

Discourse

UNIVERSITY OF REGINA RESEARCH MAGAZINE SPRING / SUMMER 2019

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**Megan Smith's
virtual reality**



University
of Regina



RESEARCH STRENGTH:

ANXIETY, STRESS & PAIN

Pain, anxiety, depression, and stress can be understood as being part of a vicious, self-perpetuating cycle. Understanding, evaluating, and managing this cycle is the focus of University of Regina researchers working in this area of research strength.

Our researchers are tackling complex and costly human problems related to anxiety, stress, and pain, their clinical evaluation, manifestation, causal factors, and their management, with the goal of improving functional ability and quality of life for millions of people.

Discourse

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📷 (cover) Michael Bell

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DISCOURSE SUBMISSIONS

Discourse is a bi-annual publication. The call for submissions is sent out through the University research listserv. The call for submissions for the fall 2019/winter 2020 publication is in September 2019. The call for submissions for the spring/summer 2020 publication is in January 2020.

Discourse is intended to profile new and ongoing research projects by faculty, staff, and students, and showcase the breadth and depth of research being conducted at our University.

If you have a research project, recent achievement, award, funding update, have written or edited a book, or have been included in a world-class publication that you would like considered for inclusion in *Discourse*, or if you are working with students conducting interesting research, please send submissions to: discourse.magazine@uregina.ca.

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“There is no better way to fully understand a concept than to teach it enthusiastically to students – they can tell when you are fully engaged and passionate about your topic!”

Welcome to the spring 2019 edition of *Discourse* magazine! This issue presents more fabulous stories about our researchers and how they are making an impact on the lives of many people locally, nationally, and globally through their work.

Critical to the research our faculty undertakes is the role that students play in this “ecosystem” of discovery. Certainly the legions of graduate students are instrumental in the success of many of our faculty who employ them in laboratories, in the field, in the library, and in the classroom collecting and analyzing qualitative and quantitative data. Our students challenge us to stay current with the literature and they push our boundaries.

What goes under-rated – or at least unrevealed – is the tremendous role that our undergraduate students play in this research enterprise. Whether they are hired as teaching assistants to allow us more time to do research, or as research assistants with direct involvement in our work, undergrads have contributed greatly. If not directly involved in our research, they offer us indirect assistance when we bounce ideas off them in our lectures to see if what we dream up as “brilliant ideas” are clear and pass their critique. There is no better way to fully understand a concept than to teach it enthusiastically to students – they can tell when you are fully engaged and passionate about your topic!

While there are still many more stories to tell about the excellent scholarship and the interface between teaching and research at the undergraduate level, in this issue we focus on some outstanding examples of our undergraduate research, which is also a testament to our dedicated professors who have challenged their students to think outside the norm and produce new knowledge.

I would like to thank the University of Regina for allowing me to serve for the past 30 years of my career. In three decades, there have been very few days that I have not been absolutely thrilled to come to work. Thank you to the several thousands of undergraduate students I have taught, the graduate students I have mentored, and the colleagues I have worked with across many disciplines.

As a faculty member in the Faculty of Kinesiology and Health Studies (KHS) and an associate member in the Department of Philosophy and Classics, I must also thank my past deans, as well as senior administrators and presidents who over these years rarely questioned my ideas, but rather asked how they could assist – this has been and continues to be very much part of the University of Regina’s values that we are so fortunate to share.

It has been a privilege to work at this truly wonderful institution and I am grateful for the friendship and kindness from so many. As of July 1, I will take on a new role as Principal of King’s University College at Western – an exciting opportunity and, for me, a return to familiar ground. [D](#)

Sincerely,

DAVID MALLOY
Vice-President (Research)



(l to r) Calum Neill, Katherine Arbuthnott, and Janelle Gerard on a park bench in Regina's Wascana Park near the University's main campus.

It only takes five minutes of sitting in nature (no exercise needed) to feel psychologically better.

Natural mood boost in just five minutes BY K.D. SAWATZKY

Feeling stressed? Try sitting in a park for five minutes; it might be exactly what you need to boost your mood. That's what two psychology undergraduate students working in the emerging field of environmental psychology will tell you.

Janelle Gerard and Calum Neill, together with their psychology professor and supervisor Katherine Arbuthnott, recently published a study that statistically proves that sitting in nature for just five minutes improves one's mood.

For Gerard, the study has clear implications for students' mental health.

"Post-secondary students have higher rates of anxiety and depression than the general public, and it's common for them to not seek treatment, whether because of a financial barrier or other barriers related to stigma," says Gerard. "Our research is important because nature is typically accessible to everyone."

Published online in *The Journal of Positive Psychology*, results from their study have been picked up by local, national, and international media, including the popular psychology news site, *PsyPost*.

"It's such an easy, good-news story," says Arbuthnott. "Short, sweet, simple, and useful."

For the study, Gerard and Neill surveyed participants before and after they sat on a park bench in Regina's Wascana

Park for five minutes. Gerard found that contact with nature significantly increased positive hedonic emotions (happy, interested, excited) and self-transcendent emotions (awe, wonder). Neill looked at whether longer exposure to nature (five versus 15 minutes of sitting) increased mood benefits. They also included data from previous research related to the effects of nature exposure on emotions for this investigation.

When combined, the students' research paints a clear picture: a very small amount of time in nature significantly increases positive emotions, while longer exposure doesn't magnify them. In other words, it only takes five minutes of sitting in nature (no exercise needed) to feel psychologically better.

For Neill, who has now graduated, the study points to the power of green spaces in cities. "Urban planners can make better use of green spaces to help people self-monitor and regulate their emotions."

Arbuthnott says she's glad the study has been well received, and that having undergrads engaged in this type of research gives her hope for the generation of students she teaches today.

"Students' emotional well-being is much more at risk than it's been before," she says. "That they're interested in focusing on how nature influences mental wellness is encouraging to me."

Garbage robot for the win

BY DEBORAH SPROAT

Hackathons – collaborative computer programming events – provide opportunities for aspiring software engineers to improve their problem-solving and coding skills as they attempt to find innovative solutions to problems.

University of Regina undergraduate software systems engineering students Maksym Zabutnyy, Ian Quach, Taylor Petrychyn, and Paul Hewitt have honed their skills over many hackathons.

This year, those skills won them the right to compete in the programming division at the national level at the Canadian Engineering Competition (CEC). They came home with third place in the programming division, a huge achievement that shows that Regina can compete with the best.

The team hopes their win will inspire other engineering students to participate in competitions.

“Hopefully it sparks interest, because there are other people who absolutely can display their skills at the regional or national level,” Zabutnyy says.

To compete nationally, the team first had to win at the Regina Engineering Competition, then place first or second at the regional level. They placed first in their division at the Western Engineering Competition (WEC) at the University of Manitoba.

At WEC, programming teams had to create a simulation to clear a snow-covered parking lot that had unknown catch-basin locations, without hitting any of the basins.

At the national competition, held at the University of Waterloo, they competed with the top teams from across Canada. Teams were given eight hours to program a robot that could clean a restaurant automatically and efficiently.

“The big challenge was getting the computer to think for itself and make its own decisions because we weren’t allowed to send any commands. We just had to click a button and let it go,” Hewitt says. “No matter what kind of map it got or what kind of restaurant it got put in, the robot had to figure out the most efficient way to scan for garbage, locate it, and sort it.”

At the same time, the team had to develop their “product pitch” for the judges. Their goal was to emphasize real-life uses for the product they developed.

Petrychyn says theirs was the only team that built a user-interface that would allow someone to visually track the robot’s progress.

“If you were a restaurant manager – that’s who we were selling it to – you could actually run it,” he says. “Because a software engineer is not going to be the one running the garbage robot every night at a restaurant.”

The students say participating in competitions and hackathons gives them new skills and increased confidence as they move into the job market.

