



BRANDON
UNIVERSITY

Built in Brandon

RESEARCH CONNECTION

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Research is Built in Brandon

Brandon University is proud to be a local, regional university, with deep roots in Brandon, in Westman and in Manitoba. That means many things for our home. We are here to serve local students and our local community, and we are here to attract new students from around the world and to create new opportunities.

Our faculty are a tremendous part of our success in fulfilling our mission. Their curiosity and originality help drive passion in the classroom, as well as new discoveries and creative works in their field. Many choose to devote their efforts to cutting-edge research that addresses pressing issues across Canada and around the world. Others choose to pursue issues that are very local. All of them are focused through a Brandon University lens, bringing our unique community perspective to their work.

That is what it means for research to be Built in Brandon. It is research that has deep local roots, and global ambition. It is research that brings together disparate disciplines and stays direct. It is research that aspires and inspires. It is research that makes us proud.

You will find all of the above in these pages. Research at Brandon University continues to thrive and this overview highlights just some of the recent and ongoing projects we are so proud to support on our campus.

About Research Connection

These Brandon University research summaries and research features are based on Research Connection, a periodical publication intended to provide information about the impact of Brandon University's academic research, creative activities and expertise.

Research Connection highlights BU research using a regular structure adapted with permission from the ResearchSnapshot clear language format used by ResearchImpact-RéseauImpactRecherche (researchimpact.ca). Research Connection is supported by the Office of Research Services and by the Centre for Aboriginal and Rural Education Studies, Faculty of Education.

Many of the summaries presented in this booklet represent ongoing research, and there are always new findings to report. Find more online at BrandonU.ca/Research-Connection

Research ethics at Brandon University

Brandon University is committed to maintaining the highest standards of research ethics for all research activities involving animals, human participants and the secondary use of identifiable information.

For research activities involving animals, the Brandon University Animal Care Committee follows the guidelines of the Canadian Council on Animal Care that require that all teaching, research and demonstrations involving animals, receive prior approval before being implemented.

For human research projects, the Brandon University Research Ethics Committee follows Tri-Council guidelines requiring that BU review and approve any research involving humans or the use of identifiable personal information before any data collection can begin.

BU also has a number of its own policies governing research.



Research That Matters at Brandon University

Prepare to be amazed, as I always am whenever I am reminded of the inspiring breadth and depth of research and innovation being done here at Brandon University.

As you read through this publication, you'll find page after page asking thoughtful questions, addressing them in innovative and meaningful ways, and providing impressive answers. While some of those answers may be surprising, it is anything but surprising that BU continues to deliver remarkable research results.

For generations of students, one highlight of a BU experience has been our compact campus, with our small class sizes, which allows very close relationships with their professors. The value for our faculty in the classroom is just as strong. Getting to know students helps make teaching more engaging — more fun! — while also allowing a personalized approach to education that supports better learning outcomes. Our diverse and close-knit campus also pays dividends outside the classroom. It is easier here for faculty to make interesting connections across different departments and outside of their areas of expertise. And, it is easier here for our researchers to connect closely with members of our community, helping industry, government and social groups investigate questions and address meaningful issues here in Brandon and in Westman, as well as those that have impact around the world.

Research is fundamental to the mission of any university, and we are committed to continuing to support it here at Brandon University. Research is how we explore the world, how we pursue (and hopefully satisfy) our curiosity, and how we learn to make sense of everything around us. Research is how we find new knowledge, knowledge that

we can then transmit to students who may go on to ask their own research questions: what next?

Sharing that knowledge is another fundamental mission at any university. The keenest insight doesn't do any good if no one else knows about it. Much of our knowledge sharing is done in the classroom or lecture theatre, as we share both best practices and our best current understanding. Cutting-edge advances are also shared with colleagues at conferences around the world (increasingly, held here at BU).

We also share knowledge outside of the halls of academia. Many conferences are opening up their doors to community members. Faculty (including me!) lead free discussions at the Brandon Public Library. And, publications like this one reaffirm our commitment to sharing knowledge as widely and as openly as we can. We all benefit as we expand our understanding of the world around us.

The curiosity you exhibit in picking up and reading this booklet is the same quest for knowledge and insight that drives every researcher and student at Brandon University. It is a mark of humanity's shared passion for discovery.

Thank you for being a part of this ongoing voyage. You will be amazed at what there is to discover.

DR. DAVID DOCHERTY

President, Brandon University



Community Connections Create Unique Impact

Our regularly published bulletin, Research Connection, initiated in 2017 and edited by Christiane Ramsey, aims to summarize the projects our leading scholars, scientists, artists, and students are conducting, and to highlight to the broader community the research and creative works that are happening in the Faculties of Arts, Education, Health Studies, and Science, the School of Music, and various other areas across our University. In October of 2018, we published the first compilation of Research Connection, It's All Happening at BU, to celebrate the 50th anniversary of Brandon University. The magazine was highly acclaimed by faculty and community alike. I am delighted to welcome you to the second glossy compilation of Research Connection, Built in Brandon.

Brandon University is the third largest University in Manitoba serving a population of approximately 3,500 students. Over the past decade, Brandon University has made great strides in expanding our research enterprise. High-quality research, innovation and creative activity are integral to our practice. While community-connected research, collaboration, and interdisciplinary research remain major areas of focus, we also emphasize the important contributions of disciplinary researchers who contribute to basic and theoretical research in their fields. Brandon University's strengths are grounded in commitment to student success and the student experience, faculty innovative research, scholarly and creative activities that engage its students and contribute to society, and its commitment to partnering in the growth and vitality of the communities it serves. Brandon University is recognized as an important asset,

catalyst and partner for economic and community growth within rural, northern and southwestern Manitoba and beyond. The 2014-15 Economic Impact study indicated a contribution of \$417 million to the region, \$87 million of which were attributed to research.

Close connections with faculty and our rural Manitoba location help make the Brandon experience unique. It's a small University with a big punch! We take pride in engaging students in dynamic research opportunities from their first year as undergraduates through to graduate studies. Our smaller size is beneficial in that many undergraduate students work with faculty on research, opportunities that in larger institutions are reserved for graduate students. By participating in research, students gain critical thinking, problem-solving, analytical, and leadership skills that are invaluable in their future careers.

It is stimulating to be a part of Brandon University as it continues impact the lives of its students, the city, the community, and beyond. I hope as you read about the exciting projects our faculty and students are conducting that you too will share our enthusiasm.

Heather E Duncan

DR. HEATHER DUNCAN

Associate Vice-President Research, Brandon University

Quantum Measurements

SARAH PLOSKER, PhD, DARIAN MCLAREN,
UNDERGRADUATE STUDENT,
& CHRIS RAMSEY, PhD

Likely, you already know about probability measures. For example, in the word *quantum*, the probability of choosing the letter *q* at random is $\frac{1}{7}$; the probability of choosing the letter *u* is $\frac{2}{7}$; the probability of choosing the letter *a* at random is $\frac{1}{7}$; and so on, so that all the (positive) probabilities add to 1. A quantum measurement, also called a quantum probability measure, is a set of matrices (a matrix is an array of numbers, organized into rows and columns) that are positive in a certain way, and they add up to the identity matrix, which is a generalization of the number 1. We can take this generalization one step further by imagining infinite-dimensional matrices, with an infinite number of rows and columns.

Quantum measurements arise naturally in quantum mechanics, and there are underlying statistical principals governing their behaviour. If we can understand them mathematically, we can get closer to understanding the world around us.

We were able to generalize some results from classical measure theory to the setting of quantum measurements, and found some entirely new results that do not have a classical analogue (that is, they represent entirely 'quantum' results). We also developed a quantum expected value for the infinite-dimensional setting.

Besides being useful information for physicists working in quantum mechanics, these results are of independent interest in pure mathematics; many questions motivated by quantum mechanics represent new lines of inquiry in pure math.

An Arts Exploration of Psychiatric Nursing Identity Formation

DEBRA DUSOME, RN, MA, EX.AT

Identity formation or professional socialization of psychiatric nurses is an ambiguous and multi-dimensional process that is not well articulated in the literature. This exploratory study gathered information from students, recent graduates, and leaders about their process of professional identity formation.

When little is known about the subject, using a grounded theory exploratory methodology allows knowledge to be discovered through the voice of participants. Two research methods were used: collage and narrative. Participants created two collages prior to attending a 4–6 hour workshop. The first collage, 'This is Me' was a self-representation piece designed to capture personality characteristics of the participants. The second collage, 'The Ideal Psychiatric Nurse' created the stimulus for a guided conversation among participants, a process

Telling Stories from Fossils

RONG-YU LI, PhD

Fossils can tell intriguing stories about Earth and life history: they form critical evidence for evolution, provide unique clues to the paleo-environment, paleo-climate, and paleo-ecology, and play important roles in confirming the age of rocks and in exploration for oil and gas. Due to burial and preservation biases, however, not all organisms can be preserved as fossils. The activities of individuals and the interactions among them are even harder to be retained. This makes telling stories from fossils more challenging, yet more rewarding. This research attempts to uncover interactions, to identify prey and predators and to reconstruct the food chain/web of a Late Cretaceous (~80 million years ago) community in Manitoba.

