Brock University

Knocking down walls to build a better world:

Transdisciplinary Hub Report

2014

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What is transdisciplinary research?

Brock University is becoming a leader in transdisciplinary research.

Transdisciplinarity is a clunky term, but a simple idea: it means a single research effort undertaken by people from different areas of expertise.

Universities are typically structured into well-defined units – disciplines – that study and teach a specific subject area such as chemistry or biology. Disciplines tend to operate independently, emphasizing depth over breadth of knowledge.

When researchers in different disciplines start talking to one another, they look at a wider issue or problem and contribute their particular knowledge to that situation. For example, the chemist could provide to the biologist details of molecular structures found in particular plants. Experts would exchange knowledge, or even work together on specific projects, but remain within their discipline, with their separate publications and conclusions.

As the name implies, transdisciplinary research transcends the boundaries of traditional disciplines; it is an entirely new way of addressing an issue as it arises. So, the chemist and the biologist together create a new process for synthesizing a substance – which involves modifying living organisms – that can be used for a wide range of purposes. They are now members of a field called biotechnology, which has elements of chemistry and biology among other disciplines, but is an entirely new, separate area of research.

The challenge

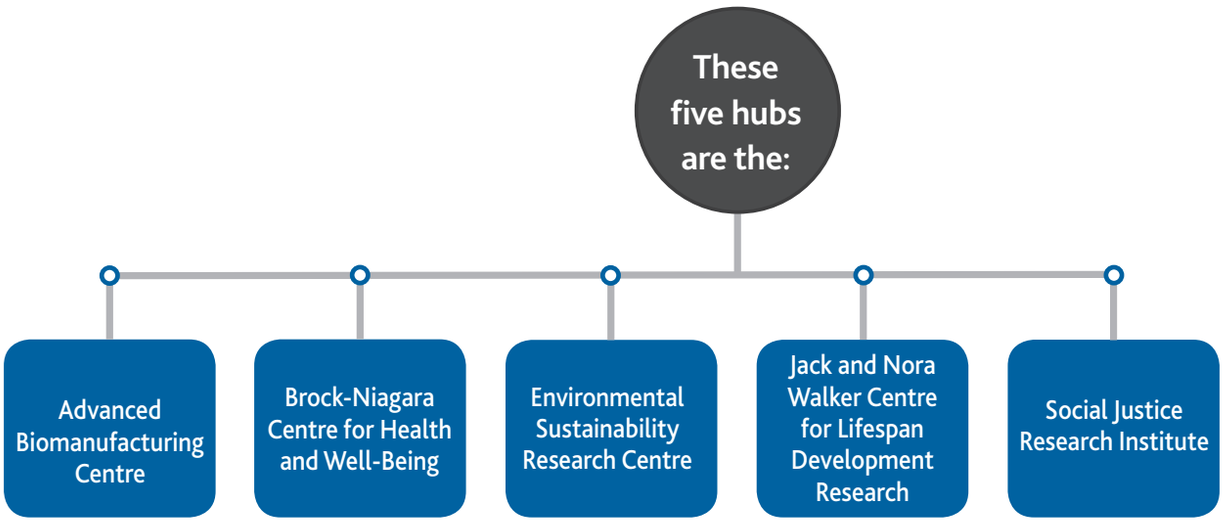
We live in a complicated world where change is ever-present. We need to be more creative in how we view – and solve – problems. We need to be innovative. We need to be nimble. That creativity, innovation and nimbleness comes from researchers talking to one another, building upon each other's visions of how to build a better world around us. It's much more than just the exchange of information. The sum is greater than its parts.

The Brock response

Brock University has a long history of supporting research and teaching that cuts across different academic disciplines and domains of knowledge. Three years ago, we expanded our transdisciplinary path, with a University-wide call for team proposals for the establishment of Transdisciplinary Research Hubs. Five were awarded, creating institutes and centres that bring together researchers from different disciplines with various kinds of expertise to address common problems.

The hubs build partnerships with the local, national and international community, both to learn from community members and to share what the hubs generate through their research. In this way, Brock University is even more deeply connected to the world around us.

Taken together, the hubs cover the whole spectrum of societal concerns, ranging from the commercialization of discoveries in the laboratory to grappling with the meanings and practical applications of social justice. They are different in many ways, but have one thing in common: they are producing research that improves lives.



This report describes each of these hubs: the challenges they address; their response to the challenges; the results of their activities to date; and their vision for the future.

Advanced Biomanufacturing Centre

Overview

The Advanced Biomanufacturing Centre (ABC) pairs the cutting edge work of Brock's plant biologists and chemists with agricultural, biotechnology, and silicone companies that develop this research into innovative products and services. These new research-industry partnerships are expected to create jobs and economic growth in Niagara and beyond, as Brock has research strengths in plant biology, genomics, and inorganic and natural product chemistry.

The challenge

There is no synthetic method for the commercial production of essential analgesics, particularly opium-like painkillers that are prescribed to people who suffer from chronic pain. Currently, pharmaceutical companies rely on the production and harvesting of opium poppies, facing problems of political instability and crop failures, among others. Plants are also valuable sources of other pharmaceutical chemicals and are used in the production of many commercially viable products. Plants need to be explored further to aid the development of important anticancer drugs, pain-control products, and antibiotics and antivirals.

In the agricultural sector, chemicals that are used to protect crops are becoming less effective; innovations are needed to bolster crop resistance and thereby cut down the amount of chemicals used to control infection. Also, silicone chemistry – applications of which include surgical dressings and coatings of materials to inhibit corrosion – is becoming more important. To protect our environment, we need to use natural, rather than heavy metal - based catalysts, in silicone production.