“What I got out of CEC, and all the competitions we have been doing together, is a better sense of where my skills are lacking and how I can improve upon them. Now I have a goalpost I can strive towards,” Quach says.

Plus it’s fun.

“I will always remember the time we went to Waterloo to compete against all the other engineering schools in Canada, and our team ended up third on the podium,” Hewitt says. “It was pretty cool.”

Ian Quach, Paul Hewitt, Taylor Petrychyn, and Maksym Zabutnyy with medals and trophies from their recent podium finishes at both the Western and Canadian Engineering Competitions.



“I will always remember the time we went to Waterloo to compete against all the other engineering schools in Canada, and our team ended up third on the podium,” Hewitt says. “It was pretty cool.”

Through the research, Adams came to know the women she was reading about and says it's important for women today to know about the struggles of earlier generations of Prairie women.



Mainly for women

BY DEBORAH SPROAT

The experience of women living on Prairie farms in the 1930s came alive for undergraduate history student Brandi Adams when she delved into the archives of *The Western Producer*, a farm weekly that's been an important source of news for farm families for almost 100 years.

Working with digital copies of October issues of the paper published over a 12-year span between the two World Wars, Adams read countless letters and articles written by women of the time and published in the paper's "Mainly for Women" section.

Originally done as a history assignment, her paper, "Violet McNaughton and the ideal Prairie woman," was later published in the winter 2019 edition of *Alberta History*.

Adams found that the women created a community through the pages of *The Western Producer*, and that they shared values such as hard work, self-sacrifice, and frugality, together with a belief in the importance of community and the value of education.

The "Mainly for Women" section was edited by farm leader and social activist Violet McNaughton. Adams says McNaughton wrote articles aimed at empowering Prairie women; she encouraged them to take an active role in their community and improve their way of life, focusing on issues such as education and access to clean water.

It was obvious the women respected McNaughton, she says, and they regarded her as a member of their community, "someone who would advocate on their behalf, someone who would agree with a lot of the same values and ideas that they had."

Through the research, Adams came to know the women she was reading about and says it's important for women today to know about the struggles of earlier generations of Prairie women.

"I really enjoyed getting to know these women, the relationships they had with one another, and the back-and-forth," says Adams. "Even though the 1930s seem distant from us, I really felt I had connected with them in some way."

Adams is now a 4th year honours history student with plans to continue focusing on women's history at the graduate level. She is particularly interested in the history of the 1950s and is currently researching the home economics club of Regina by studying minutes and scrapbooks housed in the Saskatchewan Archives.

"I think the 1950s is an interesting era because it was a time of great change," she says. "There was a push to put women back into the home. A lot of women really rebelled against that and resisted that push towards suburbia and home life. I find that fascinating." [D](#)

Brandi Adams with a copy of the *Alberta History* journal where her article appears.



A doorway to culture

STORY AND PHOTOS BY SHUANA NIESSEN What is the connection between horses, educational psychology, and Indigenous youth and culture?

Reconnecting with cultural and traditional ways of knowing and being is increasingly seen as a significant part of the healing and learning process for Indigenous peoples, whose cultures have been historically and systemically oppressed through colonization.

A key focus of cultural preservation and reclamation has been language revitalization, but a relatively new and less understood approach to learning and healing, at least among the scientific community, is Equine Assisted Learning (EAL). For Indigenous peoples, however, horses have long been viewed as healers and as carriers of knowledge. The preservation of the critically endangered Lac La Croix Indigenous Ponies is part of the process of cultural reclamation and preservation, and to healing and learning, as relations between Indigenous horses and peoples are (re)established.

Angela McGinnis, an Indigenous health researcher and assistant professor of educational psychology in the University of Regina's Faculty of Education, along with her graduate student Kelsey Moore, are conducting research to better understand how and why Indigenous youth benefit from working with Indigenous horses, specifically seven Lac La Croix Indigenous Ponies.

The ponies, located at The Red Pony Stands® Ojibwe Horse Sanctuary, are cared for by McGinnis and her partner, Cullan McGinnis, who own and operate the not-for-profit organization.

The Indigenous couple also founded the sanctuary, and, while they receive some financial support from private and corporate sponsors and donors, that support doesn't cover all of the costs. "The majority of the work and expenses

to keep the ponies happy and healthy, both physically and spiritually, fall on my partner and me. Our mission is to protect, promote, and preserve the critically endangered Lac La Croix Indigenous Pony breed," says McGinnis.

McGinnis, Cullan, and the Lac La Croix Indigenous Ponies all originate from Treaty 3 territory in Northwestern Ontario. According to the sanctuary's website, Elders and Knowledge Keepers say that the ponies' origins precede the 1800s; they were in the area prior to colonial contact.

McGinnis' parents were also caretakers of Lac La Croix Indigenous Ponies, as well as another Indigenous horse breed called the Nez Perce Horse. From her earliest memories at her home in Fort Frances, horses have always been part of McGinnis' life.

"I have a picture of me on a horse before I could even walk," says McGinnis, who credits her father as her mentor who taught her a great deal about working with horses.

Reconnecting with her Métis/Ojibwe cultural identities has been the focus of McGinnis's education and healing, and cultural connectedness was a central concept in her doctoral research in clinical psychology. At that time, she developed a measure to determine the extent to which cultural connectedness is associated with health and well-being among First Nations youth. Her findings indicated that cultural connectedness is a positive predictor of mental health.

This is critical information because "the mental health and well-being of youth is one of the most urgent concerns affecting many First Nations communities across Canada," explains McGinnis.

Education's Angela McGinnis and Zhiishigwan (Shaker/Rattle) at The Red Pony Stands® Ojibwe Horse Sanctuary.



The three Lac La Croix Indigenous Ponies from Nigigoonsiminikaaning First Nation gather around Cullan (Waabinaanikwad) McGinnis during their first meeting.

“It’s a culturally specific relationship that dates back to pre-colonial contact. This type of relationship can’t be replicated with any other breed of horse.”

This is why she views her work in educational psychology and her research as “a perfect fit.”

“You can’t have healing without learning, or learning without healing.”

Since completing her doctoral research, McGinnis has been seeking to understand how cultural connectedness can be developed through real-world experiences, which include strengthened relationships with the land and all its more-than-human creatures, particularly the Lac La Croix Indigenous Ponies.

Broadening health research to include the more-than-human world is important to McGinnis because, she says, “We need to situate well-being within a larger network of social relations, with both the human and more-than-human worlds. We need to focus beyond the individual and extend our understandings about health and well-being to living in relation to all else, not just for the present, but also for future generations.”

With her expertise in psychology and her passion for the preservation of the Lac La Croix Indigenous Pony breed, she says she is perfectly situated to bridge what often seem

like conflicting worldviews. “I understand Western mental health perspectives, but my work requires an understanding of Indigenous perspectives of holistic wellness to fully understand the role of the ponies in the resilience process.”

McGinnis likens the loss of contact with Indigenous horses experienced by Indigenous communities to the loss of family members. “Part of their family has been ripped away,” she explains. “Reconnecting Indigenous youth and adults with Indigenous horses brings about indescribable moments.” She says moments that spark Elders to tell “I remember when...” stories about the ponies and traditional ways of life are charged with healing potential. “These are moments that could potentially change someone’s life. To see that happening in front of you is a privilege.”

McGinnis felt especially privileged to hear of the repatriation of the Lac La Croix Indigenous Pony to Nigigoonsiminikaaning First Nation, her partner Cullan’s home community.

“I was completely moved by the return of three black geldings to this community, and during a recent visit to see the community’s ponies, Cullan had the opportunity to meet the geldings for the first time,” she explains. “The reunion of these family members was so powerful – an emotional reuniting. The bond between the geldings and Cullan was instant. It’s a culturally specific relationship that dates back to pre-colonial contact. This type of relationship can’t be replicated with any other breed of horse.”