The rock of the Late Cretaceous age is well exposed in the Russell area of southwestern Manitoba and over 900 fossil specimens were collected during this study. Thirteen species were identified. Breakage patterns of shells, repaired/healed scars, and circular to ovately shaped holes on some shells were carefully examined to identify the cause. The predators were identified and an extended food chain and complex food web of the local community was attempted.

The extended food chain and complex food web we reconstructed may represent a mature and stable marine ecosystem during normal times in Late Cretaceous. At the end of Cretaceous age, the dinosaurs were wiped out and the ecosystem collapsed. Future work on food chains/webs right after the mass extinction and after full recovery may enable us to compare them at different times and help us to understand the cause and impact of the mass extinction and the evolution of the ecosystem.

called Dialoguing with Images. Five of the 18 categories that evolved from the research process included: person-centered/relationship-based care; self-awareness and self-care; listening/therapeutic communication; knowledge and competence, and spiritual/existential issues. All participants indicated the themes of relationships and person-centered care were central to their practice and to their identities as psychiatric nurses.

Based on these findings, educators should focus on clinical experiences of students in their programs and skills labs to assist students in their transition to the workforce. Employers need to focus on how they could use mentors to assist in the transition of new graduates. Psychiatric nursing leaders and 'culture bearers' of the profession may need to consider how they will make space for new psychiatric nurses coming into the field.

The Lensed Universe



ADAM ROGERS, PhD

Assistant Professor, Physics and Astronomy

Supermassive black holes at the center of distant galaxies, called quasars, produce fantastic amounts of radiation when matter such as stars and clouds of gas fall into them.

These objects can be observed shining brightly even at distances of billions of light years. However, long-term observations of these sources show that they can undergo extended periods of dimming, which may occur because the radio waves from them are deflected away from us due to a special type of naturally-occurring 'lens' along the line of sight. There is also matter between the stars, a tenuous mixture of gas and dust called the interstellar medium. Some of this material is an electrically charged soup of particles called plasma.

When we see a bright quasar at a great distance from us, the radiation from it must travel through this plasma to reach us. The charged plasma acts like a lens to alter the path of the low-frequency radiation (radio waves), leaving the high-frequency radiation (visible light and X-rays) unaffected. This makes the quasar dim in a characteristic way in radio frequencies but does not affect its appearance at higher frequencies. These 'extreme scattering events' are not well understood and remain mysterious. The plasma lenses responsible for them are small and difficult to observe and not much is known about them.

Dr. Rogers and his colleague, Xinzhong Er, developed mathematical models of spherical plasma lenses which can be used to predict the variation in the brightness of a background source as a plasma lens passes in front of it. From these models, we learn about the nature of plasma in the interstellar medium and the turbulent structures that it can form.

Are Micro-Plastics a Macro Problem?



CHRISTOPHE LEMOINE, PhD

Associate Professor, Biology

Plastics are an integral part of our modern lives, and while they provide a convenient, inexpensive, and durable material from a consumer's perspective, these same characteristics make them problematic in terms of waste management.

Plastic accumulates in our landfills and eventually makes its way to our aquatic environment. While oceanic 'plastic islands' have been known for decades, more recently the plastic problem has been extended to our freshwater and terrestrial systems and more importantly has gone from the macroscopic (i.e., shopping bag), to the microscopic scale (micro- and nano-plastics less than 5mm in diameter). Moreover, the size of these microscopic particles makes them problematic from an environmental perspective as many different organisms can readily ingest them. Although we have known about the presence of large plastic litter in our oceans for over four decades, we are now finding microplastics in virtually every environment on our planet, making them an emerging environmental concern. However, despite the prevalence of microplastics worldwide we currently don't have a good handle on the repercussions of this contaminant on organisms, and therefore current research efforts aim at assessing the current and future risks associated with this pervasive pollutant.

To study microplastics, we selected a model species, the zebrafish, which lives in freshwater and is widely used as a biomedical model in laboratories around the world. We bred these fish and exposed their offspring to fluorescent polyethylene microplastics for a period up to two weeks. Throughout this exposure, we monitored larval fish growth, mortality, oxygen consumption and the accumulation of microplastics in their body. We also sampled some of the fish after two days and two weeks of exposure to assess if their overall gene expression profiles showed any effects resulting from contamination.

Overall, we found little short-term physiological effects of the microplastics on zebrafish larvae. There was no detectable effect on the growth, survival rate or oxygen consumption of the fish exposed to these particles. We also noticed that throughout our experiment microplastics only accumulated in the intestine of the fish with no changes in how many particles accumulated over time. In contrast, we observed extensive changes in gene expression in fish exposed for two days that largely dissipated within two weeks of exposure. Notably, many of these broad changes affected genes involved with the nervous system, vision, and metabolism, all crucial pathways that could have broad repercussions later in the animal's life.

We now know that short-term exposure does not seem to affect many macroscopic physiological factors in these fish, however, in the real-world animals are exposed to these particles for a lifetime. Thus, using the same approach developed in this study, we can assess the impact of lifetime exposure to microplastics on long-term organismal health. Further, using our extensive genetic data, we can refine future studies and focus our work on examining specific factors (neural function, behavior, and metabolic health) in response to microplastics exposure.

Although we have known about the presence of large plastic litter in our oceans for over four decades, we are now finding microplastics in virtually every environment on our planet.

Sexual Exploitation of Children and Youth

KAREN REMPEL, PhD
& BREANNA LAWRENCE, PhD

Sexual exploitation of children and youth is a significant issue with increasing prevalence and challenging societal considerations. In Brandon and the Westman area of Manitoba, this issue is relatively new and appears to be rapidly growing. This is not a new issue for a large urban centre such as Winnipeg; however, rural and remote communities may lack awareness and resources.

Through a joint initiative between Brandon School Division and the Brandon University's Faculty of Education, a Research Round Table Forum was held to promote exchanges between researchers, experts, and practitioners on the topic of sexually exploited children and youth in Brandon. Focused on gathering information and promoting awareness, the Forum was held over two days and included keynote presentations by recognized national researchers, discussion panels of local experts, and focused group discussions. The researchers gathered and analyzed data from the focused group discussions. The themes from the focus group discussions were used as a conceptual framework for a systematic document review of reports and research to locate, appraise, and synthesize the best and most current evidence and sources of information.

Findings from the study conclude that differing definitions of sexual exploitation result in a lack of awareness of sexual exploitation as a criminal offence and intensify barriers to institutional collaboration. While boys and young men are not traditionally seen as at risk, all genders are vulnerable to sexual exploitation. Social media is often used as a recruitment tool. The lack of identification and limited prosecution of recruiters and perpetrators of the crime of sexual exploitation contributes to on-going sexual exploitation as well as under-reporting in small, rural or remote communities.

The Research Round Table participants recommended that communities and service providers focus their efforts on prevention, reduction, and early detection. Service providers, as well as law enforcement agencies, should actively work together across jurisdictions to support and identify at-risk children and youth. At the same time, better efforts are needed to identify and prosecute recruiters and perpetrators. In the larger community, there is a need for greater awareness of the signs and risk factors, reduced stigma of sexually exploited children and youth, and more strengths-based interventions for marginalized and vulnerable populations.

The (Virtue) Epistemology of Political Ignorance

CAMERON BOULT, PhD

The state of Western liberal democracy is a prominent topic in media commentary, academic research, and political dialogue. This is especially true in the age of Brexit and Donald Trump. Much of the discussion has to do with issues surrounding facts, truth, knowledge, and rationality.

Truth, knowledge, facts, and rationality are important topics in many ways, and in many academic disciplines; but they are also the core focus of the philosophical discipline known as epistemology, or theory of knowledge. This raises a number of questions: What, if anything, does contemporary discussion about the state of liberal democracy mean for epistemology? And what, if anything, can epistemology contribute to the discussion? To explore such questions, this project focuses on a prominent and growing subfield of epistemology known as "virtue epistemology." Virtue epistemology focuses on intellectual character traits, such as open-mindedness, conscientiousness, and curiosity, in a bid to better understand how we can improve our cognitive practices (for example, how we can be more effective and efficient inquirers). Using methods of conceptual analysis, reflective equilibrium, and comparative analysis of empirical studies, the project looked at the sphere of democratic participation as a case study to examine whether virtue epistemology's focus on individual character traits is an effective strategy for improving our cognitive practices.

