



University  
of Windsor

# Research Stimulus Fund Report 2020-21

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# Research Stimulus Fund Report 201

Office of the Vice-President, Research and Innovation

## Executive Summary

The University of Windsor's Strategic Research Plan sets the direction of the University of Windsor's research and scholarship enterprise and aspires to "create a more research-intensive university with graduate programs that build on academic and professional strengths" (Thinking forward...Taking Action, 2012). The Research Stimulus Funds (RSF) was established in 2013/14 with the intention that the RSF will aid in building the University's research enterprise. Under the purview of the Vice-President, Research and Innovation (VPRI), the RSF provides annual funding of \$500,000, which is allocated among the Faculties. Now in its seventh year, these funds have been utilized to build upon research strengths, promote future research collaborations, and enhance graduate training and experiential learning. The aggregate RSF funding for each of the individual Faculties is based on the three-year average of Tri-Council (NSERC, SSHRC and CIHR) funding dollars as calculated and reported by the Tri-agency Institutional Programs Secretariat (TIPS).

Each of the Faculties distributed its allocated funding to individuals or groups of researchers whose projects or activities were selected by the Dean in consultation with the VPRI, a summary of which is outlined in this report. The RSF funds supported a diverse variety of research projects and activities, including the purchase of research infrastructure and equipment within the Faculties. The Faculty of Engineering used funds in support of scholarship funding. Through the allotted research stimulus funds, the Faculty of Science and the Faculty of Engineering were able to fund several collaborative infrastructure grants, in addition to supporting other new collaborative research activities, such as the acquisition of advanced technologies. The Faculty of Arts, Humanities and Social Sciences (FAHSS) also utilized funds to support several collaborative research grants, as well as providing contributions that supported externally funded research collaborations. Descriptions of each of the individual awards and funded activities/purchases are detailed in this report.

## RSF-Funded Projects and Activities

### Education

The Faculty of Education supported the Research Stimulus Fund Grant (RSFG) by providing principal investigators with funding that will lead to submissions for larger grant proposals to external granting agencies.

**Dr. Andrew Allen** was awarded \$4,000 for the project, *"Building the Mathematical Technological Efficacy of Elementary Pre-Service Teachers"*, as part of the 2020-21 Faculty of Education RSFG program. This study aims to provide further evidence that, given a proper foundation, elementary pre-service teachers can increase their competency in teaching mathematics in the classroom, which in turn should result in student mathematical competency and confidence. Further work in this field could be expanded to in-service teachers who wish to increase their mathematical competency, teaching abilities, and technological efficacy in their own classrooms.

**Dr. Lindsay Jaber** project, *"A Mixed-Methods Investigation of Hyper-Productivity as a Trauma Response"*, was awarded \$4,000 as part of the 2020-21 Faculty of Education RSFG program. The funds supported the recruitment and training of two students who conducted systemic literature reviews as well as quantitative and qualitative data analysis from a feminist, narrative inquiry framework. This was a pilot study for the more extensive mixed-method study.

**Dr. Dragana Martinovic** was provided with \$4,000 as part of the 2020-21 Faculty of Education RSFG program for the project entitled, *"Implementation Fidelity of the New Ontario Mathematics Curriculum During the 2021 Pandemic"*. In collaboration with the Toronto District School Board, this research de-stems mathematics by focusing on the role of equity to shift culturally embedded discriminatory practices and pedagogies toward using culturally responsive "thinking classroom" and high-impact instructional pedagogies in K-12 practices.

**Dr. James Oloo** received \$8,000 for his project, *"Racialized Mathematics Learning Experiences of Black Undergraduate Students in Ontario"*, as part of the 2020-21 Faculty of Education RSFG program. This study examines the racialized mathematics learning experiences of Black undergraduate students at universities in Ontario. It is guided by two questions: 1) How do Black undergraduate students describe their racialized mathematics learning experiences? And 2) What resilience strategies do Black undergraduate students employ to successfully navigate challenging learning environments? This research employs a narrative inquiry methodology as an approach to understanding and honouring lived experience. It is grounded in an assets-based lens, namely, the community cultural wealth model (Yosso, 2005).

**Dr. Terry Shefton** received \$4,000 for the project entitled, *"Teacher Education in the Arts Before (and After) COVID-19"*, as part of the 2020-21 Faculty of Education RSFG program. This study uses institutional ethnography as its methodological approach to examine the intersecting institutional practices, and regulatory and organizational mechanisms, that embed and reinscribe the place of the arts in generalist teacher education and how these practices constrain and potentially prevent equity before, during, and after the COVID-19 pandemic.