The Brock response

Brock University faculty members are responding to this challenge by developing significant, potentially commercial, intellectual property. The members of ABC – Vincenzo De Luca, Charles Després, Tomas Hudlicky, and Paul Zelisko – represent an interdisciplinary group whose research crosses the boundaries between several domains of knowledge, including materials science, health, biology, botany, biotechnology, and organic, inorganic and analytical chemistry.

ABC members develop the interdisciplinary skills of this group of scientists, supporting innovative research programs with the potential for commercialization of novel products in a variety of areas. They are employing innovative techniques in molecular biology and green chemistry to develop new approaches for manufacturing marketable chemicals (e.g. pharmaceuticals and corrosion-resistant coating compounds) and for making crops resistant to agricultural diseases.

Taking action

Members of the Advanced Biomanufacturing Centre are making advances in four important areas:

• ABC researchers are developing novel routes to morphine-based analgesics and antagonists, which are opium-like molecules. The U.S.-based pharmaceutical company Noramco funds much of this work, with one of the centre's patented inventions being optimized and scaled-up for commercial production. Successful scale-up will lead to significant royalty/licensing payments.

• The centre published a ground-breaking discovery — how plants protect themselves aganist infection — that led to the development of a patent and applications to the Ontario Genomics Institute Pre-commercialization Business Development Fund and Genome Canada (total grant value of approximately C$8 million) and to the NSERC Idea to Innovation program.

• To further explore ways to exploit plants as factories for production of valuable pharmaceutical chemicals, ABC members are investigating the biochemical pathways that plants use to construct complex chemicals that have pharmaceutical activity. Investigations of the Madagascar periwinkle have led to a clear understanding of how this plant produces two important anticancer drugs and an anti-hypertensive drug.

• In the area of silicone chemistry, ABC members' research focuses currently on coatings of materials to inhibit corrosion, and materials used to separate and purify pharmaceutical products. The centre foresees this work extending to the development of surgical dressings and antimicrobial coatings for surgical equipment.

The centre's progress in these areas has been made possible through extensive interactions between its members, whose complementary expertise has resulted in innovative solutions to the problems described above.

Creating knowledge

i. Publications

Publications by ABC members illustrate the diversity and interdisciplinarity of the centre and provide examples of innovative solutions achieved by sharing expertise across traditional disciplines. The centre's biologists are accessing and using chemical tools for their research into plant secondary metabolites. The chemists are using biological tools to carry out chemical transformations. Analytical equipment normally used for determination of elements in rocks and environmental samples is being used to measure ultra-trace concentrations of metals in important metalloproteins that plants use to defend

themselves against attack. Enzymes from a variety of organisms are being used as catalysts in the preparation of silicone polymers.

ABC members have been both active and effective in the publication of their research. This is particularly true when seen from a per faculty member perspective. In additional to the publications shown in Figure 1, ABC researchers have 10 new manuscripts in preparation or under review.

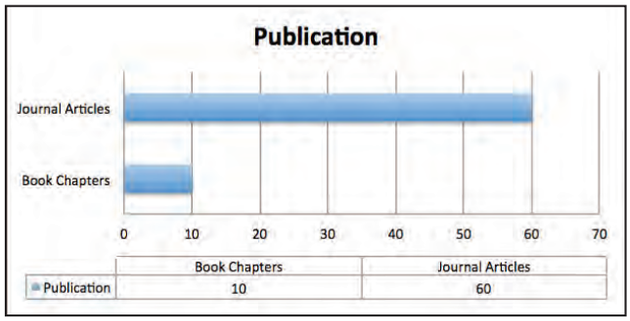


Figure 1. Publications by Advanced Biomanufacturing Centre members since January 1, 2013.

ii. Training of Highly Qualified Personnel (HQP)

As can be seen in Figure 2, ABC members are training a large number of students. These include a total of 30 undergraduate students, 19 graduate students, and 11 post-doctoral fellows. This level of student training and engagement has created an extremely active team of researchers within the centre.

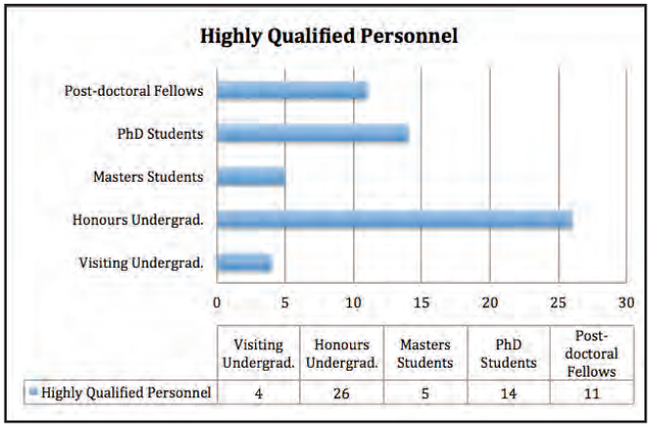


Figure 2. Highly Qualified Personnel Training and Mentorship. The number of students and post-doctoral fellows engaged in the centre over the past few years.

iii. New funding

From Jan. 1, 2013 onwards, ABC researchers received six grants (with a seventh under review) from the Natural Sciences and Engineering Council (NSERC), one grant from the Ontario Ministry of Research and Innovation, one grant from Canada Foundation for Innovation, a $30,589 contract from Noramco Inc., one grant from the Ontario Partnership for Innovation and Commercialization (OPIC), two grants from the Ontario Centres of Excellence, and a "time" grant (ie. access to equipment) from the Canadian Neutron Beam Centre.

iv. Patents and patent applications

Full patents, provisional patents and applications, as well as IP currently under review for potential patents, total 21.

v. Community impact

The creation of ABC has enabled the development of new partnerships nationally and internationally. Local partnerships include close working collaborations with new companies in Niagara (Trivium Industries) as well as very large international corporations such as Noramco. ABC member's have also been active in developing new international academic partnerships such as its new formal agreement with Charles University in Prague, one of the oldest universities in Europe.