While it might seem obvious that improving individual intellectual character (for example, through better education) is an effective way of promoting knowledge acquisition amongst citizens in a representative democracy, this project indicated such matters are far from straightforward. In particular, there are compelling reasons to believe that institutional factors such as ad campaign spending, regulations on social media abuse, and regulations on personalization algorithms for internet browsing, have a significant impact on the role that individual intellectual character traits play in the acquisition of knowledge. As a result, a multi-targeted approach—at both the individual and institutional levels—is needed. This, in turn, should inform our virtue epistemology. More specifically, rather than theorizing about intellectual character traits such as open-mindedness, conscientiousness, and curiosity independently of broader institutional considerations, epistemologists can better understand the nature of intellectual virtue by studying the intellectual virtues as embedded within specific institutional contexts. The political context provides a useful framework for exploring the details of such an approach. Looking ahead, the aim in Phase 2 of the project is to apply lessons learned at this intersection back to the practical sphere.

Toxic Elements in Brandon's Playgrounds



ALIREZA SOMARIN, PhD
Professor, Geology



KIAN KARIMZADEH-SOMARIN
Student

Every day, thousands of school students play on playgrounds. We may wonder how safe the soil is; are there toxic elements with concentrations above the acceptable threshold?

Intentional or accidental consumption of potentially toxic elements in playground soils can be a great risk to children's health. As parents, we like our kids to play in a safe environment. With respect to toxic elements, how safe are the playgrounds in the Brandon schools? Knowing the concentrations of trace elements in soils is essential to maintaining environmental quality particularly in assigning type of land use in particular areas.

Brandon soil is generally thought to be uncontaminated. Nevertheless, urbanization of agricultural soils could distort natural metal distribution. This is an important issue in residential and parkland soils and requires investigation of potential metal accumulation in these soils. This study determined composition of soil and evaluated the background level of trace elements (including heavy metals) in soils of the play structures of elementary schools in Brandon. Also the range of heavy metal concentration and distribution was investigated.

Knowing the concentrations of trace elements in soils is essential to maintaining environmental quality.

A total of 73 samples were collected from playgrounds of 16 elementary schools in Brandon. Samples were selected from the surface (0–10 cm) of soil in the playgrounds. Each main soil sample (1–3 kg) consisted of three to five sub-samples which were randomly taken from the surroundings of each site, pooled, and homogenized to form a representative sample. The portion finer than 60 mesh in each sample was analyzed by a portable X-ray fluorescence instrument.

Twenty-two elements, including six common heavy trace elements, were studied in the samples. Only arsenic, barium, and copper concentrations in some samples from a few schools were close to — or slightly higher than — the Canadian soil quality guideline. Barium occurred as insoluble barium sulfate (barite), which is generally considered nontoxic to humans. The arsenic and copper is mainly geogenic (i.e., from weathering of rocks) and occurs mostly as natural minerals such as sulfides and sulfarsenides. We found predominantly a natural distribution of elements due to geologic processes. Generally, human activity enriches one or a few elements in soil; such enrichment was not found in this research.

This research shows that these 16 elementary school playgrounds are chemically safe. This is an example of how geochemistry can help answer simple but important questions.

Could a Blood Test Detect Breast Cancer?

MOUSUMI MAJUMDER, PhD
Assistant Professor, Biology



The death rate of metastatic breast cancer is increasing. One in nine women in Canada and one in eight women in Manitoba will be diagnosed with breast cancer in their lifetime.

An increase in the number of newly diagnosed breast cancer cases is due to a delay in diagnosis and limited therapeutic options for various kinds of cancers (hormone positive, negative). The test for breast cancer currently available is very painful and invasive, and routine mammograms (x-ray of the breast) do not start until women reach 50 years of age. While recent statistics show that early detection of the disease decreases the breast cancer death rate, the current challenge is the 'early detection of the disease.' We need a blood biomarker for breast cancer, which can detect cancer at a very early stage and is as efficient as tumor biopsy. Micro RNAs (miRNA)s are small RNAs produced by our cells to regulate our growth and development. Some miRNAs found in the tumor play an opposite role, that is, they actually help the tumor to grow and become metastatic. Our research focused on identifying and validating two such miRNAs: miR526b and miR655 in aggressive breast tumor cell lines. These cell lines help us understand more complex molecular functions vastly used in medical research.

After identifying the presence of these two miRNAs in aggressive breast tumor cells and establishing that they are tumor promoting, we collected blood samples from breast cancer patients and healthy participants at the London Regional Cancer Program (LRCP) in Ontario. The plasma from blood samples was then separated and an aliquot of plasma was kept at the tumor repository at the University of Western Ontario. All plasma samples were shipped to Brandon University where we extracted the RNA from plasma samples and compared the miRNA expression between healthy and breast cancer patients' samples.

We identified a significant difference in miRNA expression between normal and breast cancer patients and established that the tumor can be detected as early as stage I (early stage). The most exciting outcome of this research is the identification of two miRNAs, which can be used as a biomarker for breast cancer. Now we are collecting more samples to validate the observation in large sample set. Further, we are trying to identify a protein biomarker (more stable in plasma than miRNA) using Mass-Spectrometry (MS) comparing plasma proteins of healthy and cancer samples.

Our goal is to use miRNA as a blood biomarker and as a new diagnostic tool for cancer detection so that we can detect tumors at a very early stage. By measuring miRNA in various tumor stages we can see a correlation of miRNA expressions with disease progression. Wouldn't it be great if a simple blood test could be as good as a tumor biopsy for cancer detection? If we can detect early, we can save many lives.

The most exciting outcome of this research is the identification of two miRNAs, which can be used as a biomarker for breast cancer.

The Rural Internationally Educated Nurses Pilot Project

CATHERINE BAXTER, RN, PhD
& LORI FONTAINE, MA

To address a shortage of nurses, in 2015 Prairie Mountain Health (PMH) and Southern Health—Santé Sud (SH-SS) both Regional Health Authorities (RHAs) entered into a collaborative partnership with Manitoba Health, Seniors, and Active Living, the College of Nurses of Manitoba, and Red River College (RRC) to develop the Rural Internationally Educated Nurses (IENs) Registered Nurse (RN) Pilot project. The project began with the recruitment of 16 interested and eligible IENs. Phase two involved the delivery of bridging education at Red River College. Phase three saw the relocation, orientation, and employment of the IENs in each of the two Regional Health Authorities, and the final stage comprised an evaluation of the pilot project.

The first phase of the evaluation took place one year after the IENs had assumed employment in each of the Regional Health Authorities. Data on key performance indicators were collected from each of the partners. The majority of the IENs completed written questionnaires and participated in qualitative interviews. Eleven of the managers who supervised the IENs also participated in a qualitative interview. All 16 of the IENs who participated in the pilot were successful in gaining licensure as Registered Nurses in Manitoba. Upon completion of the Red River College bridging program, 15 IENs accepted employment as RNs in one of the two Regional Health Authorities. One year later, all 15 IENs continued to live and work as RNs in both acute and long-term care facilities within each of the health regions. The IENs identified that the supports they received from colleagues, managers, and other IENs were important in easing their transition to the workplace. Connecting to others within the community and experiencing a 'fit' with rural life were central considerations regarding their intention to stay in the community long-term. The managers described the positive contributions the IENs had made to the nursing workforce. Buddying the IEN with experienced nurses, ensuring adequate orientation time and recognizing individual differences amongst IENs were strategies used by managers to cultivate confidence and support the integration of the IENs into rural nursing practice.

Practical Nurses' Lived Experience of Returning to School

KATHRYN CHACHULA, RN, MN, PhD
CANDIDATE, MARY SMITH, RN, MN,
& KATHRYN HYNDMAN, BSN, MN, PhD

The lived experience of licensed practical nurses (LPNs) pursuing a Bachelor of Nursing (BN) education is not commonly studied in Canada. Max van Manen's (2014) reflective inquiry into human meaning guided our understanding regarding LPNs' lived experience and meaning of returning to school as BN students. We were also interested in understanding how LPNs experienced a four-week bridge course that allowed entry mid-way through a BN program. Individual interviews were conducted and transcribed verbatim. The dialogue was explored for meaning and to listen for the participants' lived experience across five existential facets within phenomenological inquiry.

Five major themes were found:

1. Seeking advancement: Participants were motivated by the fiscal advantages as more career opportunities exist with BN preparation.
2. Stepping back into the student role: As practicing nurses, participants, had to open themselves up to being a student again, ready for new learning experiences that were different from their work experience.
3. Juggling work, school, & family: Participants had to learn to juggle multiple responsibilities.
4. Struggling to be understood: The participants noted a lack of awareness by faculty members of the scope of practice for practical nurses and they felt they were not given sufficient credit for their experience as LPNs. They also felt unappreciated at times due to the lack of formal recognition by faculty.
5. Seeing things differently: As they accepted their new learning role, the participants ultimately noticed the change in their thinking to see the greater picture of a patient's health rather than specific issues or problems.

