Priority Areas for Learning and Teaching Grant Recipients

Business

Teal McAteer – *"Coaching Manual" (Development of a Student Friendly Companion Manual to be Integrated within the First Year Mandatory Organizational Behaviour Course of the DeGroote Commerce Program)*

Leaders are not born; they are carefully and consciously fostered through consistent self-reflection and purposeful action in the interest of growth. McMaster is pursuing a brighter world. This implies the need for change through learning and development. This manual exists to facilitate this growth through an industry-proven coaching method provided by Dr. Teal McAteer. By conducting this research in an organizational context, the brighter world goal is introduced to a new aspect of study; that of business pedagogy. Our mission statement clearly outlines a need to create leaders in our society who are trailblazers; constantly defining the fields in which they work. Irrespective of choice of study, leadership is a behavior that transcends every aspect of the work we do in both our personal and professional lives. In order to create a rising tide which shall lift all boats, there must be a force that pulls water to rise. In organizations, interpersonal human interaction, and academia, that force is a leader. The purpose of this project is to coach developing leaders by presenting organizational behavior theories in contexts unto which they are designed to be implemented; ones that are practical, and every day. This manual will coach leaders through different aspects of their current and future roles as well as provide a guide to their personal and professional growth.

Engineering

Steve Mattucci – *'Sneaky Snake' Curriculum Modules*

Engineering instructors across the country share similar challenges with respect to meaningfully Integrating critical competencies into the curriculum:

- Durable / transferable skills (e.g. leadership, communication, etc.) and
- Social responsibility (e.g. equity diversity + inclusion, Indigenous perspectives, etc.)

One culprit may be the lack of leaders in this space to model, guide and support.

This project will develop a suite of stand-alone curriculum modules focused on these critical competencies, to be accessible across institutional boundaries. Modules will be developed with adaptability in mind, and collaboratively developed across both a McMaster course context in line with the larger PIVOT program transformation, and with an educator at another institution. Student Partners will be an integral component to support the development and implementation of each module. Each module will include learning outcomes, relevant assessments, and content resources (lecture slides, readings, videos, etc.). Modules will be

framed according to the UN Sustainable Development Goals (SDGs) to provide additional context for the role engineering plays in society. The modules will provide a platform for rapid iteration (addressing accreditation continual improvement requirements), and additionally a means for addressing various research questions.

The overarching research aims for this project are to explore the mechanisms that influence curriculum change, and cross-institutional collaborations in the Canadian Engineering Education community. A team lead student partner will be responsible cohesion across modules by designing and iterating on a framework to support the development of the curriculum modules.

This project is the first phase of a larger initiative framed after a children's game called 'Sneaky Snake', which involves game pieces being assembled together to form complete snakes. The individual game pieces represent individual modules, complete snakes represent entire courses, and the collection of game pieces represents a resource hub.

Health Sciences

Emma Apatu – *Integration of InPlace Software in the MPH Program*
Co-Investigators: Elizabeth Alvarez, Laura Anderson & Chika Agabassi

The purpose of this study is to improve MPH students' practicum experience and overall learning outcomes through the integration of placement administrative software (InPlace) into the MPH program at McMaster University. The McMaster Master of Public Health (MPH) program offers a highly competitive self-tailored generalist graduate degree that equips students with core knowledge and skills in public health and population epidemiology, biostatistics, health research methods, and policy analysis. Although the students' experiences collectively present a wide range of skills and expertise, at the moment the program does not have a succinct way of tracking students' professional interests, core knowledge, skills, and academic and practical milestones throughout the MPH program. We believe that the incorporation of InPlace, placement management software, could streamline data exchange and serve as a central repository for the program. Primary outcomes include student streamline data exchange and serve as a central repository for the program. Primary outcomes include student satisfaction, supervisor satisfaction, alignment of placement with learning objectives, pre and post practicum skill acquisition. Secondary outcomes include competency alignment with PHAC core competencies relating to leadership, communication, diversity, and inclusiveness. Surveys will be used to collect data for outcome analysis.