Building for the future

The five-year research and development program of this transdiciplinary centre will achieve ongoing sustainability and growth of opportunity, based upon developing revenue streams that will support a cash-flow situation. This cash flow will in turn, enable ABC to maintain its existing membership and fund its growth by welcoming new members.

The inevitable discovery and invention of intellectual property has resulted in the patent activity, as described earlier, which can lead to licensing agreements, royalty payments commercialization and the generation of cash-flow to sustain ABC.

As described in the ''Taking action'' section of the report, industry is interested in ABC research. For instance, one of ABC member's patented inventions is being optimized and scaled-up for commercial production by Noramco. If this scale-up provides results that justify the use of this invention for production, licensing fees will be substantial. In addition, one of ABC's researchers submitted an application to the Natural Sciences and Engineering Research Council (NSERC)'s Idea to Innovation program in October 2014.

ABC members' application to NSERC's Idea to Innovation Program is directed towards plant protection, particularly for the valuable commodity crops of soybeans and wheat. At least one major agricultural chemical company is very interested in this invention and will be a potential licensee of the technology. ABC members' collaborative work has led to the preparation of a new $600,000 application directed towards the development of a "Green" scratch - proof surface coating for metals that will also serve as a primer for powder coating, etc.

Environmental Sustainability Research Centre

Overview

The Environmental Sustainability Research Centre (ESRC) pursues innovative and transdisciplinary research concerning the environment, sustainability and social-ecological resilience. In working towards this mission, the ESRC encourages transdisciplinary and environmentally oriented research by faculty, librarians, and students; catalyzes knowledge mobilization about the environment; and engages community practitioners and policy makers to foster knowledge about the environment at local through international levels.

The challenge

Human activities are shaping the planet. Each week brings more news of our impact on the environment, and changes to the Earth's natural systems.

Environmental challenges manifest at all scales, from the local to global. The causes and effects of these changes defy simple explanation: the contemporary situation is marked by uncertainty, complexity, and dynamic interconnections.

As a result, no single academic discipline or domain of knowledge is sufficient to address the challenge; what is required is a collaboration of researchers from the natural sciences, social sciences, and humanities, who together can study how society can best move forward at a time when the Earth's natural, social and economic resources are being threatened.

The Brock response

Brock University is one of only a few Canadian universities to be located in a UNESCO World Biosphere Reserve. This privileged location distinguishes Brock from other institutions in the province. In addition, it provides Brock an opportunity to showcase how universities can pursue the type of economic and social development that meets present needs, but also preserve the integrity of the ecosystem. This, in turn, will ensure that future generations can meet their own needs, creating a viable, prosperous and healthy future for all.

The ESRC pursues innovative and transdisciplinary research concerning the environment, sustainability and social-ecological resilience. In pursuing this goal the centre aims to: 1) foster transdisciplinary, integrative, and environmentally oriented research by faculty, librarians and students at Brock; 2) create a vibrant learning community that enhances knowledge and develops skills through innovative educational programs for students (undergraduates and graduates), professionals and citizens; and, 3) engage with communities of practitioners and policy makers to foster environmental knowledge at local through international levels.

Taking action

As a leading centre of transdisciplinary research, the ESRC positively contributes to the transformative development of communities in Niagara, Canada and worldwide in a multitude of ways, most especially its world-class research and teaching.

The research of ESRC has been recently strengthened through the awarding of a prestigious UNESCO Chair. Housed in the ESRC, this Chair is the only one in Canada to be located at an institution situated in a UNESCO Biosphere Reserve. It distinguishes ESRC (and Brock) in Canada and connects us as part of a unique international network. The chair, held by Liette Vasseur, addresses the theme "Community Sustainability: From Local to Global" and is positioned at the nexus of research, education and community.

The 2014 launch of the Sustainability Science and Society graduate program by ESRC further strengthens Brock's position alongside prestigious world-leading universities in this field; only a handful of sustainability science graduate programs exist. The Brock program bridges the barriers separating traditional scientific disciplines and combines rigorous academics with exposure to applied opportunities.

Creating knowledge

i. Publications

Since January 2013, members have published 77 journal articles, 46 books and book chapters, 15 publications pertaining to conference proceedings, abstracts and consultations, and 16 non-refereed publications and research-based reports.

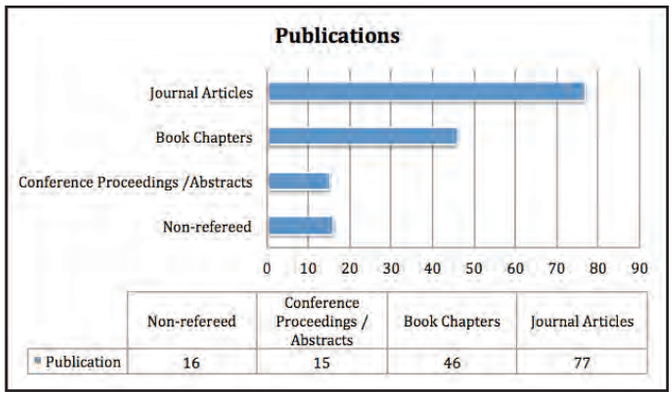


Figure 1. Publications by Environmental Sustainability Research Centre members since Jan. 1, 2013.

ii. Training of Highly Qualified Personnel (HQP)

Training highly qualified personnel (HQP) is a priority for the ESRC. More than 100 HQP (including undergraduate and graduate students, as well as post-doctoral fellows) have been, or are currently being, supervised directly by ESRC members since January 2013. The level at which supervision occurs reflects Brock's growing research stature. In addition to the students listed in Figure 2, eight research assistants have been engaged within the centre.