The four-week bridge course provided a solid foundation for continuation in the academic BN program. Students who have worked as LPNs have already established a professional identity. Therefore, faculty need to establish a trusting, non-threatening environment by demonstrating genuine respect and authentic concern for the students' learning experiences and where students are encouraged to share their feelings and fears.

Leaders and their Witnesses: An Arts-Based Inquiry



ALYSHA FARRELL, PhD

Assistant Professor, Education

The work of leadership is emotionally difficult, but it is often spoken of as if it is composed merely of the rules, policies, and processes that exist outside of those who lead.

Leaders are asked to provide guidance and support to a diverse cast of actors in our organizations, which in turn, means our work is fraught with dilemmas and conflict. Despite the emotionally charged nature of an educational leader's work, there is little consideration given in the field to the psychoanalytic implications.

A lot of the research in the field of educational leadership and administration is designed to reduce what is observed and measured in order to improve things like outcomes and performance. However, there are ethical, moral, and political questions that cannot be reasonably considered in structural-functional terms. Dr. Farrell uses arts-based research to allow participants to use their imaginations to ask questions about important and unwieldy themes such as love, forgiveness, jealousy, death, loneliness, and hope in the context of leadership studies. To explore what leading does to leaders, Dr. Farrell wrote and analyzed a three-act play called *Sincere Liars*.

The title of the play reflects the notion that dreams, memories and the childhood dramas rehearsed in adulthood are the sincerest of lies. The sincerity with which they are told and

protected is connected to a need to manage the demands placed on the ego by the social environment. The play, and much of the discussion that surrounds the play in this study, speaks to the strong real-life influence the unconscious wields. If, as Freud asserts, our houses (minds) are haunted by the past and these hauntings limit what we can perceive and do in the world, an attunement to our witnesses may assist leaders to become more conscious of the ways in which we project fears and fantasies on others in unhelpful ways. Engagements with trusted others can prompt leaders to develop more nuanced interpretations of the emotionally charged incidents that occur within our organizations.

The play urges current and future leaders to engage in self-analysis about the ways in which relationships influence professional identity and leadership. In addition, the study illustrates how intense interactions with colleagues can produce unhealthy emotional entanglements. These emotional entanglements can be rooted in an over-identification with


certain followers or when leaders attempt to take care of others in ways that inhibit colleagues' professional growth.

Witnesses play a powerful role in sculpting the mindscape of leaders.

Dr. Farrell's research

invites consideration of how witnesses—both real and imagined—pass on psychological inheritances that may wreak havoc with the capacity to be rational in leadership spaces. The study poses questions about the psychological and environmental conditions that make it possible for the appearance of witnesses. Furthermore, this invites an analysis of the consequences that result from childhood dramas that continue their influence into adulthood.

Current and future leaders should engage in self-analysis about how relationships influence professional identity and leadership.

A silhouette of a family of three—a young girl, a man, and a woman—standing on a beach and holding hands. They are facing away from the camera, looking out at the ocean under a sunset sky with soft orange and blue hues. The water is calm with gentle waves lapping at the shore.

Family Experiences with Acquired Brain Injuries



JANE KARPA, RPN, MMFT, PhD CANDIDATE

Assistant Professor, Psychiatric Nursing

Notoriously known as the ‘silent epidemic,’ Acquired Brain Injury (ABI) has reached worldwide epidemic proportions. While ABIs are manifested in individuals, their families’ lives are also dramatically affected by ABIs.

To date, evidence on how ABI affects families has been provided by examining individual family members who present their views of the ‘family perspective.’ Although this research furnishes valuable insights about families, the science on ABI and families is limited in examining the group family perspective and their experiences living with ABI. This new BU study used a family systems approach to access the ‘whole family’ perspective to understand the impact of living with ABI.

Six Manitoba families, including the person with the brain injury and their respective family members, were interviewed together. During the interviews, families were asked to talk about their lives before the acquired brain injury event, now living with the brain injury, and their thoughts about their futures. Participants were all over the age of 18. The severity of brain injuries ranged from moderate to severe. Families were diverse in their make up; from dual and single-parent families to a mixture of step and blended families.

The families’ stories led to the identification of the following themes:

FAMILIES: A GROUNDING FORCE

This theme centers on the belief of connectedness and closeness and is associated with the bonding of its members leading to a sense of belonging. Their identity as a family unit helps to maintain and stabilize themselves as they support each other while trying to figure out the adaptations they need to make in order to live with the ABI now and in the future.

LOSSES: INDIVIDUAL AND FAMILY

This theme is about multiple loss experiences. The person with the ABI experiences a loss of identity, memory, quality functioning, quality of health, and independence. Families experience the ongoing loss of the person they once knew or the loss of the person who could have been. ABI impairments are often not recognizable to others causing families to experience a social loss.

FAMILY ADAPTIVE CAPACITIES

This theme denotes the strength and resiliency of families as they cope with the ABI event. Families made sense of living with an ABI through demonstrating the capacity to reorganize roles, self-educate, and incorporate beliefs that further engendered acceptance and solidified their sense of belonging and identity as a family unit. These abilities show these families to be responsive and consider the needs of all family members while retaining the same controls on family function and structure.

Families made sense of living with an ABI through demonstrating the capacity to reorganize roles and self-educate.

EXPERIENCES WITH THE HEALTH CARE SYSTEM: HOSPITAL & HOME

This theme is also about the families’ experiences with the health care system. In the immediacy of the health crisis, they experienced support, however, leaving the hospital often meant they were on their own. Families experienced a health system that provided patient focused episodic care.

A PATCHWORK FUTURE: ENTERING THE UNKNOWN

This theme depicts the families’ vague sense about their future: positive yet uncertain. As families continue to think about the future (i.e., retirement, marriage, grandchildren), and while there is hope for continued recovery, there is a cautiousness, worry, uncertainty and fear of either regression or the return of another ABI event.

Health care professionals need to acknowledge and attend to the entire family system and not just the individual and primary caregiver. The first step for health care professionals is to purposefully ‘think family’ and then adopt intentional actions to assist individuals and their family units throughout the stages of recovery.

Describing Musical Form with Statistics

GRETTA SAYERS B.A., M.A., PhD CANDIDATE

Claude Debussy (1862 –1918) is widely regarded as one of the most important musicians of his time. One reason is that he embraced both traditional elements of 19th-century music and contemporary aspects of the 20th century. Such a stylistic dichotomy, while being a hallmark of Debussy's style, creates challenges in analyzing formal patterns across his works.

My research considers how we might discern form in Debussy's music from a perceptual or 'bottom-up' approach and then how we might describe that form. I offer a method of describing formal patterns that can accommodate a group of compositions with contrasting organizational principles, such as tonal and non-tonal works, and that can replace the expectation

of established formal patterns with associative relationships measured through statistical analysis.

After an initial exploratory analysis of Debussy's 24 piano preludes, I developed a vocabulary to define musical elements in the preludes and then identified associative relationships among the musical elements to describe formal patterns of the works. Associative relationships are measured statistically using Fisher's exact test to compare the presence of one musical parameter, such as an introduction, with the presence or absence of another, such as a fast opening tempo. These define patterns to serve as the formal backdrop against which the individual patterns of all 24 diverse preludes can be compared.

What Makes an Effective Reading Teacher?

JOE STOUFFER, PhD

Amidst charges that too many children are failing to achieve a satisfactory level of literacy, there remain concerns surrounding teachers' effectiveness. Debates of what is 'ideal' instruction that fosters reading success for children, beg an answer to the question: "What do we mean by an effective reading teacher?" Over time, drawing from their training and experiences, teachers construct knowledge and form beliefs about how literacy develops and how it should be taught.

Using surveys and observations with reading recovery teachers, and by reviewing recent studies of reading teacher effectiveness, Dr. Stoeffer found that exemplary teachers can be highlighted according to what they did (procedures), what they knew about reading development (knowledge), and what they believed about reading instruction (belief). Including the language and

prompts teachers give to their students as an important and observable factor of teachers' practice, Dr. Stoeffer created a framework with four dimensions: procedures, knowledge, beliefs, and language as interactive components of a teacher's personal theory of literacy instruction.

The reciprocal relationship among the four dimensions of a teacher's personal theory suggests that shifting teachers' practice may not be well attained by simply telling teachers what to do or say. This research shows that effective teacher preparation and professional learning needs to be broader than 'tips and tricks' but must assist teachers to build knowledge of how reading develops and determine what is most important in the process of teaching someone to read.