Reunions such as these lead to the beginning of relationships with the more-than-human world, and are what McGinnis calls a “doorway to the culture,” which can help youth make other cultural connections, such as connections to ceremony. For instance, McGinnis and Cullan’s

relationship with the Lac La Croix Indigenous Ponies at the sanctuary has led them to seek guidance from local Elders and be part of horse-specific traditional ceremonies, such as the Horse Dance.

McGinnis now wants to share these kinds of experiences with her educational psychology students. "I want to help students step through that cultural doorway. That's how we understand how to help others, by experiencing it ourselves. And in return we help the ponies in their fight against extinction. It's a mutual helping process. We need the Lac La Croix Indigenous Ponies as much as they need us," says McGinnis.

This spring, she will teach a course that integrates the importance of healing with horses and will involve experiential learning opportunities. One of the teaching assistants for the class is McGinnis's master's student Moore, who was also mentored by Life Speaker Noel Starblanket until his death in April 2019. Moore is Métis and her lifelong passion for horses began over several summers working with youth at horse camps and riding stables and continued as she got to know the Curly Horse breed at her in-laws' farm.

McGinnis and Moore were surprised by the degree to which their research intersects and aligns. They both want to understand and offer evidence-based research to explain the educational and mental health outcomes when Indigenous youth establish relationships with horses. They are both also focused on how Equine Assisted Learning programs can be culturally adapted.

"What are the chances of me finding a student who wants to work with Indigenous horses?" asks McGinnis, who says they were amazed to have found each other.

Now together they are working towards the same ends as those involved in language revitalization. "We are all tackling a shared goal: cultural preservation," says McGinnis.

McGinnis says that the preservation of the critically endangered Lac La Croix Indigenous Ponies extends as a metaphor for Indigenous cultural and identity preservation.

"Their mere presence is a counter-narrative to the colonial history of the horse, which suggests that horses perished during the Pleistocene Era," says McGinnis.

Indeed, the Lac La Croix Indigenous Pony survival itself inspires hope. But beyond that, McGinnis says that the interaction with Indigenous horses gives "Indigenous youth opportunities to connect with horses who have a shared history of resilience and strength, like their own, that they can identify with. It's a culturally specific story," she says.

EQUINE ASSISTED LEARNING (EAL)

In their 2016 paper in the *Journal of Indigenous Wellbeing*, McGinnis and Starblanket state that Equine Assisted Learning "is a relatively new approach to knowledge acquisition that draws primarily on the tenets of experiential learning, that is, learning through hands-on experience with the horse."

To deepen her understanding of EAL, Moore received EAL certification in August 2018 at Cartier Farms, near Prince Albert. Cartier Farms teaches that establishing an experiential hands-on working relationship with horses, with their sensitivity, non-verbal communications, resilience, and forgiving ways, can be an effective approach to learning, to self-knowledge, and to self-evaluation.



Mishkwiingwese (She Blushes), graduate student Kelsey Moore, Zhiishigwan, and McGinnis at The Red Pony Stands® entrance sign, which commemorates the four grandmother mares from which the Lac La Croix Indigenous Ponies descend. The seven ponies who reside at the sanctuary, located near Saskatchewan's Qu'Appelle valley, contain the two original bloodlines, the Keokuk and Nimkii lines. Their lineages date back to the four original mares from Lac La Croix First Nation and Bois Forte Band of Chippewa who were the last remaining in the world (Lilian, Biizhiki, Diamond, and Dark Face) and strategically bred to a Spanish mustang stallion named Smokey in 1977 to save the breed from extinction.



McGinnis, Mishkwiingwese, and Moore demonstrate a teamwork exercise learned at the EAL certification course.

Elders and Knowledge Keepers have taught her that horses, with their four feet always on the ground, have a greater connection with Mother Earth and the Creator.

McGinnis, who has been guided by the traditional Elders, Knowledge Keepers, and communities with whom she has worked, sees the potential for healing and learning in culturally adapted EAL. She views horses as “more-than-human co-constructors of knowledge.”

“Horses have much to teach us about the land and living on the land,” she says.

Elders and Knowledge Keepers have taught her that horses, with their four feet always on the ground, have a greater connection with Mother Earth and the Creator. This is why traditionally horses have been considered a source of maintaining and recovering holistic wellness.

Upon the arrival of McGinnis’ first pony at the sanctuary, a beautiful stallion affectionately named Sagineshkawa (Pleasure with my Arrival), she says, “I realized that I should not rush things. I needed to slow down and have humility, especially around a powerful being like a horse. This was the horse that I had to pay attention to and listen to spiritually.”

McGinnis is grateful to all her ponies for their patience in teaching her. Moore’s experiences with horses have similarly given her the understanding that she must “slow down and be present in the moment,” she says.

“Helping humans slow down is a way that the horses care for us,” says McGinnis. She views the horse/human relationship

as one of mutual caring. “We are caretakers of them and, in turn, they care for us.” Yet the researchers say there is an urgency to this work because of the need for Indigenous youth to be able to access culturally adapted healing and learning programs.

Using what McGinnis describes as “a pure Indigenous research method,” Moore is seeking to understand the spiritual and cultural connections between Indigenous youth and Indigenous horses. By incorporating ceremony as research, Moore is documenting her interactions and deep listening experiences with the ponies, along with the conversations she has with Elders and Knowledge Keepers to make sense of what she observes.

The two researchers are already envisioning future plans. “Following the completion of her academic work, we hope to apply for an operating grant to help Kelsey set up her own Indigenous-centred Equine Assisted Learning and healing program in the community,” explains McGinnis.

At the same time, the sanctuary has recently gained international attention. It will be featured in a short documentary film being produced by National Geographic Explorers as part of the Natural Connections Project. The film, called *Daughters of the Wind*, will document how EAL contributes to the well-being of First Nations youth.

Through the documentary, McGinnis hopes to showcase “how Indigenous communities are using horses to connect with culture, strengthen positive relationships, and learn through activities with horses and nature.” [D](#)


Angela McGinnis’ project is supported the Saskatchewan Instructional Development Research Unit.

This story has been adapted from Education News, the Faculty of Education’s news magazine.

SUPPORTING WOMEN'S MENTAL HEALTH

Reproductive mood disorders take their toll, affecting one in three Canadian women at a cost to the national health-care system of approximately \$45 million annually.

Jennifer Gordon, the University of Regina's Canada Research Chair in Biopsychosocial Determinants of Women's Mental Health, is working to predict, prevent, and treat these disorders, with a particular focus on depression in the menopause transition.

"The world over, women are two times more likely to suffer from depression in their lifetime compared to men," says Gordon. "Depressive disorders triggered by reproductive events, such as the menstrual cycle, pregnancy, the postpartum period, and the menopause transition — collectively known as reproductive mood disorders — likely account for an important proportion of this increased risk." 





Reality check: How virtual reality is poised to enhance cadet training

KRISTA BALIKO There's potential for emotions to run high whenever an RCMP officer responds to a call. Their decisions can sometimes mean life or death.

So how can cadets best prepare to de-escalate a situation when a suspect feels trapped, angry, and afraid while bystanders are near? How do they stay focused around distractions? How do they keep a level head when responding to potentially dangerous situations?

These are some of the questions the RCMP's Greg Krätzig thinks about, and what ultimately led him to reach out to the University of Regina to study scenario training using virtual reality (VR).

Krätzig, the director of research and strategic partnerships at the RCMP Depot Division, says that every new RCMP officer must complete an intensive six-month training program at the training academy in Regina, Saskatchewan.

"While the program covers skills and academic training, it also provides realistic, evidence-based training that helps prepare cadets to keep our communities safe and secure," says Krätzig.