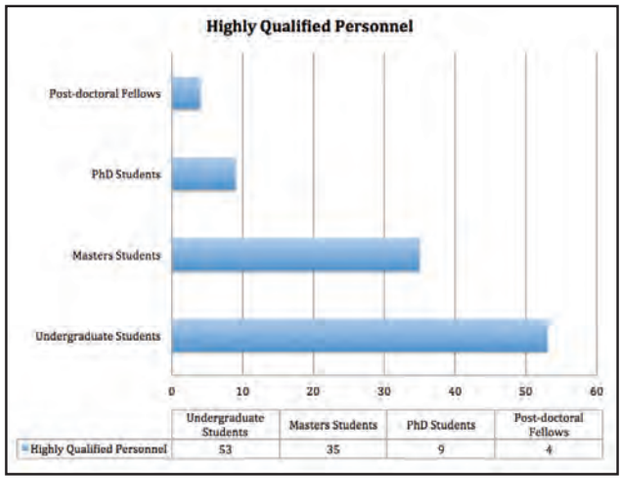


Figure 2. Highly Qualified Personnel Training and Mentorship. The number of students and post-doctoral fellows engaged in the centre since January 2013.

Since January 2013 the ESRC has fostered training opportunities by developing a new graduate program (see next section) as well as launching a Sustainability Science Postdoctoral Fellowship. To date, two Sustainability Science Postdoctoral Fellowships have been awarded.

iii. New programs

Pursuing innovative teaching programs and cultivating a vibrant learning community is paramount to the ESRC. The ESRC launched the Sustainability Science and Society graduate program (Master of Sustainability), with the first cohort of nine students commencing the program in September 2014. The ESRC is currently exploring opportunities for developing additional courses and programs under the theme of sustainability. This includes undergraduate course offerings as well as a Diploma in Geomatics. In addition, the ESRC has developed a Summer Institute for Applied Climate Change to be held at Brock University.

iv. New funding

ESRC members pursue grants vigorously to enable their research, support the training of students, and engage with partners in addressing sustainability. ESRC members have been awarded a combined total of approximately $6.45 million in new funding since January 2013. This is in addition to funding ESRC members hold for ongoing research projects that began before 2013.

v. Community impact

ESRC members engage numerous community partners. Recently, key partners in the Niagara Region supported the development of the new Master's program. The courses go beyond the classroom to engage with community organizations in addressing sustainability challenges.

The UNESCO Chair in Community Sustainability was similarly supported by numerous organizations including the Niagara Biosphere Reserve Fund, Université du Québec à Rimouski, Fujian Agriculture and Forestry University, United Nations University – Institute for Water, Environment and Health, International Network of Women, and BDA Foundation.

As the prestige of ESRC has increased, so too have requests for partnership. Faced by a high number of these solicitations, ESRC introduced a rigorous process for becoming an "institutional affiliate." The Niagara Sustainability Initiative has already joined the ESRC through this process. Also, the centre's robust communications and social media activities and popular education events widely translate and disseminate the research and knowledge produced by ESRC members.

vi. International partners

The ESRC fosters collaborations with world-leading research institutes and organizations. The ESRC has facilitated Memoranda of Understanding (MOUs) between Brock University and the Stockholm Environment Institute, Stockholm Resilience Centre at Stockholm University, and Fujian Agriculture and Forestry University, China. The newly established UNESCO Chair will further extend this network of partnerships by building relationships with communities and research institutes around the world. The ESRC is developing several additional MOUs with prestigious international partners.

Building for the future

Ensuring a prosperous future requires that we take measures to protect our environment. The ESRC is deeply committed to conducting research and communicating knowledge on sustainability with local, national and international communities.

The path forward for the ESRC is multi-faceted. It involves the development of transdisciplinary research proposals that will sustain large-scale research projects over many years, the creation of innovative educational programs related to sustainability and the cultivation of scholarly networks and engagement of communities to foster knowledge impacts.

Brock-Niagara Centre for Health and Well-Being

Overview

The Brock-Niagara Centre for Health and Well-Being's mission is to promote health, prevent disease and work to enhance quality of life across the lifespan through exercise and activity. The centre focuses on individuals with an array of disabilities, health conditions and risk factors such as obesity and type II diabetes. The centre co-ordinates programs, links researchers to groups in Niagara, and partners with local, provincial and national organizations to set up networks of excellence. Researchers from a variety of disciplines address the biological, psychological and social determinants of health.

The challenge

Heart and cerebrovascular diseases, such as stroke, were the second- and third-leading causes of death in Canada after cancer in 2011, with an estimated 24,500 cardiovascular disease-related deaths in Ontario (Statistics Canada). In addition, an estimated 85,000 Canadians are living with spinal cord injury, 33,140 of whom reside in Ontario (www.urbanfutures.com/spinal-injury/). The overall number of Canadians 65 years and older (for whom falls are the most common cause of injury) continues to grow. Based on the 2011 census, this group now makes up 14.8 per cent of the national population, or more than 4.9 million people.