Anne Malott – *Standardizing Formative Evaluation in Midwifery Clinical Education*
Co-Investigators: Beth Murray Davis, Emma Seager & Kate Demers

The Ontario Midwifery Education Program is a consortium of Laurentian, Ryerson and McMaster Universities and includes a balance of didactic and clinical learning. Clinical education consists of one to one mentorship in placements. Exposure and learning vary across placements which reflect contextual factors such as populations served, scope of practice and interprofessional dynamics which may not be easily modifiable. Evaluation of clinical education occurs formally at midterm with a formative evaluation and upon completion of a placement with a summative evaluation. Online evaluation forms are completed by the mentor and mentee but the evidence to support the assessment takes many forms. Inconsistencies in approaches to providing feedback further influence the extent to which student's benefit from clinical experiences. This leads to inequities in learning. One means of promoting equity in learning through maximizing opportunity is through implementation of a standardized approach to provision of feedback.

Our aim is to pilot implementation of a standardized feedback instrument in clinical education to evaluate the impact of the instrument on the quality of feedback provided, the facilitation of learning, and satisfaction and acceptability by students. We are also interested to examine the feasibility and acceptability of its use by preceptors and the extent to which they found it helpful in facilitating delivery of feedback to students.

Introducing a structured approach that facilitates the transformation of clinical observation into formative feedback would benefit midwifery students as well as preceptors by guiding learning and ensuring the transparency of summative evaluations.

Amy Palma – *Virtual Simulation Game Development in Nursing Education*
Co-Investigators: Lynn Martin, Tracey Jewiss, Maria Pratt, Elaine Shuhaibar & Sean Hui

Virtual simulation games (VSG) have shown promise in nursing student education, as an engaging learning activity to apply learning concepts, rehearse nursing care in a safe and controlled environment, and practice clinical judgment and decision-making skills. Previous studies on VSG report high levels of student satisfaction and engagement (Foronda et al., 2013; Verukyl & Hughes, 2019). Virtual simulation games have potential in a variety of learning environments: as a substitute for clinical practice, as a teaching and learning enhancement in theoretical courses, and as preparation for high fidelity simulation. Some virtual simulation games are currently available for purchase; however, costs to individual students are high and content is not always aligned with the BScN program curriculum. An alternative is to develop novel simulation games tailored to suit specific curricular needs. The aims of this project are: (a) to build faculty capacity by hosting a two-day faculty development workshop in the School of Nursing on the development of virtual simulation games, offered by the Canadian Alliance of Nurse Educators using Simulation (CAN-Sim); (b) to develop a virtual simulation game focused on one of the top ten priority simulation areas identified by the Canadian association of Schools of Nursing (CASN); and (c) to assess student satisfaction, measure changes in student knowledge,

and gather student perspectives on the potential uses of virtual simulation games in the BScN curriculum. Results from this project will be used to guide the development of additional virtual games for use in the undergraduate nursing program.

Health Sciences

Karim Ladak – *Diversifying Learning in Rheumatology Through High Quality Podcasts: Uptake, Effectiveness, and Utility*

Medical knowledge is rapidly expanding, and Canadian rheumatology fellows are expected to grasp all relevant content to become "Medical Experts", as outlined by CanMEDS (a framework by The Royal College of Physicians and Surgeons of Canada, which delineates competencies in medical education). Currently, learners derive medical information from written sources (books, websites, journal articles), casual teaching by supervising physicians during clinical encounters, and infrequently through lectures.

I am to create a series of 10-15 podcasts on core rheumatology topics and hope it will benefit student learning for a number of reasons. It will alleviate the immense guilt our trainees (on average in their late 20's and early 30's) feel when they wish to leave their desks and partake in mandatory or leisure activities. It will provide a different learning modality which does not require looking at pages or a screen. These podcasts will cater particularly well to auditory learners. They will be receiving the most updated information I can find, including unpublished data. I will aim to make these sessions as engaging as possible. Ultimately, the project goal is to provide a new modality of medical education in rheumatology so learners at all stages can see patients competently and consolidate knowledge in preparation for their board exams.

The research objectives are to determine whether there is interest in rheumatology learning through podcasts, whether the teaching is effective and how future sessions can be improved upon.