He adds that while most police-public interactions are peaceful and positive, "unfortunately there are also situations that require the police to use force in a rapidly changing situation."

It's moments like these that necessitate exceptional decision-making skills, and this is the area that Krätzig and his research team are delving into.

The RCMP has used simulation technology (driving simulators and simulators for marksmanship and judgment training) for many years. But with the rapid development of

VR and through discussions with other safety and security partners, Krätzig envisioned using VR as a meaningful way to deliver training that was not previously possible.

But now it is.

Krätzig knew that while the RCMP didn't have the necessary expertise to work with VR technology, the University of Regina had a rich pool of talent. And that's where he first met Megan Smith.

"We started talking at a University networking event called Digital Future. It provided an opportunity for professionals in various fields interested in technological research and development to swap ideas and, perhaps, to also develop collaborative partnerships," explains Krätzig.

At the time, Smith, an associate professor of creative technologies with the University's Faculty of Media, Art, and Performance, was working on a Social Science and Humanities Research Council-funded project where she was using new media art processes to build an augmented reality performance. It involved her riding a networked stationary bike through Google Street View across Canada.

"That was a large endeavour, and included developing educational kits along with workshops to teach people how to make their own networked bikes at home," Smith explains.

Her experience in physical computing (building interactive art works from hardware and software), an area of practice that encompasses art, computer science, and engineering, was a perfect match for Krätzig's vision for the RCMP.

Megan Smith, in her University of Regina lab, building a VR-compatible remote control that looks and feels like a real weapon.

(l to r) Greg Krätzig, Rhett Krushen, and Megan Smith in the Virtual Reality Research and Development area at the RCMP Academy, Depot Division.



“Developing smart devices for the RCMP, and placing something in their hands that feels and performs like a real pistol or Conductive Energy Weapon will actually help place the trainees into that kind of immersive situation.”

“I’m always working on how to push visual and sensory experiences and he was looking at implementing virtual reality technologies to enhance the cadet training experience,” says Smith. “We met at the right time.”

A year after their first conversation, Krätzig says he reached out again to Smith once he received funding from the Canadian Safety and Security Program and Defence Research and Development Canada. “It was a perfect way to make our project a reality.”

VIRTUAL REALITY

Krätzig and Smith knew that VR could add an important aspect to cadet training. They imagined the cadets immersed in VR scenarios where they would have to respond to a host of situations via their VR headsets.

Smith’s role was to build remote controls that would work in the VR world, but would look and feel like real weapons that an officer would normally carry on their belts.

“A lot of the VR industry is still putting regular remote controls in people’s hands to manage situations and scenarios. But a remote control doesn’t mimic what would be in an officer’s hands in a real-life situation. And that can break their presence and detract from the immersive experience,” Smith explains.

To overcome this obstacle, Smith wanted to see if she could imitate the weapons that the RCMP use in real life, as well as build their tactile assets into a VR remote control. She started by researching and developing the RCMP’s duty pistol as a virtual controller. Then, using a 3D printer, she experimented with the technology. Several iterations later, she produced a VR pistol that includes a functioning trigger. Now she’s working on adding additional weight to improve the realism.

Smith says, “It’s important to have a few physical cues in real life that translate into the virtual reality space in order to keep you entrenched in the virtual environment.

“You don’t need to replicate an entire space, but you do need a few sensory similarities to keep the cadet embedded in the situation.

“Developing smart devices for the RCMP, and placing something in their hands that feels and performs like a real pistol or Conductive Energy Weapon will actually help place the trainees into that kind of immersive situation.”

To do this, Smith installed specialized motion-tracking sensors in all the 3D-printed equipment she has built so that the trainees can see the tools move within the VR environment.

Smith also works closely with Rhett Krushen, a multimedia designer with the RCMP. He creates the virtual

environments that the RCMP cadets are immersed in while using the weapons Smith has created.

These highly immersive visual environments are designed with sound and interactive characters. "When a user puts on a headset, they may find themselves in places like a drug house, a city corner or a rural setting," Smith explains.

While a student interacts with the virtual world, Krushen can manipulate and change what happens in real time. "If a cadet is de-escalating a situation properly, the circumstances also change in accordance," says Smith.

The virtual environments are designed to be as realistic as possible, and are even able to incorporate sensations such as wind, smells, and tactile feedback. For example, in a shooting simulation, the user would hear a gunshot, which would be accompanied by the smell associated with that.

"It's not real life, but you don't actually need to make it real to stimulate the sense of urgency and responsibility you require to react," says Smith.

The end result is a realistic looking and feeling field-training experience.

But can VR adequately prepare someone for real-life situations?

Smith says it's difficult to describe how immersive it is to someone who hasn't put on a headset, but says, "Once you experience it, you understand how engaging and productive it is and what possibilities exist in VR for deep training."

Krätzig agrees that VR has to be experienced to truly be understood.

"VR has the capacity to elicit powerful reactions," he says. Describing his own experience using a commercially available VR horror game, he says, "My heart was racing. I got the shivers and the hairs on the back of my neck stood up. I was looking behind me because I heard things all around me – it's what you would expect in the real world."

Krätzig says there are many advantages to using the technology and that's why the RCMP has begun to research reactions to VR scenarios.

"We have done some research with commercially available games measuring ECG (electrocardiogram) data and the physiological responses are incredible."

"Building these tools has been like solving a puzzle. The pieces exist, and I'm doing the work to find them, then put them together to create a useful, realistic tool, in a way that hasn't yet been done," says Smith.

Krätzig says when they eventually put cadets in these environments, they will experience the emotional response they would experience in the real world. "The VR will add a lot more to their mental library when confronted with stressful situations."

But for the VR scenarios to be effective training tools, the actual tools found on officers' belts – pistols, Conductive Energy Weapons, and pepper spray – must be realistic. "The work [Smith] has done in developing the hardware has been remarkable. In fact, she's light years ahead of industry in this regard," says Krätzig.

To make them, Smith combines commercially available developer components with custom designed parts, fitting them into the 3D-printed weapons. Working with commercial VR hardware development kits and optical sensors, she is getting excellent object tracking results.

"At this stage of the design, I have also developed a way to actually see how cadets manipulate the trigger on their weapon." This is a crucial part of the technology she's developed as it allows facilitators to teach the cadets how to react better if needed.

"Building these tools has been like solving a puzzle. The pieces exist, and I'm doing the work to find them, then put them together to create a useful, realistic tool, in a way that hasn't yet been done," says Smith.

However, high demand for the components has resulted in supply issues. But using gaming technology that already exists means that in the long run the cost of VR equipment

(l to r) A chronology of VR-compatible pistol prototypes researched and developed by Smith.



will be much cheaper than conventional training methods. And more portable, too.

The whole setup runs off of a mid-range consumer gaming laptop.

"It's not overpriced," Smith says. "My goal is to have a kit that can go out to RCMP units across Canada for under \$5,000, which includes the headset, VR weapons, and computer."

She also says that training modules can be downloaded on site, allowing for more rapid and mobile training capabilities.

The VR training can also be incredibly responsive.

"I envision that as procedures or laws change, the RCMP virtual training can be quickly altered to keep pace, ensuring, for instance, that rural and remote areas receive training updates in a timely fashion," says Smith.

Smith is also working on integrating user biofeedback into the system to measure physiological response, refine simulations in real-time, and identify problem areas, allowing trainers to look into how users manage their stress.

Now this innovative work is garnering Smith international attention.

Law enforcement agencies and partners worldwide have expressed interest in her technology. "I am very up to date on VR use within a policing environment, and the commercial products that are selling for hundreds of thousands of dollars cannot come close to what she has developed. She's

a recognized global leader who has done remarkable work on a shoestring budget," says Krätzig.