Falls, heart and cerebrovascular diseases and other chronic disease, disability, and aging-related issues are central factors in our ever-spiraling healthcare costs. For instance, a 2011 report projected that if left unchecked, healthcare costs in Ontario could consume up to 80 per cent of the total provincial spending by 2030 (due to hospital, pharmaceutical and physician expenditures that are disproportionately higher among older adults). This is a massive increase compared to the present rate of 46 per cent (Drummond, 2011, "*Therapy or Surgery? A Prescription for Canada's Health System*").

The Brock response

The centre has created four programs to improve health and quality of life for our special populations as a way of responding to rising health care costs: Heart Strong (cardiac patients); SeniorFit (older adults); Power Cord (individuals with spinal cord injury and MS); and Therapeutic Exercise for Amputees in Motion (T.E.A.M.).

The centre's research team – which pursues community-based, transdisciplinary research on exercise rehabilitation and dietary modifications – takes a biopsychosocial approach to health in which disease is seen as an interplay between physical, behavioural, psychological, social and environmental factors. This approach is critical to the design, delivery and effectiveness of health interventions.

Taking action

The Brock - Niagara Centre for Health and Well-Being is unique in many ways. The centre is the only one of its kind that is committed to technology development and testing, which will enhance Ontario's and Canada's global reputation as an innovation hub. There is no other centre in Ontario or Canada that currently investigates the effects of nutrition and exercise for special populations.

Other similar university-based, research-focused exercise centres primarily use traditional forms of exercise training such as resistance training with machines or free weights and aerobic training with treadmills and arm ergometers. The Brock - Niagara Centre for Health and Well-Being is innovative and comprehensive in its exercise approach; it also investigates less traditional forms of exercise training such as high-intensity circuit training, balance training and chair yoga. These exercise approaches are not only proving to be highly effective at increasing strength and cardiovascular fitness, but they are also proving to be beneficial for balance, mobility, functional independence and quality of life.

Creating knowledge

i. Publications and conferences

Brock - Niagara Centre for Health and Well-Being members have communicated the results of their research through an intense program of academic journal article publication as well as book and book chapter publication. In addition to the publications listed in Figure 1, more than 38 manuscripts are submitted or in preparation.

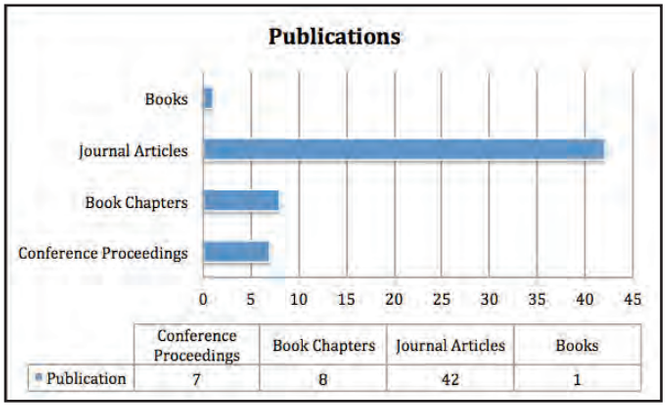
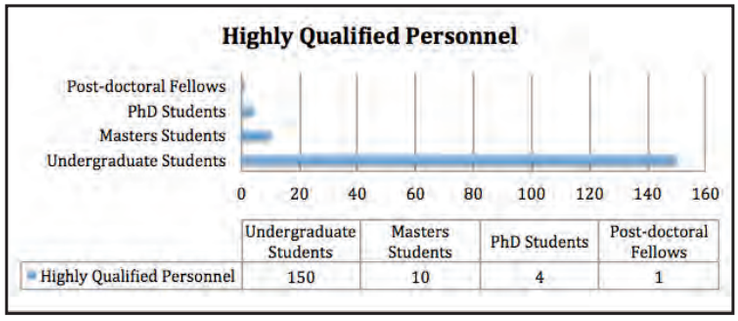


Figure 1. Publications of the eight Brock-Niagara Centre for Health and Well-Being members since Jan. 1, 2013.

As shown in Figure 2, 14 graduate students (Master and PhD) and one post-doctoral fellow have been involved in multi-disciplinary research being conducted at the centre. These students will become frontline researchers and health professionals with a solid understanding of the value of "prevention" and/or lifestyle approaches for health. During the past year, more than 150 undergraduate students from the departments of Kinesiology, Health Sciences, Recreation and Leisure, and Nursing, as well as those from the Faculty of Business, have benefited from volunteer and experiential-learning placements at the centre.



	Undergraduate Students	Masters Students	PhD Students	Post-doctoral Fellows
Highly Qualified Personnel	150	10	4	1

Figure 2. Highly Qualified Personnel Training and Mentorship. Trained by the eight centre members 2013.

iii. New programs

The Brock - Niagara Centre for Health and Well-Being, in conjunction with Brock's Department of Kinesiology, is taking an active role in providing continuing education for these students through the creation of a Master of Professional Kinesiology program. The centre also collabrates with the MedPlus program at Brock University, which allows undergraduate students to gain hands-on experience in health-related fields. Likewise, an ongoing relationship with Brock's International Services allows international medical and physiotherapy students to complete their placement component in the centre. Their interactions with our special populations help to shape their attitudes towards disease, disability and rehabilitation, and ultimately, these attitudes are shared with their healthcare colleagues upon their return home.