Rural Teacher Professional Development

CANDY SKYHAR, PhD

Rural school divisions and teachers face challenges providing effective teacher PD due to funding, geography, staffing, and contextual differences. The question of how rural divisions and teachers create models of PD is an important one in terms of equity. For quality educational programming to exist for rural students, rural educators must have access to opportunities for professional growth and access to PD that is relevant to their unique contexts.

Through a qualitative, single case study design, Dr. Skyhar's research examines the effectiveness of the Numeracy Cohort,

a locally constructed teacher PD model, implemented in a small rural Manitoba school division. In addition to identifying several challenges faced by the division and its teachers, findings from the study suggest that the Numeracy Cohort's design was able to mitigate several of these challenges. The model supported teachers' professional growth, and fostered a sense of community, collaboration, and accountability for learning. The model also provided valuable pedagogical content, time and resources to support learning, and opportunities for teachers to work on areas of their choosing using action research.



Improving Nursing care for aging LGBTQ adults



NADINE HENRIQUEZ, RN, MN

Assistant Professor, Nursing

Previous research has shown that health inequities for the Lesbian, Gay, Bisexual, Transgender and Queer/Questioning (LGBTQ) community are related to differences in access to health services, unhealthy or risk-associated behaviours, and the overall negative impact of experiences of discrimination.

While LGBTQ older adults experience challenges similar to other older adults, they may also face unique barriers that can decrease their quality of life in later years.

Nursing students have the potential to influence the lives of thousands of patients, families, co-workers, and community members during their career. Well-developed knowledge and skills for providing holistic, culturally sensitive care to LGBTQ older adults and their families will positively impact the health and well-being of the LGBTQ community.

This project introduced an older adult transgender family case model using a method that unfolds or evolves over time to undergraduate nursing students. Students provided narrative feedback and quantitative numerical ratings prior

to and after the educational interventions. Surveys focused on examining students' abilities to identify and discuss health disparities and comfort levels in providing nursing care for patients from the LGBTQ community.

Students reported increased knowledge on LGBTQ culture and transgender older adults and increased empathy and insight into patient perspectives for transgender families. Students also described significant increases in abilities to describe LGBTQ health disparities, demographics, strategies for creating welcoming environments and self-perceived effectiveness of being able to communicate with LGBTQ people sensitively. The most notable finding was a significant increase in students' reported comfort levels in providing nursing care to the LGBTQ community following the implementation of the case model.

Notable was a significant increase in students' comfort levels in providing care to the LGBTQ community.

By including LGBTQ families in the curriculum, faculty can foster the development of inclusive and nonjudgmental practices in a safe, supportive, educational setting. This approach allows students to examine their biases and to practice gender-affirming communication techniques and helps to prepare students for future challenges working across cultures in diverse communities. This model provides an opportunity to normalize sexual and gender diversity in the nursing curriculum, and helps to provide students with skills for providing inclusive and equitable care for LGBTQ persons.

100,000 Lakes

T. PATRICK CARRABRÉ, PhD

Cultural initiatives formed an important component of the Canada 150 celebrations, with many new works designed to focus attention on the positive qualities of Canadian society. Some members of the Indigenous community criticized the celebrations for ignoring the significantly longer history of their habitation in this geographic region and the many hardships they continue to suffer in postcolonial Canada.

100,000 Lakes is a commissioned work for string quartet and piano. By providing a contextual program note, an introduction from the stage, and descriptive titles for each of the four movements highlighting our longer geo-history (Glacial Expanse, Ice Melt, Flood, Remnants “100,000 Lakes”), Dr. Carrabré supplied the audience with possible starting points for their listening journey, or for further discussion on a range of issues from climate change to decolonization.

Following the performance of this piece, several audience members shared how they connected to the music. One spoke of the impact the glacier had on their farmland, leaving many different sized rocks for them to plow around. Another commented on how they had never thought about the formation of Manitoba’s 100,000 lakes.

While composer Igor Stravinsky famously believed that music is “essentially powerless to express anything at all,” sharing compositional inspiration and various types of metaphor can help the listener to engage with intellectual concepts. This may, in turn, provide a deeper aesthetic experience to the listener and opportunities for engaging audience members in matters beyond the purely sensual or abstract elements of the music. Hopefully, this music makes a small contribution to the evolution of our human geography, as we produce a Canadian culture that embraces beauty in all its forms.

To Build a Ghost House on Your Territory

AARON WILSON, DMA,
& PETER MORIN, MFA

In June 2018, Peter Morin and Aaron Wilson were asked to perform at the Savvy Contemporary Gallery in Berlin, Germany. The two performances addressed decolonialism and collaboration across disciplines and cultures.

Collaboration between Indigenous and Western artists is a profound way to promote healing from colonialism. Our two methods for performance, the hand drum and the trombone, are perceived to be at crossed purposes because of their specific histories. Collaboration between the trombone, what Beethoven and other classical composers referred to as the “voice of God”, and the hand drum, referred to as the “heartbeat of the nation” in Indigenous cultures, should not exist. To present this new song, especially on foreign soil, we needed to build a new space for it. We referred to this as the ‘sonic ghost house’. It was a space for us to honor both of our performance practices and to address the regrettable history of colonization. Through this performance, we hoped that we, and our audiences, would find understanding, connection, beauty, and healing.

In the first of our two Berlin performances, we told the story of colonialism. Peter sang traditional songs along with his hand drum, and I performed sea shanties and the actual piece of music that Christopher Columbus and his crew sang upon reaching the New World. This developed into confrontation, conflict, and musical shouting between the two of us representing the painful history of colonialism on the North American continent. This conflict was unsustainable, and after working ourselves into utter exhaustion, we needed to find healing. Peter healed the trombone piece by piece while echoes of Columbus’ song rang through the increasing dismantled instrument. Once all pieces were healed, we wrapped the instrument in a blanket and let it rest overnight. In our second performance, we unwrapped and reassembled the trombone and performed improvised songs together celebrating friendship and reconciliation, concluding with both of us singing into the trombone.

We want people to be more open to collaboration across cultures. The tragic history of colonialism has made it difficult for new partnerships to be forged. It takes effort and continued communication to heal those wounds, but beauty can emerge out of this effort. We both encourage others in all disciplines to follow our example and make something new through collaboration and understanding.

Cross-Border Shopping: Economic Growth & Drain



DOUG RAMSEY, PhD
Professor, Rural Development



TATJANA THIMM, PhD
Professor, Economics & Social Sciences at the Applied University of Konstanz, Germany.

No two border regions are alike. International borders can have substantial impacts on the tourism industry, particularly in communities located adjacent to borders.

Cross-border shopping, for example, can be a tourist draw for one region and at the same time an economic drain for another. The researchers addressed the economic impacts of political and economic conditions in two distinct border regions. The research was based on a previous survey of shoppers in the Germany–Switzerland case study. Data including border crossings, employment, currency values, media accounts, etc., were utilized to make direct comparisons in each of the case study regions.

The European example involved a border between Germany and Switzerland that includes a densely populated, weakly secured border with tax incentives that exacerbate cross-border shopping on the German side of the border, while negatively affecting businesses on the Swiss side of the border. The North American example examined the sparsely populated region of the U.S. Great Plains and Canadian prairies with an increasingly secured border that lacks formal incentives such as tax rebates for purchases made on either side.

Border security is also quite different in both locations. The border between Germany and Switzerland is fairly open compared to the border between North Dakota and Manitoba, where passports have been required since 2009. At the same time, the limit on goods purchased has been raised. Employment rates and currency values continue to influence border crossings, which includes shopping in both regions.

There can be positive and negative outcomes for regions on either side of the border in question. Issues such as population density, border security, external events (9/11, BSE, SARS, refugee crisis), the economic condition, and political conditions were identified to affect border crossings.

In Germany and Switzerland, currency value and taxation levels, both of which are higher in Switzerland, continue to result in a high volume of cross border shopping as Swiss residents seek value.

This research is useful to border communities and regions trying to adapt to changing political, economic, and social conditions. For example, there are periodic campaigns in North Dakota offering deals to attract Canadian shoppers. Interestingly, the Canadian government has made shopping in the U.S. more lucrative by raising the duty-free limit. The Swiss border region has countered the loss of shoppers with campaigns about staying home to shop. The German government has also responded by increasing the minimum purchased required to receive tax exemptions.

Population density, border security, economic conditions, and politics all affect border crossings.