Given interest in the team's work from various international groups and professionals in other fields of study, such as medicine, Smith says she is now in the early stages of possibly commercializing the process. But, for now, preparing cadets is the primary goal with the VR training project.

Krätzig is duly impressed with what the team has already accomplished, and is excited for the future. "The VR training methods will be an effective complement to the RCMP's current programming."

And Smith agrees.

"I never thought I'd be doing this kind of work when I first came to the University of Regina. But being part of this project has been an incredible experience because it's reciprocal: I do development work, then take it to the RCMP, who offer feedback, then go back to my lab and make informed changes." Working directly with the RCMP allows her to thoroughly understand and quickly respond to their technology needs.

"This entire process really demonstrates how VR can lead to exceptional training experiences," says Smith, who adds that her team will continue to work on creating smarter tools, which ultimately will allow for more effective instruction and better learning experiences for everyone, now and into the digital future. [D](#)


Megan Smith wearing a VR headset in an urban VR scenario.



TRUTH, RECONCILIATION & INDIGENOUS LITERATURES

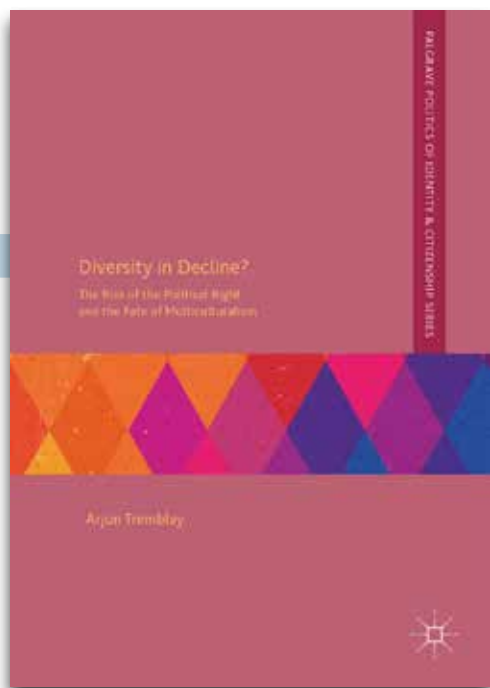
Educators across Canada are working hard to tackle the Truth and Reconciliation Commission's Calls to Action. They must forge ahead despite the growing but still insufficient resources to do so.

Michelle Coupal, Canada Research Chair in Truth, Reconciliation & Indigenous Literatures, is working to provide educators with theories and practical strategies for bringing Indigenous literatures into classrooms in respectful and ethical ways.

"Part of the reckoning in the path toward reconciliation involves establishing connections through the stories that Indigenous writers tell. My research aims to nurture ethical witnessing in the classroom as students enter into what one hopes is an allied and activist relationship with texts and materials that often directly engage with colonial violence and its ongoing legacies. Education is the key to restoring nation-to-nation relationships in Canada." 



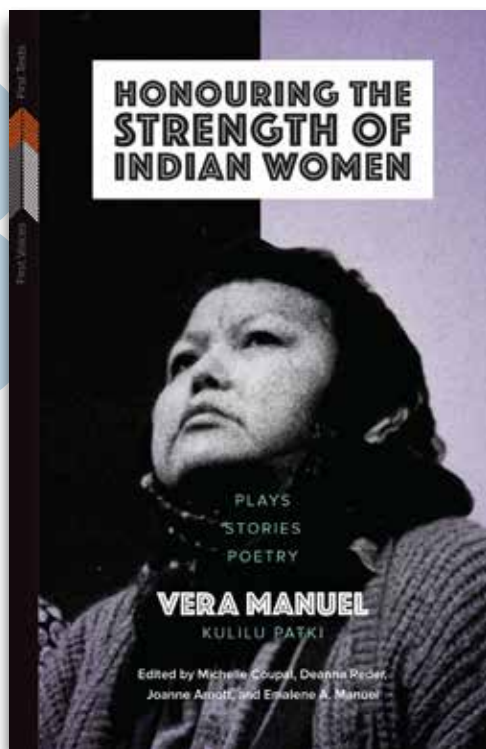
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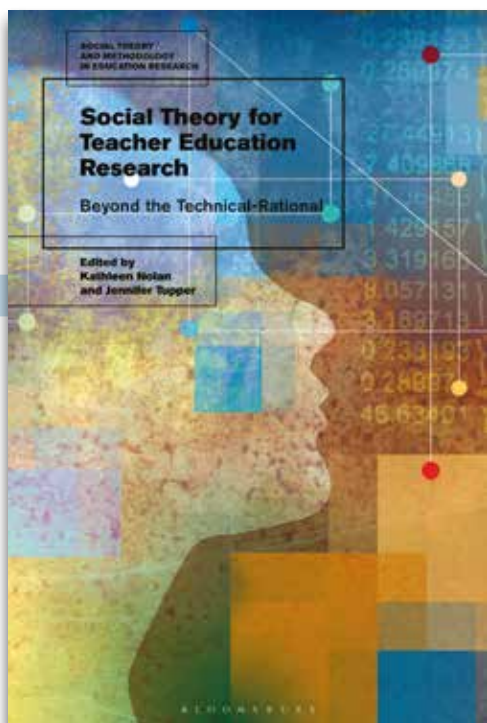


1. Will multiculturalism survive in an ideological environment that continues to veer to the right? **Arjun Tremblay**, from politics and international studies, delves into this question in his new book, *Diversity in Decline? The Rise of the Political Right and the Fate of Multiculturalism* (Palgrave Macmillan, 2019). The book brings to light the conditions under which multiculturalism is most likely to survive under right-wing governments and provides insight into the possible fate of other traditionally left-leaning political projects.

2. Official stories say that violence in Latin America is a product of criminal activity and the drug trade. In *Organized Violence: Capitalist Warfare in Latin America* (University of Regina Press, 2019), politics and international studies assistant professor **Simon Granovsky-Larsen** co-edits a collection that exposes how that narrative serves corporate and state interests and de-politicizes events that have more to do with logistics infrastructure, social control, and the extractive industries than with cocaine.

3. *Honouring the Strength of Indian Women* (University of Manitoba Press, 2019), co-edited by Canada Research Chair **Michelle Coupal**, is a critical edition that brings to light largely unpublished works of Ktunaxa-Secwepemc writer and healer Vera Manuel, daughter of prominent Indigenous leaders Marceline Paul and George Manuel. Long before mainstream Canada understood and discussed the impacts and devastating legacies of Canada's Indian residential schools, Vera Manuel wrote about them as part of her personal and community healing. She became a grassroots leader addressing the need to tell stories of survivors and advocate for the therapeutic value of writing and performing arts.