The centre's team has also established a partnership with Restorative Therapies in Baltimore, MD., a company that offers continuing education courses across the U.S. on functional electrically stimulated exercise. In collaboration with Restorative Therapies, the centre will be offering the same continuing education courses this winter (2015).

iv. New funding

Members have received seven internal and nine external grants since Jan. 1, 2013. Applications with the Canada Foundation for Innovation and the Ontario Ministry of Research and Innovation are pending.

v. Patents

The centre recently has been granted a U.S. patent on a device (Anti-Contracture Elevating (ACE)-wheelchair legs) aimed at preventing and reversing muscle contractures (the chronic shortening of a muscle over time) in chronic wheelchair users. Preliminary results have shown a great deal of promise and have yielded unexpected benefit for both lower limb spasticity and edema, both of which seriously limit quality of life in this population. Better Motion Group (Aurora, Ont.) has agreed to manufacture the ACE-wheelchair legs product, and once developed, there are plans to license the product through major medical device distributors in Canada and the U.S.

vi. Community impact

The centre's research, which focuses on novel exercise and nutritional interventions, will ultimately improve the efficiency of both private and public healthcare expenditures in Ontario. For example, research will result in fewer hospital admissions and shorter duration of hospital stays, increased independence and the ability to reside in personal homes longer, reductions in informal caregiving, reductions in job loss due to disease or injury, and an increase in current job force productivity. Focusing on prevention of disease and injury, as well as improving health and functional independence, the research will be used to inform best practice exercise and nutritional guidelines for publicly accountable healthcare units and privately owned long-term care facilities, community health programs and rehabilitation clinics.

Currently, our four existing programs – Heart Strong, SeniorFit, Power Cord and T.E.A.M. – serve approximately 300 members. The research and programs at the centre promote a peer support environment that encourages personal interactions, regular attendance, and community involvement, which in turn, fosters social engagement and reduces social isolation.

Building for the future

The centre's revenue generation is structured primarily around membership fees, as well as continuing education courses and patents. At present the centre has more than 300 paying members across the four existing programs. The centre would like to expand its programming and the size of its facility so that it can serve individuals who have suffered a stroke and those with Parkinson's disease.


Brock Seniors
Exercise Progra

Jack and Nora Walker Centre for Lifespan Development Research

Overview

The Jack and Nora Walker Centre for Lifespan Development Research is a transdisciplinary collaborative effort dedicated to studying human development across the lifespan. More than 60 faculty members representing the Faculties of Social Sciences, Applied Health Sciences, Education, Business, and Humanities, as well as 40 community agencies, work together to investigate psychological, social, health, neurophysiological and educational aspects of life from infancy to old age. The centre houses specialized labs, observation, interview and testing rooms, as well as computer labs for large-scale studies.

The challenge

Researchers in the centre address several challenges in lifespan development:

- What factors (eg. context, turning points) promote behaviour change across the lifespan?
- Are there sensitive periods for some aspects of development?
- Do cognitive processes, such as memory, face perception and self-regulation function differently among older adults in comparison to young people?
- How can research across disciplines (e.g., psychology, education, sociology, physiology, applied linguistics, health) be integrated to help promote health and well-being across the lifespan?

The Brock response

Centre members address these challenges through a variety of collaborations, with researchers within the centre, other Brock faculty, and with other universities in Canada and around the world. Partnerships with more than 40 community and post-secondary institutions form a vital component of research projects.

Examples of the centre's research collaborations include:

- Researchers from neuroscience, biology and chemistry study compounds that could limit the damage to tissue caused by stroke and heart attack.
- A team of psychologists and a researcher from business are developing effective strategies for the prevention and understanding of bullying. Team members belong to PREVNet, a national network of leading researchers and organizations working together to stop bullying in Canada.
- The centre's Cognitive Brain Research team of five cognitive neuroscientists investigates the role of attention, memory, sleepiness, emotion regulation, and aging on performance. A core community partner is Pathstone Mental Health.

Taking action

One of the centre's major strengths is strong community connections. We build on that strength through the employment of a full-time Knowledge Translation Officer who brokers relationships between our members and community agencies, organizing internal and external speaking events and working to identify and develop new partnership opportunities.

In addition, the centre provides space for 60 lifespan development researchers to meet and collaborate on research projects, with state-of-the art labs and observation rooms. The result is that we can now engage more efficiently in transdisciplinary research, integrating psychological, social, health, and neurophysiological aspects of lifespan development.

Creating knowledge

i. Publications

As is shown in Figure 1, centre members have published five books and 274 journal articles since Jan. 1, 2013. In addition, in 2013-14, Lifespan researchers participated in 233 conferences, symposia and workshops, with just about the same number (232) in 2012-13. This is up from 224 in 2010-11.

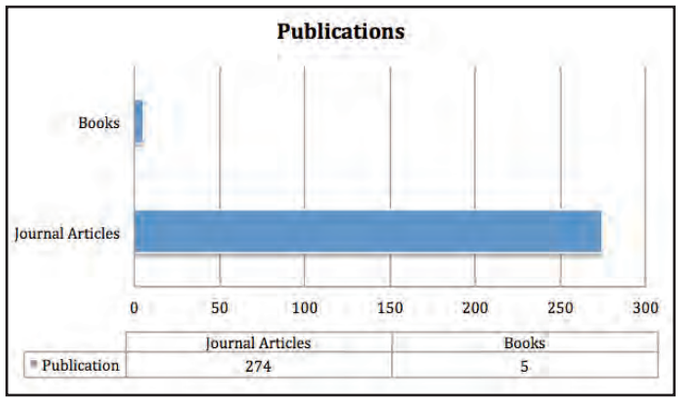


Figure 1. Publications by Lifespan Centre members since Jan. 1, 2011

ii. Training of Highly Qualified Personnel (HQP)

We are committed to training and mentoring highly qualified personnel. Graduate students learn from each other and undergraduate students are brought into a culture of discovery and knowledge advancement. Centre members have a strong track record of student supervision and are committed to

advancing the careers of their students and post-doctoral fellows.