“The Dead Art of Poetry”: Approaches to Teaching Ezra Pound’s Poetry and Prose

T. DEMETRES TRYPHONOPOULOS, PhD,
& IRA B. NADEL, PH.D. (MLA)

The distinguished Modern Languages Association series on teaching includes more than 150 volumes, but a volume on Ezra Pound—arguably the founder of the modernist movement and one of the most difficult of modernist writers in terms of form and content—has not been undertaken until now. This new volume will make the teaching of Pound’s poetry more accessible and easier to discuss in the classroom.

Ezra Weston Loomis Pound (1885-1972), was an expatriate American poet and critic and a major figure in the early modernist poetry movement. This teaching volume includes a series of essays written by 18 scholars, plus a 20,000 thousand-word introduction in which the editors outline Pound’s biography, publication history, literary reception, and his ideas about teaching.

Tryphonopoulos was invited by the MLA Series Editor to produce this volume following a prescribed, three-stage process that required developing a proposal, a prospectus, and a final manuscript. At each stage, the submission was reviewed by three referees and approved by the MLA’s Editorial board.

The researchers found that this poet, editor, essayist, translator, anthologist, and literary kingpin is—unquestionably—one of the most important and fascinating but also problematic writers of the 20th century. So how does one teach about such a poet whose work in general and *The Cantos* (his 800+ page “long poem” written over six decades)—more specifically, may be viewed as an authoritarian summing up of the most abhorrent 20th century ideologies and prejudices?

One of the things both editors and contributors discovered is various ways of rendering the difficulties Pound’s texts present as opportunities to delve deeper into understanding his work but also the work of other modernists.

The Invisibility Cloak of Nature’s Most Complex and Challenging Parasites

BERNADETTE ARDELLI, PhD

Diseases caused by parasites threaten the lives of nearly 80% of the world’s human population; about one-third of these infections are caused by the parasites we study in this research. In terms of disease control and management, vaccines are the most desirable strategy as they can provide a lifetime of protection. Despite considerable efforts on part of the scientific community, an effective vaccine against any of the major parasitic infections of humans has not been realized. The majority of control programs rely on the method of ‘environmental sanitation’ either through the use of therapeutic agents to eliminate or prevent the establishment of stages in the hosts, or through the use of insecticides or pesticides to prevent establishment of infectious stages in insect vectors. The reliance on drugs in combination with their misuse (e.g., under-dosing) and has resulted in drug resistance. Thus, new methods of control are urgently needed.

This research focuses on a group of parasites, Kinetoplastida, which have been around for millions of years wreaking havoc in plants, animals and humans, taking their toll in lives and economic losses. Despite being one of the best-studied group of parasites, efforts to control their destruction have met with limited success, as they have evolved a number of sophisticated self-protection methods. One of these methods, called antigenic variation, involves the parasite creating an ‘invisibility cloak’ that enables it to hide from the immune system. The parasites have unique molecular machinery that allows them to change their cloak (i.e., a surface made of proteins) indefinitely until the host dies. The model kinetoplastid, *Cryptobia salmositica*, used in this study is not infectious to humans. The science of bioinformatics was used to search over 38 million codes within the genome of *C. salmositica* and locate the molecular machinery required for antigenic variation.

To illustrate the enormity of this task, transferring the *C. salmositica* genome to Word would create a document 12,786 pages long. Since we have demonstrated that this parasite has the capacity for antigenic variation, we can manipulate the genome (e.g., gene deletion or silencing of components of antigenic variation) to ultimately unlock the secrets of the invisibility cloak. If the ability of these parasites to make their invisibility cloak is thwarted, the parasites can be eliminated.

The Future of Blockchain Technology



GAUTAM SRIVASTAVA, PhD

Associate Professor, Mathematics and Computer Science



ASHUTOSH DWIVEDI

PhD candidate



RAJANI SINGH

PhD candidate

The blockchain is the core mechanism for cryptocurrencies like Bitcoin. Blockchain technology can be regarded as a public ledger, in which all committed transactions are stored in a chain of blocks.

This technology has far-reaching possibilities of applications beyond finance in areas such as healthcare, voting systems, and civil document management to name just a few.

To date, we have explored the possibilities of implementing blockchain technology in voting systems. One of the biggest problems plaguing society today is that of fraudulent elections. The world's largest democracies still suffer from flawed electoral systems. In current voting systems, we see problems with vote rigging, hacking of the EVM (Electronic Voting Machine), election manipulation, and polling booth capturing. We have proposed a novel voting model, which can resolve these issues. Using blockchain technology, we try to alleviate known problems in voting systems. Furthermore, the advantage of using our model is that it is compatible with all voting schemes. So, one can implement our model using any voting scheme depending on the requirement of the different type of elections.

Using blockchain technology, we try to alleviate known problems in voting systems.

We have also explored the on-going game that exists between the miners in Bitcoin. Miners in bitcoin receive reward payments for confirmation of transactions, thereby making the mining of bitcoins a competitive activity. We have found provable results stating that it is better for miners to work together to mine bitcoins rather than against each other. These findings are not only in the best interests of the miners but for the currency itself.

We see research in blockchain technology taking over many public services. Since the blockchain is secure, decentralized, and can be easy to use, it can have far-reaching uses in all facets of public administration.

Engaging Communities in Sustainable Food Systems Research

KRISTEN LOWITT, PhD

For Indigenous communities across Canada, re-establishing access to traditional foods (also called ‘country foods’) is a key pillar of achieving food security and food sovereignty. For the Saugeen Ojibway Nation (SON) in Ontario, engaging in wild harvest activities throughout their traditional territory on the Saugeen (Bruce) Peninsula and the waters of Lake Huron and Georgian Bay has long been vital to their food systems, culture, and trade. Fishing is of special significance to the Saugeen Ojibway peoples, with the Ontario Supreme Court reaffirming in 1993 that SON has an Aboriginal and treaty right to fish for commercial and sustenance purposes within their traditional territory.

This project was a partnership-based study involving the researcher and SON, which looked at the relationships between access to fisheries in SON’s traditional territory and outcomes for food security in terms of access to sufficient, nutritious and culturally appropriate food.

A key finding was that while access to fish for food security depends on SON’s legal rights to the water, these are not sufficient to derive food security benefits. Due to the disruptive impacts of colonialism, more attention needs to be placed on strengthening the social mechanisms that are important to SON making better use of their legal rights. These include enhanced transfer of inter-generational fishing knowledge, rebuilding cultural identities tied to land and water, and strengthening community sharing and exchange networks.

Maintaining Agriculture in Urban-Influenced Areas

MIKAËL AKIMOWICZ, PhD

Rapid urban development threatens agriculture around metropolitan areas as urbanization takes place at the expense of surrounding farmland. A dynamic farming sector in an urban-influenced area can contribute to the sustainability of metropolitan areas through the provision of goods and services that are by-products of the productive activity (e.g., beautiful landscapes, rich biodiversity, and flood control). For farmers, operating a farm in an urban-influenced area is both a source of opportunities (e.g., direct marketing, income diversification) and constraints (e.g., conflicts with residents, increased competition for land).

This project investigated farm investment dynamics to

Can Ancient Arctic Swamp Forests Help Us Predict the Effects of Climate Change?

MARKUS SUDERMANN, GRADUATE STUDENT
& DAVID GREENWOOD, PhD

Current global climate change is already having drastic impacts on plant ecosystems, especially in the Arctic. The long-term responses of plant ecosystems are difficult to predict due to complex variables affecting plant migration and adaptation.

The high latitude regions are warming much faster than the rest of the world due to climate change from rising levels of greenhouse gases, and polar ice caps are disappearing at an alarming rate. Because of rapid climate change, there is great concern about how plant communities will respond.

We studied ancient swamps that are preserved as coals at Stenkul Fiord, Ellesmere Island, Nunavut, which contain fossilized pollen and spores of plants that lived in the Arctic during the early Eocene (~56 million years ago). Understanding how local climatic conditions changed in response to rapid climate warming, and how those changes affected the structure and diversity of ancient forests, will provide an idea of what to expect in the future over relatively longer time-scales.

Results showed how over ~1 million years Arctic plant communities gained warm-adapted plant species in response to global warming and lost these unique plants species associations during cooler intervals. This allowed the researchers to examine changes in plant communities in response to rapid climate change. Plants seen in these coals include species that are common to eastern North America, such as alders, elms, hickories, walnuts, chestnuts, pines, firs, and even swamp cypress trees like those in Florida.

understand how to maintain a viable urban-influenced farming sector. The research was conducted in Toulouse, France, and highlights that several organizations involved in agricultural development have worked in different directions for too long. Together with farmers, these organizations need to define a common project to align their visions of the future—e.g., a local food policy.

The results can be transferred to the Manitoban context, where the farming sector is also threatened by rapid urban development and where farmers need to develop strategies to adapt to their urban-influenced environment.

Robert's Motets pour la Chapelle du Roy: The Missing Link



ANDRÉE DAGENAIS
B.MUS., M.MUS., D.M.A.

