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Research at Colleges in Ontario: Learning from the Past and Looking Towards the Future

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Abstract

Research activities are a relatively new undertaking for Ontario colleges. The Government of Ontario enabled Ontario colleges to grant baccalaureate degrees in applied areas of study with the passing of the 2000 Postsecondary Education Choice and Excellence Act, and conduct applied research with the passing of the 2002 Colleges of Applied Arts and Technology Act. Fifteen years later, applied research has now become an essential part of college programming. This article provides history and context for the emergence of Ontario colleges as institutions engaging in applied research activities, examines the barriers and limitations that researchers at Ontario colleges face, and identifies some implications for research practice at Ontario colleges in the future.

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Introduction: History and Context

The Canadian system of postsecondary community

colleges emerged in the 1960s, in response to the federal shift from an agricultural, resource-based economy to an industrial, service-based economy. In 1960, the Technical and Vocational Training Assistance Act authorized the federal government to join provincial governments in funding capital costs for vocational training facilities (Longfield, 2003). Subsequently in 1967, the Adult Occupational Training Act was passed, which focused on unemployed and underemployed workers and short-term retraining (Longfield, 2003). These acts provided the provinces with the enabling legislation and capital assistance they needed to establish the Canadian college system (Fisher, 2010).

Sparked by the shift from an industrial-based to a knowledge-based economy, the 2000 Postsecondary Education Choice and Excellence Act and the 2002 Colleges of Applied Arts and Technology Act were passed by the Government of Ontario in response to the demands of global competitiveness. By enabling the Ontario colleges to grant baccalaureate degrees in applied areas of study (Government of Ontario, 2000) and extending them the permission to conduct applied research (Government of Ontario, 2002), the Colleges of Applied Arts and Technology (CAATs) could begin to support national economic goals related to research and innovation. As a result of this enabling mandate and access to some modest funds from provincial and federal granting agencies, many Ontario colleges have been able to increase their applied research activities in the years since these legislation were passed (ACAATO, 2004, 2006; Munro & Haimowitz, 2010). In Canada, the role of colleges and institutes has traditionally been to support economic development by facilitating access to jobs for graduates in both public and private sectors to support

the development, production, sales, delivery and maintenance of products and services (Madder, 2005).

Focus on Applied Research

Very broadly, there are two general types of research: basic and applied. Basic research is usually theoretical, and is often undertaken in order to gain new knowledge or understanding of the fundamental aspects of phenomena. Basic research may lead to disruptive innovation, and has traditionally been the purview of universities. In contrast, applied research is usually undertaken to solve a specific industry, community or public sector problem, with the goal of providing measurable and immediate social and/or economic benefits and resulting in incremental innovation. Basic research often results in industry, community or public sector push, while applied research is often the result of industry, community or public sector pull. Applied research may validate the findings of basic research by providing benefits or solutions related to the knowledge or phenomena discovered through undertaking basic research. According to Munro and Haimowitz (2010), applied research differs from basic research in that:

> it is driven not primarily by the curiosity of the researcher, but instead by needs and problems identified by firms, governments, and other organizations in the private and public sectors, and is more often oriented toward developing new or improved products, processes, and services that contribute to competitiveness and organizational effectiveness. (p. 2)

Following a decade of capacity building in the early

2000s, applied research has now become an essential part of college programming. The responses of 103 institutions to the Survey of 2011-2012 College and Institute Applied Research Activity demonstrates sustained growth in applied research across Canada (ACCC, 2013). Noted areas of growth include institutional commitments, growing participation by faculty members and students, and increasing support from industry and community partners and government.

Canada's economy ranks close to the bottom of the scale of the world's leading economies based on research and development spending as a percentage of Gross Domestic Product, the number of national and external patent applications submitted, and the amount of human capital devoted to research in relation to the size of the workforce (Madder, 2005). In order to improve Canada's weak innovation record, strategies and mechanisms to stimulate business research and development are desperately required. Colleges are uniquely poised to respond to this need. It is evident that institutions across Canada are increasingly becoming involved in research activities with more administrative structures in place to support research projects, more faculty members, staff members and students engaged in the research process, and more applied research partnerships with industry and community members. The survey results also indicate increasing areas of research expertise, growing numbers of dedicated research facilities, and more involvement in research networks (ACCC, 2013, 2014).