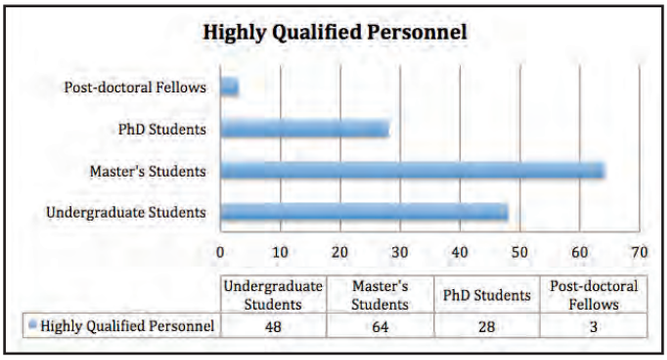


Figure 2. Highly Qualified Personnel Training and Mentorship. The number of students and post-doctoral fellows engaged in the centre since 2013.

iii. New programs

The centre is currently developing an applied clinical diploma program that will be the first of its kind in Ontario. The program will provide post-master's level clinical training to individuals wishing to work in mental health services and will help upgrade skills for individuals already working in the mental health community. This program will address a significant skilled-worker gap in health services in the local community. We anticipate that we will accept students in 2015.

iv. New funding

Since the beginning of 2013, centre members have received 34 new internal and 18 new external multi-year grants. The external grants include five from the Natural Sciences and Engineering Research Council (NSERC), four from the Social Sciences and Humanities Research Council (SSHRC) and two from the Canadian Institutes of Health Research (CIHR). Centre members' operating funds during 2013 totalled $1,026,918. This figure includes funding from the new grants and from previously awarded multi-year grants housed at Brock.

In addition, Lifespan Centre researchers are collaborating with colleagues on many multi-year research projects homed elsewhere, with some portion of the funds being available to the collaborating centre member.

v. Community impact

External demand for collaborative relationships with centre members is continually expanding, currently including Pathstone, PREVNet, Ontario Neurotrauma Foundation, National Institutes of Health, FedDev, Ontario Brain Institute, Ontario Problem Gambling Research Centre, The Students Commission, various provincial ministries, etc. in addition to the federal granting councils.

We have recently initiated an annual workshop on electrophysiology (unique in Canada), regularly sponsor the Golden Horseshoe Pediatric Exercise Group annual meeting, and have also sponsored other one-off meetings. Additionally, as part of its commitment to mobilize research effectively, the centre hosts regular speaking events where researchers, practitioners, clinicians, and community organizations share their knowledge in practical ways. We also work with various Brock departments to organize and host community events across the University. For example, we have partnered with Office of Brock's Research Services and the Faculty of Graduate Studies to arrange a research forum on bullying across the lifespan, which is expected to draw a large crowd of both academic and community partners.

vi. International partners

Our members have various research collaborations, including connections with the United States, China, Japan, Poland, Austria and Israel. These collaborations involve projects concerning developmental mental and physical health issues, cognitive development, neurophysiology of response control, educational practices and effectivity and linguistics.

Building for the future

The centre plans to apply for large-scale grants such as the Networks of Centres of Excellence. The first few years of the internal funding are focused on preparing the centre for that goal. For example, transdisciplinary teams of researchers are meeting to create and extend existing research collaborations, both within the centre and with national and international research partners.

Our recently hired Knowledge Translation Officer is facilitating members' outreach efforts through the production of plain language and basic research summaries, relationship stewarding, help with grant writing, and the mobilization of research findings to various end users. We also are supporting and promoting our success through electronic media (e.g., website, social media), newsletters, conferences, and networking sessions.

Finally, the centre currently is engaging in research and development in the form of software development that will provide strong advances in the field of psychophysiology, with the potential option of providing fee-for-service in data processing. In these ways the Lifespan Centre will strengthen our understanding of psychological, social, health, neurophysiological and educational aspects of life from infancy to old age.

Social Justice Research Institute

Overview

The Social Justice Research Institute (SJRI) is a vibrant collective of faculty from Social Sciences, Humanities, Education, Applied Health Sciences and Library Services brought together by a shared concern for social justice. SJRI was established as a leader in advanced transdisciplinary social justice scholarship, innovative knowledge mobilization strategies, and community-university partnerships for the betterment of society in and beyond the Niagara region. The institute aims to build mutually beneficial research relationships that generate socially relevant knowledge, and ultimately, help build a more just society.

The challenge

The global economic crises, the risk of catastrophic climate change, and growing recourse to war to solve conflicts are some of the many challenges facing society today. In Canada, inequalities based on race, gender and age are increasing in a context of deepening economic polarization. The "Idle No More" movement of indigenous people drew attention to great social suffering, environmental threats and disregard for other species and linked them to a degradation of Canadian democracy.

The Brock response

SJRI researchers work across disciplines, in a variety of modalities, including with community partners who share the institute's vision of a more peaceful, equitable, and sustainable society, from local to global scales. Our areas of research and activities include:

- Jobs and Justice concentrates on issues related to work and labour and their relationship to social justice such as deindustrialization and union organizing in Niagara.
- Gender and Justice addresses the intersections among sexuality, race, class, age, nation and other issues that impact gender relations, politics, and identities.
- Global Justice focuses on transnational social justice movements and connections between the local and the global.
- Animals and Justice explores social justice through Critical Animal Studies, encompassing animal issues as they relate to political economy, environmental and human social justice, and how dominant ideas about relationships between species are created, sustained and challenged.