Associate Professor, School of Music

Pierre Robert (ca. 1625-1699) was appointed along with three other composers to the Royal Chapel during the reign of Louis XIV in 1663 to provide music for the daily mass.

His *Motets pour la Chapelle du Roy*, a collection of 24 motets (short pieces of sacred choral music), were printed in 1684 “par exprés Commandement de Sa Majesté” in 19 separate partbooks. While no extant manuscript of Robert’s motets à grand choeur remains, three printed sets of partbooks have been located. Although the notation is clearly printed, the uniformity of the printing process conceals information for the understanding of the performance practice and the circumstances of performance of this repertoire.

The opulence and prestige of the collection and the fact that very few handwritten corrections were found in the parts, lead to the conclusion that these partbooks were actually intended as a reference collection and not to be used as a performing edition.

The editorial process showed that a number of parts could be mistaken as being similar, when in fact slight variations in the text setting, subtle differences with rhythms and the use of different clefs for similar parts cast doubts. Furthermore, in a few instances, two identical solo vocal parts were found in two different partbooks.

These observations lead us to surmise that this collection is not necessarily a copy of parts that were in use, but rather a collection of materials that synthesizes all performing possibilities for these motets à grand choeur. This perspective opens the possibilities for these works to be performed by a lesser number of performers than the number of parts

featured in the reference collection, which includes eight soloists, a five-part choir, and a five-part string orchestra.

Lastly, the methodical work involved in the preparation of this edition will lead to some

insights about when and how the string instruments were introduced to the Royal Chapel.

This research project provides a modern conducting score and parts accompanied by a critical apparatus to understand key points about how this music was used and under which circumstances it was performed. It also fills the gap needed to fully understand the evolution, stylistic trends, and practical considerations surrounding the circumstances and performance of this genre in 17th-century France.

The overall editing process gave rise to a number of questions in regard to the circumstances of performance and the performing forces themselves.

The Anthropocene and the Image of Science

ANDREW INKPEN, PhD

In 2016, a group of scholars recommended that the world officially recognize the Anthropocene as a new geological epoch, with humans a major geological and environmental force on par with natural forces. This has proven to be a hotbed for discussion well beyond geology, compelling scientists and humanists to confront problems and systems that transgress traditional disciplinary boundaries. This project explores how recent changes within science justify rethinking a prevailing image of how science is done, and with it, the working relationship between scholars in the humanities, natural scientists, and social scientists.

This research is interdisciplinary and brings together methods from the history and philosophy of science, the social sciences, and the natural sciences. As a philosopher of science, I focus on clarifying concepts and on how values enter into and shape scientific research.

So far, we have suggested three central issues. First, given the preponderance of natural-social systems in the Anthropocene, there are circumstances when analyzing such systems requires new methodological standards. We have focused on theoretical modelling in ecology and economics. Second, science during the Anthropocene will increasingly link the normative and the scientific, where questions of how and what we should study imply questions of value. Finally, because the vast majority of Anthropocene science will be interdisciplinary, we have sought to identify mechanisms that allow researchers to engage with social scientists and scholars in the humanities.

This research may be used by scholars interested in the philosophical theory behind interdisciplinary work, or who are trying to understand and overcome the impediments to interdisciplinary work, or who are interested in developing and exploring ways of doing scholarship that is not as siloed by disciplinary affiliation.

Men, Masculinity, and Popular Romance

JONATHAN ALLAN, PhD

In this project, I consider a range of texts, from Harlequin romances to *Fifty Shades of Grey* and beyond to explore the ways in which authors represent and present the male body, ideas of masculinity, and men. Men and masculinity are becoming more fluid and more inclusive, and yet, when confronted by the popular romance novel, we see a continued interest in and desire for traditional masculinities.

Romance novels are largely written by women, for women. In which ways do romance novelists present masculinities and men? Romance novels tend to present an ideal man who is a young, white, urban, northern, heterosexual, educated, fully employed, of good complexion, weight and height, and with athletic achievement. However, what might it mean to challenge these ideas? For example, what happens to the 'virgin' hero, rather than heroine, in the romance novel? Or, what happens in romance novels that are about two men?

This research brings together critical studies of men and masculinities to the study of popular romance novels. In particular, I read novels closely and look at how the authors construct and imagine masculinities.

I am also interested in the covers of these novels, particularly the ways in which the artists portray and imagine the male body.

So far, while there are challenges to masculinity in the popular romance novel, the vast majority still uphold the ideas and ideals of traditional masculinity. However, my research is not done yet and I imagine that I will find some challenges. What is interesting is how romance novels are reflecting on the complexity of gender and gender relations. For instance, we have seen a marked shift in 'safer sex' practices in novels — a response to the culture in which the novels are being read.



Economic Disadvantage of Single-Parent Families



LEVIN WONG, PhD
Associate Professor, Sociology

At the community level, the concentration of single-mother families is one of the most powerful predictors of youth crime.

An understanding of this relationship is important in devising crime control policies as well as community support for single-mother families. The research is based on data from the Canadian Census and crime rates from over 400 Canadian municipalities. The analyses are based on data collected between 1996 and 2011. The effects of the concentrations of single-mother families (SMFs), single-father families (SFFs), couple families (CFs), and other sociodemographic variables on youth crime were estimated using statistical analysis.

As social control agents for youth, are single-parent families as effective as two-parent families? Based on municipal-level data, my research found that the concentration of single-mother families (SMFs) caused youth crime to increase. On the other hand, the concentration of single-father families (SFFs) had a neutral effect (i.e., near zero effect) on youth crime, similar to the effect of two-parent families.

Do the economic conditions of the SMF explain the effect of its concentration on youth crime? The results revealed that the economic conditions of the SMF did not have much effect on youth crime, but the unfavorable economic conditions of the SFF had significant and moderate crime-causing effects.

Does the crime-causing effect of the SMF on youth crime reduce as the prevalence of the SMF increases (i.e., when it becomes more common or normalized)? The results from my analysis did not support the 'normalization hypothesis.' Quite the contrary, the effect of the concentration of SMFs on youth crime increased with its prevalence, thus supporting the 'minority threat hypothesis' instead.

From the above questions and findings, one can ask and perhaps answer a number of practical questions. Here is an example: 'Will throwing money at the problem solve the problem?' 'Can alleviating the economic conditions of the SMF help to reduce youth crime?' Unfortunately, based on the research findings, there is no evidence supporting an affirmative answer. Instead, the findings lead to the rather unsettling suggestion that alleviating the economic conditions of the SFF might produce a moderate crime-reduction effect. Of course, one can dismiss the findings as a fluke—or—further research is needed as we may not yet have the final and definitive answer.

Discriminatory policing: In my next project, I will examine the relationship between the concentration of SMFs and the crime clearance rate. This explores the other side of the equation. That is, is it possible that the police may target the SMF and its youth, thus causing the rate of youth crime to increase (i.e., the mobilization of law effect)? In other words, targeted policing may manufacture crime, and targeted policing against the SMF and its youth may manufacture youth crime.

Do the economic conditions of the single-mother families explain the effect of its concentration on youth crime?

External and Internal Research Funding

Brandon University researchers received more than \$2.5 million in external research funding for the 2018–19 year. The following tables identify the research funding received by Brandon University faculty members in the 2018–19 year. Tri-agency grants are highly competitive grants received from three funding agencies: Canadian Institute of Health Research (CIHR), Natural Sciences and Engineering Research Council (NSERC), and Social Sciences and Humanities Research Council of Canada (SSHRC). Other granting agencies include the Canada Foundation for Innovation (CFI), Canada Research Chairs (CRC), Research Support Fund (RSF), Government of Canada, Manitoba Provincial Government, industry and others.

The Brandon University Research Committee (BURC), through its annual competition, allocated more than \$100,000 additionally to BU researchers. New researchers may apply for up to \$7,500 and experienced researchers up to \$4,000. These funds are intended as seed money to develop research for larger national grant applications.