**Dr. Clayton Smith** was awarded \$4,000 as part of the 2020-21 Faculty of Education RSFG program for the project entitled, *"An Investigation of the Potential Micro-discrimination of International Students' Experience on a Canadian University Campus"*. With an increasing number of international students coming to Canadian universities every year (Statistics Canada, 2019), the retention of

international students has been a significant topic for administrators and researchers. This study is designed to explore international students' experiences with micro-discrimination.

## Engineering

The Faculty of Engineering continues to provide support for the NSERC/Ford Industrial Research Chair in Clean Combustion Engine Innovations. The Faculty also supports collaborative research by providing scholarship funding, student exchange opportunities, infrastructure development and the acquisition of advanced technologies. These initiatives provide enriched opportunities for researchers and enhance training and internship opportunities for students.

**Dr. Neil Van Engelen** was awarded \$40,000 in support of the ancillary work and received an additional \$46,339 for the shortfall of his ongoing CFI-JELF project entitled, "*State-of-the-art research facility for earthquake-resilient infrastructure*". The main goal of this project is to improve the resilience of civil infrastructure from damage due to earthquakes and other vibration sources. Experimental testing is being conducted on specialized control devices to identify and improve key performance characteristics and develop life-cycle planning.

**Dr. Ming Zheng** received \$50,000 in support of his senior NSERC/Ford/UWindsor Industrial Research Chair (IRC) in Clean Combustion Engine Innovations-Deterministic Ignition Control. This highly regarded IRC program continues to perform fundamental and applied studies which aim to improve fuel efficiency, emphasize efficient ignition techniques, and modify mechanisms that modulate power to distribute the sites of energy release during ignition.

## Human Kinetics

The Faculty of Human Kinetics supports the study of human movement, including recreational, leisurely and high-performance sports activities.

**Dr. Dave Andrews** received \$3,500 for the 2021 Kinesiology Seed Grant Competition for his project, "*Laboratory reconstructions of head-to-head and head-to-ground impacts in youth football*". Funding was used to purchase helmets and helmet hardware that when worn, simulate head-to-ground impacts. This research furthers the understanding of the severity and injury potential associated with actual game head impacts, and subsequently, how we can intervene to improve impact-related health outcomes for youth athletes.

**Dr. Cheri McGowan** was awarded \$10,000 for the Faculty of Human Kinetics Research Leadership Award. Dr. McGowan will use the award to extend her efforts in advancing Kinesiology research, including promoting research, supporting Kinesiology Research Day, maintaining research equipment and software licenses, purchasing equipment and software, providing support for undergraduate thesis students and conference travel funds for undergraduate students, hiring research assistants, and inviting guest speakers.

## Science

The Faculty of Science invested in several collaborative infrastructure grants in addition to supporting other research activities, such as the acquisition of technology.

**Dr. Marcus Drover** was awarded \$9,428 for his Science Xcelerate project, *"Electrifying small-molecules: An electroanalytical set-up for metal-mediated reduction reactions"*. The awarded funds support the purchase of electrochemistry infrastructure that enables the next generation and characterization of molecules and materials relevant to a wide variety of applications.

**Dr. TJ Hammond** received \$23,500 for his Science Xcelerate project, *"Development of a sensitive spectrometer for soluble reactive phosphorous: Applying physics to environmental science"*. This research supports the development of a robust, versatile, and sensitive spectrometers that allow a greater sampling of reactive phosphorus, and eventually other nutrients across the Great Lakes and freshwater ecosystems of the world. This instrument allows a comprehensive understanding of nutrient dynamics and contribute to management and conservation in freshwater ecosystems.

**Drs. TJ Hammond, Steven Rehse, and Kenneth Drouillard** were awarded \$9,500 for their project, *"Laser-based mark characterization for prophylaxis of COVID-19"*. This project discusses the development of a test apparatus for assessing mask efficacy by measuring the aerosols transmitted through the masks. A laser-based system is employed, using relatively inexpensive diode lasers to illuminate the exhaled particles, a webcam for data acquisition, and Python-based particle tracking software. The approximation is that the intensity of the scattered light from the droplets is proportional to the size of the droplet, but we will be able to quantify the droplet size by analyzing the data with Mie scattering theory.

**Dr. Arunita Jaekel, Bala Balasingham, and Francesco Biondi** were provided \$25,000 for their Science Xcelerate project, *"Data fusion strategies for improved human computer interaction in autonomous systems"*. Autonomous systems are designed to respond to complex, real-world situations automatically, and the hardware and software required to implement these systems must be capable of responding to unexpected conditions. This collaborative research project aims to improve human computer interactions for autonomous systems and can be extended to target operation of autonomous vehicles through the development of a robust autonomous system.