College Applied Research and Small- and Medium-Sized Enterprises (SMEs)

College applied research and innovation activities have become increasingly important in recent history both

federally and provincially, particularly in relation to Small- and Medium-Sized Enterprises (SMEs). SMEs are key contributors to Canada's economy. In 2012, SMEs accounted for 98 percent of businesses in Canada and employed over 7.7 million individuals, or 69.7 percent of the total private labour force (Industry Canada, 2013). According to the Organization for Economic Co-operation and Development (OECD) (2012), "colleges are becoming proactive in directly meeting the needs of small businesses in areas of problem solving, process innovation, and technical skills" (p. 79). CAATs are poised to fill this capacity gap. Applied research collaborations between CAATs and industry partners enable colleges to emerge as innovation catalysts and accelerators that help businesses overcome barriers to research and innovation (Munro & Haimowitz, 2010). Due to the nature of their size, SMEs lack the capacity to conduct their own research, development and innovation activities. Colleges are well positioned to support them in these endeavours.

Research at the Ontario CAATs

The Ontario CAATs were established in 1967 by the Government of Ontario. Ontario colleges are mandated to provide "accessible, quality career-oriented education and training that foster leadership and citizenship in students, and strengthen the workforce as well as the economy" (ACAATO, 2004, p.1). Ontario colleges also undertake applied research and innovation activities to enhance social and economic development throughout Ontario in order to meet local, regional and global marketplace demands (ACAATO, 2004).

In their report entitled "Applied research and innovation: Ontario colleges – an underutilized resource", Colleges

Ontario (formerly the Association of Colleges of Applied Arts and Technology of Ontario) (ACAATO, 2004) describes the unique role that Ontario colleges play in contributing to Canada's national innovation strategy goals. Unlike their university counterparts that focus on performing basic research to test and extend the boundaries of knowledge, colleges focus on applied research, which leads to innovations and wealth creation through the sales of new goods and services. Applied research is the link between knowledge and economic activity; it applies basic research to the development of new products, processes and services. Ontario colleges can provide the skills and resources needed to rapidly translate research knowledge into new products, services and processes that strengthen industry competitiveness, enhance productivity, and improve quality of life (ACAATO, 2006). In this regard, Ontario colleges play an invaluable role in strengthening the research and innovation record of Ontario and of Canada as a whole.

Ontario colleges are degree-granting institutions. As such, research is a central focus of their mandate. This is especially the case for the five Institutes of Technology and Advanced Learning (ITALs) that are authorized to offer up to 15 percent of their programming at the undergraduate degree level. The six polytechnics in Ontario also offer a wide range of advanced education credentials, including four year bachelor's degrees, and strongly focus on applied research and industry innovation (Polytechnics Canada, 2015).

In the six decades since the Ontario CAATs were established, they have developed a unique set of strengths that enable them to successfully execute applied research collaborations with industry,

community and public sector partners. Over the course of the 12 years that Ontario colleges have had research included as part of their mandate, they have demonstrated that their research outcomes are significant in terms of economic development and commercialization impact, innovation, job creation and the development of highly-skilled personnel (ACAATO, 2004). As Munro and Haimowitz (2010) acknowledge, in Canada, “funding for applied research is modest, the scale of activity is limited, and many Ontario colleges are new to applied research – but the results of completed projects are impressive” (p. 17). It is evident that the strengths of Ontario colleges to support applied research, education and training will enable them to play a significant role in improving the innovation and productivity performance of both Ontario and Canada (Munro & Haimowitz, 2010). Colleges Ontario (2011) claims that there are two necessary parts to the success of Ontario colleges in their applied research endeavours. The first is that many colleges now have established centres of expertise, where applied research leaders work with local business and community organizations to foster innovation and entrepreneurship; for example, Fleming College has a Centre for Alternative Wastewater Treatment, George Brown College has a Food Innovation and Research Studio, and Niagara College has an Advanced Manufacturing Innovation Centre. The second is that through the colleges, students, faculty members and industry partners collaboratively work to turn innovative ideas into new and improved products or services that get to market faster than they would using other means. Ontario colleges provide relatively easy access to knowledge, skills and other resources that industry, community and public sector organizations

need to leverage in order to overcome the barriers to innovation and growth that they face.