EXTERNAL RESEARCH FUNDING 2018–19

Natural Sciences and Engineering Research Council of Canada (NSERC)

Total \$278,500

Researcher	Faculty/School	Grant	Title	Years	\$ Awarded
Nancy Stanley	Education	Physical Education	PromoScience Supplement	1	\$ 5,000
Nancy Stanley	Education	Physical Education	PromoScience Supplement	1	\$ 5,000
Paul Alexandre	Science	Geology	Collaborative Research & Development	2	\$ 56,000
Pete Whittington	Science	Geography	Collaborative Research & Development (ULaval sub grant)	1	\$ 15,000
Vince Chen	Science	Chemistry	Discovery Launch Supplement	1	\$ 12,500
Vince Chen	Science	Chemistry	Discovery	5	\$ 185,000

Social Sciences and Humanities Research Council of Canada (SSHRC)

Total \$ 396,334

Brandon University	n/a	n/a	Institutional Grant	3	\$ 128,397
Allison McCulloch	Arts	Political Science	Insight (Univeristy of Alberta sub grant)	1	\$ 7,000
Alysha Farrell	Education	Education	Insight Development	2	\$ 61,665
Doug Ramsey	Arts	Rural Development	Aid to Scholarly Journals	3	\$ 66,150
James Naylor	Arts	History	Connection	1	\$ 25,000
Kristen Lowitt	Science	Geography	Partnership Engage	1	\$ 24,965
Patricia Douglas	Education	Education	Partnership (Ryerson sub grant)	1	\$ 10,000
Petrella Serena	Arts	Sociology	Partnership (University of Manitoba sub grant)	7	\$ 16,900
Rachel Herron	Science	Geography	Insight Development	2	\$ 56,257

Canada Foundation For Innovation(CFI)

Total \$15,849

Researcher	Faculty/School	Grant	Title	Years	\$ Awarded
Brandon University	n/a	n/a	Infrastructure Operating Fund	1	\$ 15,849

Canada Research Chairs (CRC)

Total \$560,000

Jonathan Allan	Arts	English & Creative Writing	Research Stipend	1	\$ 20,000
Rachel Herron	Science	Geography	CRC Tier II	5	\$ 500,000
Rachel Herron	Science	Geography	Research Stipend	1	\$ 20,000
Sarah Plosker	Science	Mathematics & Computer Science	Research Stipend	1	\$ 20,000

Research Support Fund (RSF)

Total \$372,731

Brandon University	n/a	n/a	Research Support Fund	1	\$ 372,731
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Government

Total \$462,930

Canada				Subtotal Canada \$ 366,807	
Ayat Baig	Science	Geography	Western Economic Diversification	1	\$2,100
William Ashton	Arts	RDI	Indigenous Services Canada	1	\$85,840
Manitoba				Subtotal Manitoba \$ 96,123	
Bernadette Ardelli	Science	Biology	Manitoba Health	1	\$ 24,761
Deanna Smid	Arts	English & Creative Writing	Research Manitoba Connection	1	\$ 3,500
Donna Lowe	Library	Library	Manitoba Heritage	1	\$ 6,921
Eftihia Mihelakis	Arts	Classical & Modern Languages	Research Manitoba New Investigator	2	\$ 34,522
Nancy Stanley	Education	Physical Education	Manitoba Heritage	1	\$ 8,000
William Ashton	Arts	RDI	Indigenous and Northern Relations MB	1	\$ 18,419

Industry and Other Agencies

Total \$ 317,707

Candice Waddell	Health Studies	Nursing	St. Boniface University (sub agreement)	1	\$ 3,215
Hamid Mumin	Science	Geography	Cypher Environmental	1	\$ 1,500
Hamid Mumin	Science	Geography	Mitacs Accelerate	1	\$ 15,000
Hamid Mumin	Science	Geography	Gossan Resources	1	\$ 2,000
Pamela Rutherford	Science	Biology	Nature Conservancy of Canada	1	\$ 3,000
Pamela Rutherford	Science	Biology	Manitoba Habitat Heritage Corp	1	\$ 1,000
Rhonda Hinthier	Arts	History	Canadian First World War Internment Recognition Fund	1	\$ 29,068
Terence McGonigle	Science	Biology	Western Grains Research Foundation	5	\$ 89,815
Terence McGonigle	Science	Biology	Manitoba Beef & Forage Initiatives	1	\$ 11,000
William Ashton	Arts	RDI	City of Brandon-WOLG	1	\$ 40,000
William Ashton	Arts	RDI	IRW-UofM	1	\$ 86,241
William Ashton	Arts	RDI	Bolu Intermediary Services	1	\$ 150,000

TOTAL EXTERNAL FUNDING \$2,518,183

Brandon University Research Committee (BURC) Awards 2018-2019

NEW FACULTY RESEARCH GRANT

Principal Investigator	Title	Amount
Adam Rogers	Filamentary Plasma Lenses	\$ 7,166
Alexandra Giancarlo	"There's Nothing Half so Pleasant as Coming Home Again": Buxton Homecoming, Black History, and Canadian Identity	\$ 4,335
Andrew Inkpen	Health in Ecological Systems	\$ 7,431
Candice Waddell	Racism within the Health Care System: Reflections of Psychiatric Nursing Students	\$ 7,453
Lisa Wood	The Dinner Parties	\$ 4,380
Neal Melvin	The Biochemical Consequences of a Schizophrenia-related Mutation in the Calcineurin Gene	\$ 7,500
Rory Lucyshyn-Wright	Category-theoretic Structure of Variable and Distributed Quantities	\$ 7,496

RESEARCH GRANT

Principal Investigator	Title	Amount
Bruce Strang	Arms and the Yemen: Italian Economic and Military Influence in Yemen, 1931 to 1939	\$4,000
Cathryn Smith	Developing Capacity for Leading Change in Rural Educational Contexts through Simulation	\$3,994
Chenkuan Li	The Fractional Differential Equations in Distribution	\$4,000
Chris Malcolm	Community Attitudes Towards Estero el Salado, an Urban Protected Area in Puerto Vallarta, Mexico	\$3,156
Corinne Mason	#MeToo? Campus Sexual Assault and the (under) Utilization of Expert Knowledge	\$4,000
Deanna Smid	Bees in Manitoba: The History of a Love Affair	\$4,000
Hejun Zhuang	Bidding and Auction Design in Online Market	\$1,840
Lynn MacKay	Reprieving Annette Meyers: The Media and the Law	\$4,000
Mary Malainey	Testing and Assessment of the Olson site, DgMg-167	\$4,000
Megumi Masaki	PIANO BLAST, a New Work for Piano, Augmented Piano and Interactive Computer Game	\$3,441
Michael Charette	Identifying the Consequences of Mis-assembled Ribosomes in Manitoba's Bowen-Conradi Hutterite Syndrome	\$3,988
Mousumi Majumder	Cell Secretome Analysis to Identify Novel Secretory Proteins in Metastatic Breast Cancer	\$4,000
Pamela Rutherford	Effects of Grazing on Species-At-Risk Populations of Reptiles and Amphibians in Mixed-Grass Prairie	\$4,000
Simon Pattison	Petrology of Cretaceous Sandstones from Utah	\$4,000
Tyler Foster	Searching the Milky Way's High-Latitudes for Highly Magnetized Regions: The Galactic Anticentre	\$4,000

MOMENTUM GRANT

Principal Investigator	Title	Amount
Ariane Hanemaayer	A Critical Sociology of Community Medicine and Child Health in England in the 1960s and 1970s	\$ 2,000
Derrek Eberts	Cultural Heritage and Tourism in Mexico's "Pueblos Mágicos"	\$ 2,000
Jonathan Allan	The Foreskin Archive (Momentum)	\$ 555

TOTAL \$ 106,736

Centre for Aboriginal and Rural Education Studies (C.A.R.E.S.)

At the heart of all we do at CARES are rural and Indigenous students. We believe that working together can improve rural and Indigenous students' experiences with education. CARES research projects have involved topics such as youth homelessness in rural areas, pathways to educational and employment success, engaging youth in community change, and sexual exploitation of children and youth. The reports and publications from these projects are all freely available on our website BrandonU.ca/BU-cares

Institute for Research in Music and Community (IRMC)

The Institute for Research in Music and Community brings together creators, performing musicians and scholars, as well as representatives of the music industry, government, non-profit organizations, and listeners to better understand how musical communities develop and evolve through the influence of societal, stylistic, environmental, technological, and other factors. The IRMC seeks to study diverse musical communities, present and past. For more information please visit IRMC.ca

Centre for Critical Studies of Rural Mental Health

The Brandon University Centre for Critical Studies of Rural Mental Health was established in the spring of 2019. The intent of the Centre is to respond to the issues facing rural people and communities through innovative, community-connected research and education that will, in turn, inform mental health policies and practices. The Centre will act as a catalyst for collaborative rural mental health research while linking research results to people who can use them.

Rural Development Institute

Founded by Brandon University's the Board of Governors, the folks at the Rural Development Institute are proud of the 30 years of history as a centre of excellence. Besides over 3,000 reports, publications, and presentations all free to download, the Institute also publishes the peer-reviewed Journal of Rural and Community Development. As a multi-disciplinary centre, we apply our knowledge and expertise in Westman, Manitoba and across Canada. To help define our efforts we pursue five strategic directions: rural immigration, regional economic development, rural governance and capacity building, rural infrastructure, and rural innovation. For more, see BrandonU.ca/RDI

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