Taking action

SJRI is unique in Canada, pursuing research that encompasses the humanities, social sciences, education, applied health, and library services. Its institutional and intellectual reach is wide, comprising 47 Brock faculty members across 15 academic units who are collaborating on a common research theme. The SJRI achieved national visibility at Congress 2014, showcasing social justice scholarship across disciplines involving collaboration with 15 academic societies. At Congress 2014, SJRI co-sponsored, promoted and/or webcast the events of 21 organizations and seven international scholars.

SJRI's vision is to establish Brock as a leading site for transdisciplinary social justice research by establishing Studies in Social Justice as a leading open access journal for transdisciplinary scholarship and holding an annual thematic symposium with a parallel student conference. SJRI also offer skills-building workshops and other support for our affiliated faculty members.

Creating knowledge

SJRI has a multi-year plan to advance knowledge through conferences, symposia, capacity-building workshops, public events, recruitment of post-doctoral fellows, student training and publication of a peer-reviewed journal.

i. Publications and conferences

As can be seen in Figure 1, SJRI members and affiliates have produced seven books, and edited six more. The book chapters and journal articles published by members and affiliates have contributed new data and new insights across the spectrum of social justice research and scholarship.

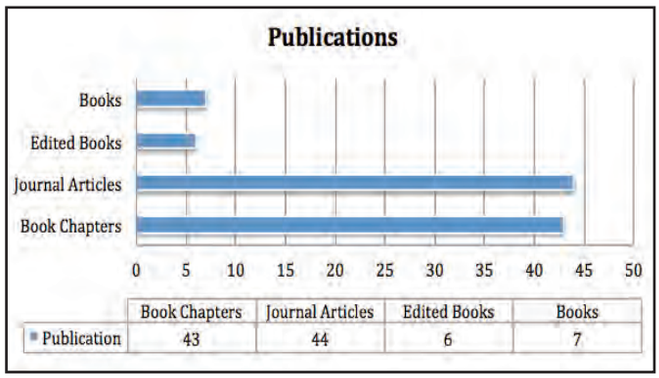


Figure 1. Publications by Social Justice Research Institute members and affiliates since Jan. 1, 2013.

In addition to the publications shown in Figure 1, SJRI has assumed management of – and issued a call for – the first issues of Studies in Social Justice on "Scholarship and Activism," to be published in the summer of 2015. In addition, over the past few years, affiliated members have produced non-refereed materials that include four manuals, five reports, one exhibition, two exhibits, 34 plays, four film/television shows, and 18 radio/podcasts. The SJRI presented at, or organized, 173 conferences, 13 symposia and 38 workshops in 2013-14.

ii. Training of Highly Qualified Personnel (HQP)

Trainees are recruited through annual competitive MA fellowships. SJRI had one MA fellow in 2013. Two will be in place for 2014-15. SJRI will host two post-doctoral fellows – one Banting and one funded by the Social Sciences and Humanities Research Council (SSHRC) – in 2014-15. In 2015-16, SJRI will host the first of a series of rolling post-doctoral fellows. In 2013-14, SJRI employed one BA student and one MA graduate as assistants.

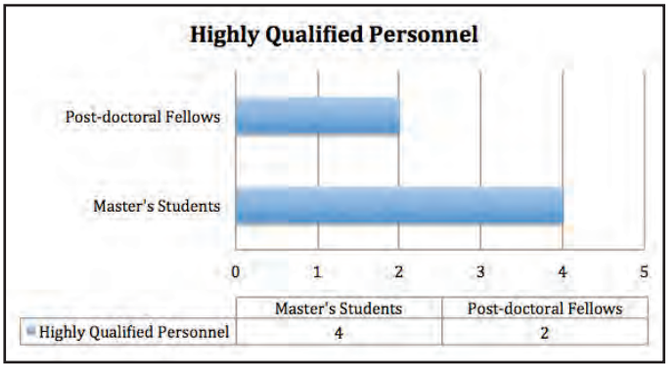


Figure 2. Highly Qualified Personnel Training and Mentorship. The number of students and post-doctoral fellow placements in progress within SJRI.

iii. New funding

Since Jan. 1, 2013, SJRI's faculty steering committee has secured $1.9 million in external funding as principal investigators or co-applicants. From 2013 to 2014, the institute's affiliates secured 64 internal grants and 25 external grants. These include nine grants from SSHRC and two grants from the Canadian Institutes of Health Research.

iv. Community impact

SJRI fosters community connections and increases the institute's public visibility. Externally, SJRI has 14 participating members from other academic institutions and 20 from community organizations. Partnership activities include co-sponsorship of scholarly events hosted by seven academic units; co-sponsorship of 11 high-profile events with international participation at Congress 2014; and three sponsored activist scholars at the 2014 People's Social Forum. SJRI nurtures community collaborations through the Niagara Social Justice Forum.

SJRI also has a social media strategy that highlights and mobilizes the work of our members. Since May 2014, SJRI has received 5,049 views on Twitter and distributed two e-bulletins. As the institute's social media presence grows, SJRI has developed relationships with external groups, such as Leadership Niagara, and will continue to distribute information about funding and other research opportunities.

Building for the future

SJRI has dramatically increased the scope of its activities and impact since its launch in 2013. The institute's goal is to be the national leader in social justice research. To support its expanding national presence, the SJRI is exploring the possiblity of developing a large-scale SSHRC Partnership Grant that will co-ordinate multiple community-based projects in Niagara. In addition, SJRI plans to develop Memoranda of Understanding with principal investigators to share operating costs associated with external grants and to further expand its capacity. The institute has successfully established a large research community within Brock University; going forward, the institute will use its expertise, talents and energy to expand this network to our local, national, and international communities.

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