of the project’s pilot, 15 books were placed in classrooms within 9 different schools in Pennsylvania, and the student writer-publishers displayed their critical and creative work as they collaborated with local teachers in networked conversations about science and multimodal communication. Dr. Sarah Ruffell, as course instructor, formally evaluated the book projects, and the local school teachers often asked for more copies for their classrooms and even to add their classroom curriculum. This innovative pedagogical approach to assessment is important inside and outside of the Sciences because it participates in High Impact Practice (HIP) pedagogy. Among other key HIP characteristics, the Science Library Project has students invest a significant amount of time and effort over an extended period of time, participate in frequent, timely and constructive feedback, and, most importantly for this project, have the opportunity to discover the relevance of their learning through real-world applications in public demonstration of their projects (Kuh et. al. 2013). Other scholarship also shows that engaging students via multimodal communication methods improves their retention (Clark and Paivio 1991) and that graphic books have a positive impact on students’ knowledge and attitude scores (Holser and Boomer 2011). Our poster shares our approach to creating and implementing the Science Library Project for Undergraduate education that has important and exciting potential outside of Science as well. The communication

modes the Science Library Project activates motivate Science learners to engage with course concepts in deeper and creative ways, and this motivation can be harnessed across the disciplines.

## **509 – Second Chance on Learning?: Impacts of Bonus Exercises on Student Learning and Behaviour**

*Hossam Amer, Electrical and Computer Engineering*

The use of extra credit assignments (ECA) and bonus points has been a hotly debated topic in the teaching literature. Instructors who consider this practice are faced with questions such as, Which type of students benefit from extra credit/bonus exercises? Do ECA affect student learning and motivation? In the following paragraphs, we provide a synopsis of the literature about these two questions and state this proposal objective.

The research on ECA suggest that student interest in the course is a key variable for determining whether these exercises are effective. For example, [1] states that students interested in bonus exercises are the ones who are already doing well in the course and motivated enough to get even better grades.

Several research studies linking ECA and motivation suggest that ECA have a positive impact on student learning and behaviour. For example, bonus exercises encourage students to deepen their understanding and be more serious about their learning [2]. Along the same lines, ECA are opportunities for students to increase their practical knowledge in certain contexts. For instance, [3] states that students were very satisfied with practically applying the concepts they learn in extra projects. Bonus exercises may, however, train students to seek grades over learning [4]. In addition, these exercises may lead to students procrastinating their work because they think that exercises are more difficult [5]. Also, according to [6], bonus exercises improved the overall grades but these exercises did not impact student motivation.

As seen in the literature, bonus exercises are suitable for some students and impact student overall learning experience, which are not well-studied. Thus, in this proposal, we aim at studying these effects and sharing some research-based practices discussing in engineering education literature in order to stimulate a discussion about the value and effectiveness of this practice.

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## **510 – Keeping the Learner Interested in Class: Engaging Students with Clickers**

*Nagham Mohammad, Statistics and Actuarial Science*

*Dina Dawoud, Statistics and Actuarial Science*

*Diana Skrzydlo, Statistics and Actuarial Science*

In these current times, students are becoming more technology-dependent, which can cause students to have their attention divided among several things at the same time. As instructors, this presents a challenge since losing

focus can often be demotivating for a student. As their attention drops and gaps in knowledge occur, trying to connect the information heard at the start and end of a lecture can cause students distress and decrease motivation.

Our hypothesis is that incorporating technology into the class through the use of a handheld classroom response system (often referred to as “clickers”) will help students stay active in class which in turn will help maintain their attention during the lecture and will reduce the knowledge gap. Collectively we hypothesize that such a strategy will keep the students engaged and motivated. In addition, it allows us, as the instructors, to stay in tune with the concepts that students are able to grasp quickly and those that require further clarification. It also gives us the opportunity to incorporate questions designed to create thought and discussion which we often find creates more intrigue and excitement around the course material.

We performed two studies to test this hypothesis: the first is an observational study and the second is an experiment. We analysed the feedback and findings from a questionnaire based survey of students’ experience and perceptions of the use of clickers across two introductory Statistics and Probability courses at the University of Waterloo. In our second study we compared the final grades of students in different years to study the effect of clickers on their performance.

This poster will show our findings of both studies. These two studies are aimed at providing recommendations to help overcome some of the drawbacks, while amplifying the benefits of clickers.