Emma Richardson – *'Aha' Moments Using Artificial Intelligence and Simultaneous Translation in Online, International Global Health Education*
Co-Investigators: David Cecil Hill, Christy Gombay, Otto Sanchez

For the past ten years, McMaster's global health program has engaged students in international, interdisciplinary group work. With 283 students engaging in online, international small-group work in 2019-2020, the program is piloting the use of artificial intelligence and live transcription/translation with two small groups. This pilot seeks to integrate cross-cultural learning while facilitating more equitable access to higher education in lower-resource settings.

The use of artificial intelligence technology to facilitate international group work allows Spanish-speaking students to communicate in their native language, producing more inclusive

environments for education, learning and teamwork. Qualitative interviews will be conducted with 10 students, 2-4 tutors, as well as program directors. The researchers seek to capture 'aha moments' to understand how translation technology can be used to simultaneously improve access to higher education while also strengthening existing educational programs.

This research seeks to understand how artificial intelligence tools can improve online, international education in global health by capturing the experiences of students, tutors, and program directors participating in the pilot project. The findings of this research will inform the scale-up of artificial intelligence technologies across the consortium of universities participating in this global health educational initiative. The findings are also applicable to educators around the world seeking to implement or evaluate the use of artificial intelligence and transcription/translation technologies in education. The program's interdisciplinary nature will facilitate the dissemination of findings across McMaster, and the researchers will also submit findings to academic journals and for conference presentations.

Humanities

Philip Savage – *Beyond "Getting a Job" Internships: Learning Outcomes, Community Engagement, and Experiential Education in Communication Studies*

This research seeks to determine the changing learning outcomes that arise from community-based experiential placements (a.k.a. Internships), relative to the dynamic nature of community engagement by students with a range of community leaders.

The research evolves from the observations of the author coordinating for twelve years 200+ undergraduate CSMM students in internship placements with communications-related organizations in the course: CMST 3B03: "Practical Aspects of Media Production."

Over that time, there has been a change in the nature and form of placements in terms of the fields chosen by students and the key learning outcomes; from traditional 'media production' roles for interns to students learning about a broader development of digital media, social media and in-person or group engagement as part of the strategic community-based communication approaches. This appears to involve more general learning, broader skills development, and increased competencies relating to dynamic organizations and communities outside the traditional media fields (e.g. into areas such as healthcare and gerontology, arts and music, and related event management and community development).

The objective of the research is to re-examine and question assumptions about the value of internships (e.g. to build the résumé and "get a job in comms"), and moreover to develop insights, methods, and relationships within a range of different communities, and to reflect on these and develop broad career goals and further education approaches, including more and

better understanding of the learning outcomes and strategic communication competencies involved in community engagement practices and experiences.

Science

Sharonna Greenberg – *Chem-FAST: A Formative Assessment Study Tool for Level 1 Chemistry*
Co-Investigators: Will Adams, Danielle Brewer-Deluce, John Dunlosky, Katherine Rawson

We propose to create a low-stakes Formative Assessment Study Tool for level 1 Chemistry (called Chem-FAST), based on principles in cognitive psychology. Chem-FAST will enable students to practice their understanding of course material, improve their long-term knowledge retention, and think critically about their learning and problem-solving skills.

Our students' primary study resources in level 1 Chemistry are the past assessments, which we post online along with full solutions. Students comment that solving the past assessments is the best way to learn the course material, even though solving past assessments is not worth any marks in our course. Moreover, each year in their course evaluation surveys, students request more practice questions with higher degrees of difficulty.

Instructors similarly value the past assessments when it comes to creating the current assessment. Through our prior research in the scholarship of teaching and learning, we have created a Test Archive and Analysis System (TAAS) to help instructors manage assessments for large-enrollment courses. The TAAS contains a database of questions from a decade of past assessments, along with the difficulty level and discrimination index for each question. The TAAS serves many purposes, but first and foremost, it is a tool for instructors to design fair and predictable assessments and inform our use of class time.

Given this impressive tool we have already created for instructors, and the fact that past assessments are students' primary resource, we now aim to extend the tool to students to help maximize their learning. We will create Chem-FAST based on the TAAS –a pre-existing database of questions. Chem-FAST will incorporate principles in cognitive psychology to promote effective learning, including successive retrieval (practice testing), spaced practice, and interleaving. We know these strategies are effective, but many of our students are not using them to their utmost degree. Chem-FAST will also be able to adaptively incorporate more difficult or less difficult practice material on an individual basis, according to each student's needs. If we find that Chem-FAST is effective at promoting student learning, we may eventually replace the costly publisher-created online homework platform with our own free tool, in alignment with inclusive excellence.