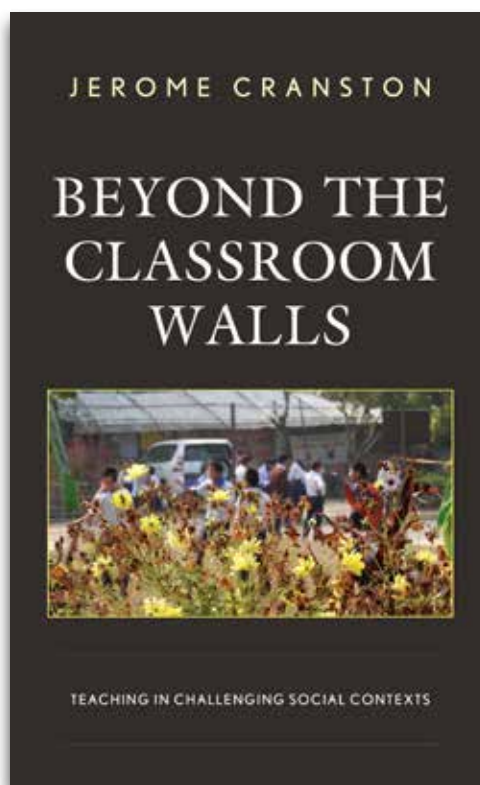
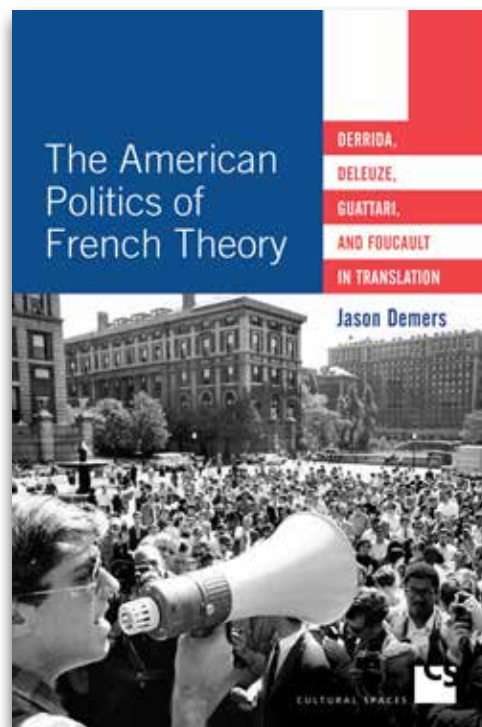
Michelle Coupal's *Honouring the Strength of Indian Women* brings to light the largely unpublished works of Ktunaxa-Secwepemc writer, healer, and activist Vera Manuel.



4. In *Social Theory for Teacher Education Research: Beyond the Technical-Rational* (Bloomsbury, 2019) co-editor **Kathleen Nolan** and the book's contributors argue that research in teacher education must draw on social theories to help move beyond technical-rational concerns. This change in focus will build a critically reflexive stance for noticing and unpacking the socio-political contexts of schooling. Drawing from the theories of Barad, Bourdieu, Foucault, Heidegger, and others, the authors assert that innovative social theory-driven research can challenge and change teacher education practices and the learning experiences of students.

5. Ideas are developed not in the vacuum of a discipline or a nation-state, but through borders meeting and crossing. In *The American Politics of French Theory: Derrida, Deleuze, Guattari, and Foucault in Translation* (University of Toronto Press, 2018), English lecturer **Jason Demers** documents the cross-pollination of French philosophy, international activist movements, and American countercultures to demonstrate why, in an era of mass communication and global revolt, we need to think of translation as a web of associations.

6. Growing forced migration and refugee resettlement make it all the more important to understand the teaching profession in a global context, especially for those who work with a diverse school population whose experiences of schooling are different than their own. In *Beyond the Classroom Walls: Teaching in Challenging Social Contexts* (Lexington Books, 2019), **Jerome Cranston**, education dean, uses data from three ethnographic studies to examine some of the world's most challenging settings and illustrates the complexities that educators face in trying to meet the needs of their students.



Funding



Tanya Dahms (seated) and research associate Taranum Sultana (standing), who was instrumental in securing the SHRF grant, in a University of Regina lab.

1

1. Fungal infections, relatively common worldwide, are associated with high death rates in hospital patients with compromised immune systems. Patients who receive medication by catheter are at increased risk for the most common fungal infection, invasive candidiasis caused by *Candida* species.

Recently, biochemistry professor **Tanya Dahms** received a \$50,000 Saskatchewan Health Research Foundation (SHRF) 2018-19 Collaborative Innovation Development Grant to initiate a new project.

Dahms says the grant will galvanize a group of researchers to find new anti-fungal combinations intended to help prevent and treat fungal infections.

"Currently only a limited number of anti-fungal drugs remain effective in the fight against the global rise of invasive fungal infections among immunocompromised patients."

The research team includes University of Regina associate professor **Mohan Babu**, research associate **Taranum Sultana**, master's student **Fatema Zohora**, PhD candidate **Ali Molaeitabari**, Saskatchewan Health Authority medical microbiologist **Dr. Jessica Minion**, and Canada Research Chair **Malcolm Whiteway** from Concordia University.

The team will study monoterpenoids, a class of plant derivatives that have strong anti-fungal properties. By analyzing the impact that these plant derivatives have on *Candida* species, both alone

and in combination with classic antifungals, the researchers will determine potential clinical use (such as catheter coatings) and how to increase their effectiveness, while finding combinations that reduce fungal resistance.

2. Computer scientist **Malek Mouhoub** and postdoctoral fellow **Munira Faysal Al-Ageili** recently received \$90,000 Mitacs Accelerate funding for their project, *Communication Aid for Non-English Speaking Newcomers*.

"Working with the United Way, the Regina Public Library, and the Regina Region Local Immigration Partnership, we'll examine how pictograms (simplified pictures that appear on information signage) and other visual symbols can be used to develop a

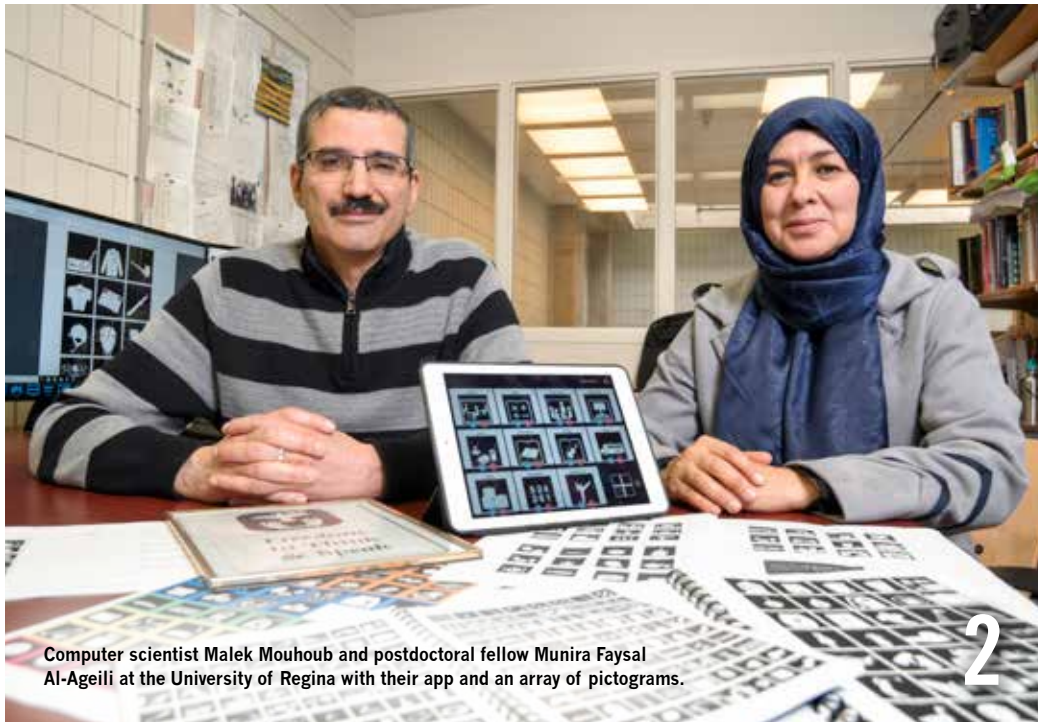
communication aid to help Arabic-speaking Syrian refugees and recent immigrants learn English," says Mouhoub.

PictoPages, the software being used in the project, was funded by the George Reed Foundation. It was developed to assist people with acquired or developmental verbal communication limitations and includes text, recorded speech, and symbols.

"We will focus on developing the app for people with limited to no English skills, limited resources, and a range of educational backgrounds," says Al-Ageili.

Taking a user-centred design approach, the researchers will work with the technology and the language learners in real-world settings to better understand

“Our app will assist with communication between newcomers and the organizations providing settlement services.”