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## **511 – The effectiveness of in-class response systems in enhancing student learning and engagement**

*Melissa Paquette-Smith, Psychology, University of Toronto*

One of the greatest challenges in teaching large lecture-style classes is to keep students engaged. In recent years, many instructors have begun to use in-class response systems to make lectures more interactive. Although, the use of response systems can vary widely from class to class, generally students report that they have a positive impact on their learning and engagement (Fies & Marshall, 2006). In this project, I examined how student attitudes towards in-class response systems and the frequency of their use might relate to learning outcomes. As part of an Introduction to Developmental Psychology class, students used an in-class response system to answer approximately five multiple choice, matching, or short answer questions during each lecture. Qualitative and quantitative data on the effectiveness of this platform were collected within the framework of quality assurance/assessment (N = 34 respondents). Similar to previous work, most students reported that the in-class response system was beneficial. Over 80% of the students sampled thought that the platform increased their learning and made them more engaged and attentive in the classroom. However, preliminary analysis of the quantitative data suggested that student’s use of the platform (i.e., the number of questions they answered) did not predict their final grades,  $b = .045$ ,  $SE = .298$ ,  $t(31) = 0.151$ ,  $p = .881$  (while controlling for cGPA). The degree to which the students thought that the in-class system improved their engagement seem to be a better predictor of their performance in the course,  $b = 2.75$ ,  $SE = .441$ ,  $t(31) = 5.83$ ,  $p = .039$ . This could suggest that individual differences in student’s perceptions of the effectiveness of teaching technology might play an important role in motivation and learning. Future work should investigate how fostering positive attitudes towards in-class response systems might increase their effectiveness in the classroom.

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## **512 – The effectiveness of an online practice grading exercise on student lab test performance**

*Melissa Paquette-Smith, Psychology, University of Toronto*

*Jeffrey Graham, Psychology, University of Toronto*

Students are more motivated to perform well in classes when grading is perceived to be fair (Chory-Assad, 2002). The goal of this project was to increase grading transparency and promote reflection on course material by training 1st year psychology students to use a grading key to evaluate sample lab test responses. Feedback was provided to students on how accurate their evaluations were relative to an experienced grader. The data for this project was collected within the framework of quality assessment/assurance and was used to examine: 1) whether students' accuracy in grading predicts performance on lab tests and 2) whether training students to think like 'graders' improves their understanding of course material. Compared to an experienced grader, students were more generous in evaluating lower-scoring responses,  $t(694) = 26.52$ ,  $p < .001$  and more punitive in evaluating higher-scoring responses,  $t(694) = -19.90$ ,  $p < .001$ . In line with our predictions, student's accuracy in assessing the sample responses predicted their performance on a subsequent lab test (while controlling for attendance and course grades),  $b = -.686$ ,  $SE = .34$ ,  $t(593) = -2.02$ ,  $p = .04$ . This could indicate that students with better metacognitive abilities may be more able to reflect on their own responses, but can this ability be taught? To address this, we compared the 597 students that completed the task to the 114 students that did not. Students who completed the task seemed to perform slightly better on test questions that were conceptually related to the questions they graded (controlling for attendance and course grades),  $F(1,707) = 3.34$ ,  $p = .068$ . The task had no impact on their performance on unrelated questions,  $F(1,707) = .098$ ,  $p = .754$ . Future work will explore whether training students to grade a broader range of questions might improve their ability to understand and reflect on course content.

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## **513 – Tackling weight-based stigma in the classroom: Pilot project findings and future directions**

*Amanda Raffoul, School of Public Health and Health Systems*

*Rachel Acton, School of Public Health and Health Systems*

*Kirsten Lee, School of Public Health and Health Systems*

*Katie Burns, School of Public Health and Health Systems*

*Katelyn Godin, School of Public Health and Health Systems*

Weight bias and discrimination are highly pervasive; they are evident in the education, legal, and healthcare systems, and are reinforced in everyday interactions between individuals. The high prevalence of weight bias and discrimination, coupled with their associated consequences, underscores the need for initiatives to equip students with the knowledge and tools to actively tackle this important social problem in their personal and professional lives.

Across departments, many undergraduate courses include topics related to weight and obesity and its diverse determinants. However, there has been a glaring lack of attention to weight bias as a pressing public health concern within course curricula at the University of Waterloo (UW), even within the applied health and social sciences.