Our success with the TAAS has encouraged faculty members at McMaster and beyond to incorporate it into their courses; we envision similar uptake for Chem-FAST and will disseminate the results of our research accordingly.

Chem-FAST has the potential to improve student learning in chemistry. Moreover, if students subscribe to and incorporate the underlying principles in cognitive psychology, it could enhance their study habits and metacognitive skills for life-long learning.

Social Science

Yvonne LeBlanc – *An Evaluation of the 'Intergenerational Learning' Component of an Introduction to Aging and Society Culture*
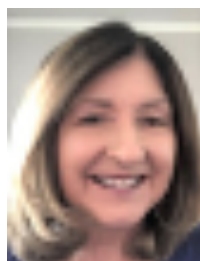
This study evaluates modifications to an experiential approach to intergenerational learning in a first year 'Introduction to Aging and Society' course. The central objective of the experiential component is to enhance student learning by providing opportunities for 'face to face' discussions with older adults, based on course content. Embedded in educational constructivist theory, the study will use a mixed methods approach to systematically examine the strengths and limitations of intergenerational learning among undergraduate students, graduate student facilitators, and older adult volunteers. To my knowledge, no research has evaluated this kind of learning opportunity. Such an analysis may provide a better understanding of the 'intergenerational learning' experiences of those involved in this experiential program and offer insight into improving the future delivery of intergenerational learning to undergraduate students with multidisciplinary interests.

Abeer Siddiqui, Ana Tomljenovic-Berube & Ryan Belowitz – *Exploring Perceived Barriers and Facilitators to Data Literacy in the Life Sciences*

Life Sciences students consume, collect, and produce data in many forms; however, at present, data literacy instruction and assessment are not scaffolded strategically in the curriculum. Data literacy can be defined as the skills needed to interpret, collect, manage, represent, and produce data. These skills are transferable and applicable to our students' academic and professional pursuits. This research study will explore to which extent data literacy instruction and assessment is embedded in the Life Sciences program. Specifically, we will explore how we can scaffold learning outcomes earlier in the program to better prepare upper-year students for their thesis projects, as well as future academic and professional pursuits. We aim to conduct two sets of surveys and focus groups with Life Sciences thesis students, evaluate existing curricular products, such as assignments and in-class activities, and interview thesis project supervisors to identify gaps in the data literacy training our students receive. Based on our findings, we hope to provide recommendations for curricular refinement across the Life Sciences program through strategic integration of data literacy learning outcomes and scaffolded assessment. Furthermore, we predict that the Life Sciences program is not unique

in its desire to effectively integrate data literacy teaching and learning and address student anxiety around data practices; our findings and recommendations, therefore, may have implications beyond just our curriculum.

Small Teaching and Learning Exploration Grant Recipients

Health Sciences

Sandra Monteiro – *Can a Popular Pedagogical Tool Predict Whether Students Acquire "Deep Understanding"?*
Co-Investigator: Andrew LoGuidice

Educators often express a desire to teach so-called 'deep understanding' of general principles rather than rote memorization. Indeed, many studies focus on potential measurement tools to quantify how well a given course promotes deep understanding in students.

One popular tool called the Study Process Questionnaire (SPQ) generates a number from 0–50 for each student that supposedly reflects their tendency to obtain deep understanding within a given course. However, the predictive validity of the SPQ has been challenged because few studies have explicitly defined this so-called 'deep understanding' construct and convincingly measured it.

Here we propose to assess the predictive validity of the SPQ by defining deep understanding using a novel student-centered approach. Students will complete the SPQ during one of their courses and write their final exam as usual. However, students will also review the exam again and rate how much they think each question tapped into application—i.e., their knowledge of general principles as opposed to isolated facts. If the SPQ measures what it is intended to measure, then SPQ scores ought to correlate most strongly with exam performance specifically on these application-based questions identified by students.

This study has important implications for educational research and practice. If SPQ scores predict (i.e. correlate positively with) performance on the application-based oriented exam questions identified by students, this would provide strong evidence that educators, course developers, and researchers alike can trust the SPQ to measure how well a given course design promotes deep understanding.