**Dr. Phillip Karpowicz** received \$45,000 towards his CFI-JELF funded project, *"Confocal Imaging Infrastructure for Cell Biology and Biochemistry"*. The purchase of this infrastructure enables high resolution cell biology imaging that address health-related problems, such as how cancers are affected by vitamins and sleep/wake cycles. The research will also benefit the control of invasive and non-invasive fish species in the Great Lakes that will help develop a clean and healthy environment for Canadians.

**Dr. Daniel Mennill** was awarded \$10,000 in support of his NSERC RTI project, *"Next-generation acoustic biosensor for studies of ecology and conservation"*. With recent developments in digital acoustic technology, funding supports the purchase of digital recorders to study vocal learning and cultural evolution in wild birds. This body of research provides ground-breaking insights into the behaviour, ecology, and evolution of animals and trains many diverse Canadian scientists to further develop innovative recording technologies for studying wild animals.

**Dr. Mir Munir Rahim** was provided with \$14,500 for his NSERC RTI project "*Multi-user in vivo/ex vivo animal imaging system*". Currently, the Windsor region lacks any capacity for fluorescence/luminescence imaging of whole animals/plants and tissues. Acquisition of a core facility in vivo/ex vivo imager with capabilities to image a wide range of different colours with high quality resolution is essential to facilitate the success of the research and training in this field.

**Drs. Sherif Saad Ahmed, Lorna De Witt, and Linda Patrick** received \$25,000 for their project, "*Towards accelerating aging in place solutions development and adoption*". These funds were used to recruit a Masters student and a PhD candidate to work on security and privacy research in the intelligent internet of things systems. As part of their work, the students helped develop an external application which was ultimately successful in securing a further \$145,000 in research funds.

## Faculty of Arts, Humanities and Social Sciences

The Faculty of Arts, Humanities and Social Sciences (FAHSS) has supported several collaborative research projects with a wide variety of stakeholders in the community. This will help facilitate the knowledge mobilization through dissemination and training. FAHSS elected to use the RSF 2020-21 funding in support of their Collaborative Research Grants (CRG).

**Dr. Christopher Abeare** received \$5,000 to support the Concussion Research Group. Dr. Abeare's research lab promotes collaborative research in sport-related concussions, brain health and safety of athletes, as well as to provide state-of-the-art training to students. The lab is in the investigation of understanding cognitive processes, primarily language and emotional consequences of sport-related concussions and traumatic brain injury to improve assessment and treatment methods.

**Dr. Amy Fitzgerald's** research group, Animal and Inter-Personal Abuse Research Group (AIPARG) was provided with \$4,990. AIPARG is comprised of faculty and graduate students across disciplines who conduct research on the intersection of abuse against people and animals. Working with the community, the group aims to understand the co-occurrence of animal and interpersonal violence and advocate for change in policy and practice to better address the needs of those affected by abuse – human and animal alike.

**Dr. Patti Fritz's** research group, Health Research Centre for the Study of Violence against Women (HRC-VAW) was awarded \$8,000. HRC-VAW is an interdisciplinary group of faculty and researchers with interests in the causes of violence against women/girls, its prevention, and the rehabilitation of its effects.

**Dr. Catherine Kwantes** was provided with \$5,000 in support of her research group, the Trustworthiness Research Alliance. The Trustworthiness Research Alliance is an international and multidisciplinary group of researchers who investigate trust, and the role that perceptions of trustworthiness of individuals, organizations, and institutions plays in decision-making.

**Dr. Jane Ku** was provided with \$4,000 for the project, "*Antiracism Solidarity Research Action*". The purpose of Dr. Ku's research is to continue and expand support for existing and new groups of faculties who are engaged in on-going collaborations for the purpose of advancing a collaborative programme of research and research training. These collaborations will lead to increased collaborative tri-agency program applications, increased graduate applications interested in interdisciplinary or sub-disciplinary

fields, events that increase research profile public exposure such as conferences, and enhance research collaboration partnerships with other institutions.

**Dr. Kim Nelson's** "*Propeller Project*" was awarded \$5,000. The Propeller Project is comprised of a team of artists, artist-researchers, and scholars, working in the dissemination of research via multimedia across the disciplines of installation art, bio-art, documentary film, live performance, and digital storytelling. They aim to explore and experiment with research-creation both in terms of artist-led research and researcher/artist collaboration.

**Dr. Wansoo Park** was awarded \$5,000 for her project, "*Health, Equity and Social Inclusion*". This research uses both quantitative and qualitative methods in the areas of health and mental health issues of immigrants, health access among immigrants, international adoption, Korean transnational educational migration, and international social work education.

**Dr. Christopher Tindale** was awarded \$5,000 in support of the Centre for Research in Reasoning, Argumentation and Rhetoric (CRRAR). CRRAR is an internationally recognized leader in individual and collaborative research on the theory and practice of research in reasoning, argument and argumentation, and rhetoric from the perspective of all related academic disciplines.