Computer scientist Malek Mouhoub and postdoctoral fellow Munira Faysal Al-Ageili at the University of Regina with their app and an array of pictograms.

the users' communication requirements, while continually adapting and modifying the concept and software.

“Our app will assist with communication between newcomers and the organizations providing settlement services. It will also provide them with the basic communication help they may need out in the community,” says Al-Ageili. “We anticipate that the app will also increase their confidence in communicating with others, reduce their need for assistance from the supporting community organizations, and may even help them to obtain employment.”

3. Exposure to potentially traumatic tragedies can be a frequent part of the work life of Canadian public safety personnel, and we need to understand how the often hazardous and volatile environments in which they work can impact their mental well-being. But building this understanding takes research, and research requires funding.

On February 8, 2019 the Government of Canada announced a \$2.95 million commitment to support 22 research projects through the Canadian Institutes of Health Research (CIHR) Post-Traumatic Stress Injury (PTSI) Catalyst Grants competition.

“Public safety personnel put themselves in harm's way to protect Canadians, putting them disproportionately at risk of post-traumatic stress injuries. Our country must do more to protect the mental well-being of public safety officers on the job. The initiatives highlighted today will help address gaps in PTSI research and inform long-term plans to support the mental health and well-being of our public safety personnel,” said the Honourable Ralph Goodale, minister of public safety and emergency preparedness.

The University of Regina's **Gordon Asmundson, Ronald Camp, R. Nicholas**

(l to r) **R. Nicholas Carleton, Amber Fletcher, and Alec Couros**

Carleton, Alec Couros, Amber Fletcher, and David Malloy will undertake research on 12 of the funded projects.

The federal government, having identified PTSIs among our nation's public safety personnel as a priority in Budget 2018, also invested \$20 million over five years to support the CIHR – CIPSRT National Research Consortium for Post-Traumatic Stress Injuries among Public Safety Personnel. For its part,

the Canadian Institute for Public Safety Research and Treatment (CIPSRT), which operates under the governance of the Collaborative Centre for Justice and Safety (CCJS) at the University of Regina, serves as the Consortium's Knowledge Exchange Hub.

“With PTSI research happening throughout the country, the Knowledge Exchange Hub acts as a central repository, as well as the body that synthesizes, translates, and exchanges PTSI research,” says Steve Palmer, executive director of CCJS and CIPSRT.

All of the researchers involved in the 22 projects, who work at 17 research institutions across Canada, will become part of the CIHR – CIPSRT National Research Consortium. Their research will help to build the Knowledge Exchange Hub.

“The Knowledge Exchange Hub at CIPSRT means that, ultimately, a storehouse of vital evidence-based research will be at the fingertips of Canadians. Researchers, policy-makers, public safety personnel, leaders, and their families, as well as the public will have one place to find and share key evidence-based research, improving the ability of Canadians to create the policies, programs, and treatments that will improve the mental well-being and resilience of our nation's public safety personnel, as well their families and those in leadership,” says Palmer.



Collaborate

Roger Petry and Jocelyn Crivea at the Luther College cafeteria, which has implemented sustainable food waste management systems.



PRODUCTION AND CONSUMPTION: THE ELEPHANT IN THE ROOM By K.D. Sawatzky

The University of Regina and Luther College have been chosen by the International Association of Universities (IAU) to lead one of the United Nations' Sustainable Development Goals (SDGs) over the next 12 years.

A 600-member global organization, the IAU promotes collaboration between universities. In 2018, it developed its "Cluster on Higher Education and Research for Sustainable Development" in support of Agenda 2030, the UN's 17 goals for global development (2015–2030).

In May 2018, the IAU approached the University of Regina to lead the twelfth goal, "Responsible/Sustainable Consumption and Production."

"SDG 12 is at the heart of all the SDGs," says Roger Petry, philosophy professor at Luther College and cluster co-leader of SDG 12. He is also co-coordinator of the Regional Centre of Expertise (RCE) Saskatchewan, a UN University-initiated education organization promoting regional sustainability.

"The elephant in the room is human production and consumption systems," he says. "If you want to deal with poverty, health or climate change, look to how we produce and consume."

Petry and his co-leader Jocelyn Crivea, manager of the Institute for Energy, Environment and Sustainable Communities, will "cluster" with six other schools to work on this goal: Universiti Sains Malaysia, University of Kelaniya

(Sri Lanka), Moi University (Kenya), University of Vechta (Germany), El Bosque University (Colombia), and Pontifical Catholic University of Peru. The University of Saskatchewan is an informal partner.

"Being the only university in North America chosen to lead a cluster is a feather in our cap," Petry says.

He adds that it also makes sense because Saskatchewan faces challenges when it comes to sustainable consumption and production, whether it's primary production of resources, such as oil and gas, or people's energy-intensive lifestyles due to weather extremes.

"We're kind of a pressure cooker for sustainability issues," he says, arguing there isn't a better place for this type of initiative.

Crivea, who is also a grad student in public administration, is the co-chair of a two-day conference hosted in May by the University where the SDG 12 cluster schools will meet in person for the first time. She says she is interested in knowledge mobilization between scientists and politicians, which will be discussed at the conference.

"Decision making is a collaborative process," Crivea says. "We will explore how scientists and social scientists can inform decision making and help policy-makers better understand their options and develop good policies that make our communities better for everyone."

The SDG 12 cluster will meet several times a year, both virtually and in person, to decide what to work on collectively until the SDG goals expire in 2030.

“Ultimately, the work we are doing together helps to reduce and prevent risks to the health of people and the environment.”



Renata Raina-Fulton and Ondiveerapan (Arasu) Thirunavukkarasu stand at the bioreactors at the City of Regina Wastewater Treatment Plant operated by EPCOR.

WORKING TOGETHER TO PROTECT OUR WATER QUALITY

Safe water is vital to human health, and that's why a long-term collaboration between a University of Regina scientist and Saskatchewan's Water Security Agency (WSA) is important to the province.

Renata Raina-Fulton, an analytical chemist at the University, and Ondiveerapan (Arasu) Thirunavukkarasu, a senior standards engineer in the Environmental and Municipal Management Services Division of the WSA, have teamed up to help protect public health and prevent disease.

Raina-Fulton and her University team develop analytical methods for difficult-to-analyze contaminants, which often occur in real-life environmental samples.

"The analysis may be time sensitive or impacted by other materials in the sample, so we need to closely coordinate with the WSA on their sample collection and our chemical analysis," says Raina-Fulton. "Their water samples are often complex, allowing us to test the analytical methods we develop so that we can say with confidence whether or not the contaminants are truly in the environment or water treatment processes. It's a very valuable collaboration."

It's also one that's been developing for more than a decade.

"In 2008, we worked together to determine the exposure levels of haloacetic acids in the treated water of several water treatment systems in the province," says Raina-Fulton, who explains that haloacetic acids are the undesirable by-products from the chlorination of drinking water.

"Knowing the haloacetic acid levels, and other aspects like treatment efficiency, cost, and stakeholder feedback, helped

us to establish a new drinking water standard for haloacetic acids in the province," says Thirunavukkarasu.

Then, in 2014, the research team investigated different toxins in water and wastewater, including the levels of pharmaceuticals, personal care products (PPCPs), and endocrine-disrupting compounds (EDC).

"This study helped to determine the concentrations of both PPCPs and EDC in water and will be useful for the WSA as we establish objectives and guidelines for some parameters in the future," says Thirunavukkarasu.

"Delving into that work inspired my graduate student Ghada Aborkhees to develop a new-and-improved analytical method for studying compounds prone to degradation, such as Bisphenol A (BPA) and estrogens in wastewater," says Raina-Fulton. BPA is a chemical formed from the breakdown of plastic ingredients, and is often found in containers such as water bottles, while estrogen, commonly called female sex hormones, can be found in substances such as oral contraceptives.