In Fall 2017, the Canadian Obesity Network – Students and New Professionals (CON-SNP) chapter at UW developed a pilot educational module to educate first-year undergraduate students in the School of Public Health and Health Systems on the gravity and implications of weight bias and stigma. The module was designed for an introductory health course (HLTH 101) and comprised two elements:

1. A guest lecture delivered to approximately 350 undergraduate students by two CON-SNP executive members/PhD students; and,

2. Complementary facilitated small-group discussions that took place in HLTH 101 tutorials, facilitated by teaching assistants following some initial training on what types of questions to expect from students and how to effectively facilitate discussion.

We received overwhelmingly positive feedback from the students, teaching assistants, and course instructor, highlighting the success of the pilot project and opportunity for expansion and adaptation to other contexts. This presentation will highlight potential next steps for this pilot project, including capacity-building to increase the sustainability of weight bias-focused content in courses offered at UW, and how this educational module format can be applied to address other challenging topics in university courses.

### **514 – Measuring the value of including experiential opportunities as part of a blended learning continuing professional development program for prospective providers of anticoagulation services\***

\*This is a University of Waterloo [LITE grant](#)-funded project

*Jeff Nagge, School of Pharmacy*

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*Marie Lippens, Centre for Extended Learning*

**Background:** In 2007, a blended learning Continuing Professional Development (CPD) course was launched in partnership between the School of Pharmacy and the Centre for Extended Learning. The Management of Oral Anticoagulation Therapy (MOAT) course was developed for practicing pharmacists, nurses and nurse practitioners who wanted to provide anticoagulation services in community settings. The course is delivered by combining self-paced, online learning with experiential training opportunities during which learners apply their knowledge in an actual anticoagulation clinic with real patients under the supervision of a clinical expert.

**Objective:** The primary purpose of this project is to measure the value of including practical experience under expert supervision in a continuing education program designed to prepare health care professionals to provide anticoagulation management services.

**Methods:** A survey administered by the Survey Research Centre at the University of Waterloo was sent to 186 graduates of the MOAT course in November 2017. Participants were asked to indicate how much their confidence in providing anticoagulation services changed after completing the various portions of the course, and to rank the importance of each section. Responses will be compared using paired t-test and/or Wilcoxon rank-sum where appropriate.

**Results:** 124 participants completed the survey for a raw response rate of 67%. Analysis of the responses is ongoing, and will be complete by the end of February 2018.

**Discussion:** The results will inform the developers of both CPD programs and courses for the undergraduate and graduate curricula at the School of Pharmacy and the broader University of Waterloo community.

## **515 – Assessing communication of therapeutic knowledge to patients and clinicians across courses**

*Elaine Lillie, School of Pharmacy*

*Nardine Nakhla, School of Pharmacy*

Communication challenges may take the form of low health literacy skills, which may lead to suboptimal patient outcomes, increased system cost and patients' inability to effectively practice self-care. The use of targeted techniques can help improve patient communication, thus two course instructors at UW collaborated to create an assignment that simultaneously develops self-care knowledge and presentation skill. Instructors wanted to evaluate assignment effectiveness.

120 first-year Pharmacy students are required to take PHARM127, a communication basics course, and PHARM129, a Professional Practice course focused on patient self-care. Prompted by modification to the PharmD curriculum with its emphasis on the pharmacist's expanded role, beginning in 2014 Dr. Nakhla and Professor Lillie created an assignment that asked groups of six students to create 15-20-minute patient workshops.

Teams select from a defined topic list. Using a variety of credible sources, teams research topics and summarize pertinent points in a template intended for pharmacy students and professionals. Accuracy of the content is verified by a pharmacist TA and the course coordinator and then distributed to the class as "testable" therapeutic content. That same content is then distilled for patients and translated into patient-friendly language for the in-class presentation to a "group of patients". On presentation day, students are marked on both the accuracy of therapeutic content (PHARM129) and communication skills (PHARM127).

Course evaluations over the past four years have prompted minor changes but the assignment has received positive feedback and has succeeded in building both therapeutic knowledge and communication skill. By using the information simultaneously for different audiences, it is hoped students will understand that both self-care knowledge and communication skill are critical factors in determining a pharmacist's success. In conclusion, integrating communication skill-building with therapeutic knowledge acquisition enhances aptitude in both.