Now, Thirunavukkarasu and Raina-Fulton are embarking on a new project that will focus on determining the levels of perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) in water, two problematic chemicals that are resistant to typical environmental degradation.

"The results of these latest studies will be useful in determining exposure levels, treatment efficiency, cost estimates for treatment, and the adoption of improved drinking water standards in the province," says Thirunavukkarasu. "Ultimately, the work we are doing together helps to reduce and prevent risks to the health of people and the environment."

Dinah Tambalo, Aditi Sharma, Jordyn Bergsveinson, Esam Hussein (dean of engineering and award presenter), Christopher Yost, Nurul Huda Khan, and Ryan Weir (senior manager of Innovation Place) with the Innovation Saskatchewan Award of Innovation at the 2019 Paragon Awards.



Michael Lasko Photography

INNOVATIVE INOCULANTS

Collaboration can be the key to discovery. In the case of a dynamic partnership between a University of Regina research team and an industry partner, it's also the key to an award that celebrates innovation.

Chris Yost, biology professor and co-director of the Institute for Microbial Systems and Society, and his research team of postdoctoral fellows recently won the Award of Innovation at the Regina Chamber of Commerce 2019 Paragon Awards for their work with Lallemand Inc., a business that develops and commercializes microbe-based technologies.

The University scientists first partnered with Lallemand in 2016. Since then, their work has centred on plant inoculants, which are the bacteria or fungi added to crop plants to help mobilize nutrients or protect plants against diseases, ultimately resulting in increased yields for farmers.

"Lallemand knows that their products work, but they came to us because we have the infrastructure and expertise to help them to understand precisely how their plant inoculants work at the molecular level," explains Yost.

Yost says that improving a system to get better outputs requires an understanding of all the gears inside that system. "Essentially, we figured out the gears inside which has helped in the understanding of how these products increase outputs for farmers," says Yost.

Using DNA sequencing technologies to develop new functional genomics tools, the researchers were able to show in great detail what is happening when the microbes grow on the roots of the plants. This information has allowed for more targeted inoculations, which, in turn, has provided farmers with new tools to secure crop yields with environmentally friendly plant growth-promoting bacteria.

"This collaboration has been mutually beneficial," says Yost. "Lallemand benefits because they gain new insights into the biology of their inoculants. The farmers benefit because

they get higher yields, and we benefit because we train students for skills in addressing Saskatchewan-relevant research, make new fundamental discoveries, and publish our research with students."

The team, which includes postdoctoral fellows Jordyn Bergsveinson, Aditi Sharma, and Dinah Tambalo, is now taking its work a step further.

"Using a complex genome-shuffling process, we are working to create superior crop inoculant strains that have never before been available as commercial inoculants," says Yost.

If successful, their work will help Lallemand to quickly and successfully create better products for farmers.

"Our long-term partnership with Lallemand is allowing for continuous innovation," says Yost.

Nurul Huda Khan, senior research and development manager, Lallemand Plant Care, Lallemand Inc., says collaborating with Yost and his team is a pleasure and privilege.

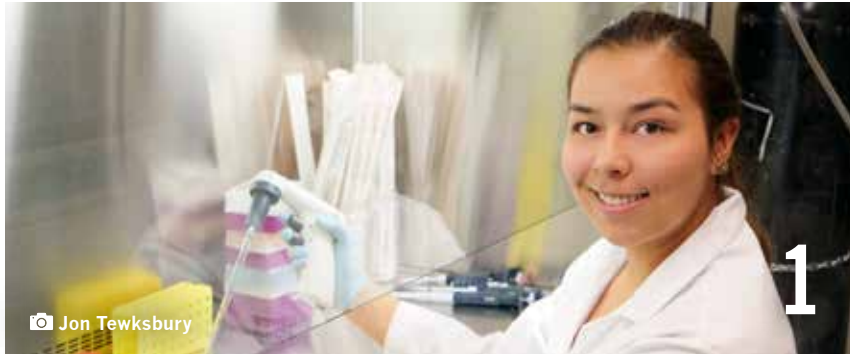
"Their knowledge in creating and connecting the dots between academics and industry means we have developed a long-standing trustful and fruitful relationship, which has led us to hire three former students from [Yost's] lab," says Khan.

Khan says the scientific data and information the researchers have already generated are expected to benefit Lallemand's current inoculant business, and they are anticipating more exciting results in the future.

"Our heartiest congratulations to the team for receiving the Award of Innovation. Lallemand is proud to be a part of this great honour," says Khan.

The Award of Innovation recognizes original research carried out at the University of Regina that has the potential to create substantive societal benefits. Each submission is reviewed based on novelty, societal benefit or public good, application of research, and collaboration and partnership.

Accolades



Jon Tewksbury



Tyson Klein



Nicole Lermينياux overlooking Oxford, UK atop St. Mary's Church Tower.

1. Imagine taking an entire thesis and boiling it down to a 180-second presentation. That's what **Alejandra Castilla Bolanos** did to win the People's Choice Award and the overall U of R Three Minute Thesis (3MT) Competition, a student challenge to describe their research in plain language in only three minutes. The biology master's student delved into a recent discovery she made that's showing promising results.

Alzheimer's disease is caused by progressive neuronal cell death. Currently it's understood that cell death occurs when deposits of part of a protein called amyloid beta (A-beta) form plaques that stop the transfer of signals between neuronal cells in the brain. Castilla Bolanos found that certain types of A-beta can neutralize neuronal electrical activity, causing some cells to recover instead of being damaged. It's promising research in the search for a cure.

2. **Nicole Lermينياux** recently received a Queen Elizabeth II Diamond Jubilee Scholarship, allowing her to participate in a six-month study-abroad program as a visiting researcher at the University of Oxford in the UK.

"While there, I studied how bacteria respond to antibiotics produced by competing bacteria," says the biology graduate student, who also explains why studying abroad made her a better scientist.

"I was put in a new environment and worked with different people, and that encouraged me to think in different ways."

She found that a type of antibiotic that *E. coli* produces, called bacteriocins, can promote biofilm formation in *E. coli*.

"This is a problem because normally we assume bacteriocins would kill *E. coli*," explains Lermينياux. "But biofilms, which are clusters of microbes that cling to each other on surfaces, are typically more resilient to antibiotic

treatments than free-swimming bacteria. This means that problematic *E. coli* may become even harder to get rid of, which would be a serious issue in food and health sectors."

The results from her work have important implications for understanding how bacteria detect, respond, and tolerate clinical antibiotics, which is crucial in the face of rising levels of antibiotic resistance.

3. **Raven Sinclair**, social work professor and Sixties Scoop expert and survivor, produced and consulted on director Roz Owen's feature film, *Trouble in the Garden*. The film delves into the Sixties Scoop and its continued impact on Indigenous and non-Indigenous people in Canada.

In early 2017, Owen, who is non-Indigenous, sought out Sinclair as a key collaborator because of her personal and scholarly knowledge, to ensure the film accurately depicted the reality of the Sixties

Scoop. "Raven was involved in the film through production, post production, sound, and now through the publicity. I could never have made this film without her support," says Owen.

Sinclair, who made edits to the script and changes to scenes to better reflect the world view of survivors and Indigenous peoples, says that presenting this part of the Indigenous child removal system through a feature film is a good way to reach a wide audience, and to portray how Indigenous peoples have been affected by something that is part of our collective Canadian history.

"I loved being part of the film. It gave me a chance to participate in a creative medium that I knew nothing about. Film is an amazing way to capture and articulate the human experience," says Sinclair. *Trouble in the Garden* is screening across Canada, and in March was part of the Maoriland Film Festival in New Zealand.

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