Barriers and Limitations to College Research

The challenges facing colleges in terms of incorporating research into their respective cultures are many, varied and complex. Although Ontario colleges are well poised to make great contributions to the research and innovation landscape both provincially and nationally, strategies and resources are clearly needed to better support and increase their research and innovation activities (ACCC, 2006; ACAATO, 2004, 2006; Fisher, 2010; Madder, 2005; Meek et al., 2009; Munro & Haimowitz, 2010). Canadian colleges and institutes are currently unable to expand their research and innovation activities to meet increasing demands because they face a number of systemic barriers in terms of restrictions to the number of faculty members, facilities and institutional resources that they can allocate to research, innovation and commercialization activities (ACCC, 2006).

In a critical examination of the college research landscape in Ontario, one would be remiss to fail to mention the limitations imposed by a lack of dedicated federal or provincial funding specifically for research activities. While the CAAT Act allows colleges to pursue research activities as one way to achieve their core objectives (Government of Ontario, 2002), fund transfers from the Ministry of Training, Colleges and Universities do not include distinct envelopes for research. Colleges do not currently receive core funding to cover the expenses associated with research and innovation activities. This is most likely the result of the fact that

most funding programs have been developed in keeping with the university model, where researcher salaries are supported through core funding. Madder (2005) attests that this gap in support is the primary limiting factor for research and innovation activities at colleges and institutes.

Colleges may allocate some of their funding to support research, but they are not entitled to additional resources and must continue to meet their mandate and objectives with the resources they receive (Munro & Haimowitz, 2010). As a result of this, a significant amount of funding for college research comes from federal and provincial agencies and departments that support research and innovation, including the federal Tri-Council and the Canadian Foundation for Innovation. However, this funding is often difficult to access as a result of barriers that arise from both program design and internal college challenges. According to Colleges Ontario (ACAATO, 2004), many of these barriers are “rooted in the criteria for eligibility and the process of, and participants in, the adjudication processes used” (p. 8). Without dedicated financial support from the provincial and federal government, colleges will be unable to fulfil their research and innovation mandates over the long term.

Additionally, colleges must gain the capacity to develop research and innovation strategies, leverage faculty technical expertise, and cultivate successful research proposals (ACAATO, 2006; Fisher, 2010; Madder, 2005). Through interviews with federal and provincial program officials and the Heads of Applied Research at Ontario colleges, Munro and Haimowitz (2010) uncovered six key factors that affect funding application success rates: institutional supports and structures,

proven capability, partnerships, champions and "grantsmanship", emphasizing and adhering to evaluation criteria, and demonstrating faculty research expertise. In the absence of these critical supports, any further growth of college research and innovation initiatives will be brought to a grinding halt.

In the 2006 Association of Community Colleges of Canada report entitled "Applied Research at Canadian Colleges and Institutes" (ACCC, 2006), colleges and institutes were asked to identify and rank the barriers which hinder or impede them from maximizing their potential to contribute to innovation in Canada through applied research and development, technology and knowledge transfer. Insufficient time for faculty and staff members to participate in research activities ranked as very important or important by the highest number of colleges and institutes. This finding is consistent with the conclusions of ACCC-SSHRC consultations with colleges and institutes, which found that the most significant barrier for faculty members is the lack of funding for release time for faculty members involved in research projects (ACCC, 2006).

Directly related to the limited funding and resources available to support college research activity is what Rosenkrantz (2013) refers to as the cultural conflicts that may arise if a schism develops between faculty members who have advanced degrees, engage in applied research, and teach primarily in the applied degree programs, and those who do not. According to Rosenkrantz (2013):

> In terms of the institutional culture that is evolving in colleges, it is one split between the academic side of the institution, and the managerial, or corporate

> side. The academic culture arises primarily from the disciplines of the faculty where teaching and student engagement are valued, as are shared governance and decision-making, whereas the managerial culture focuses on the goals and purposes of the institution and values efficiency, effective supervisory skills, and fiscal responsibility. (p. 22)

Additionally, each college is not an independent institution in the way that universities are. The collective bargaining rights of partial-load and full-time faculty members are represented by the Ontario Public Service Employees Union, which makes it particularly challenging to make any changes to the collective agreement in order to allocate college faculty time for research purposes. Overcoming the challenges associated with this cultural shift certainly influences the effectiveness of colleges in their attempts to develop and sustain robust research programs.

Looking Forward: Implications for Research Practice

The demand for Ontario college applied research and innovation support exceeds both the supply and the capacity of Ontario college resources (ACAATO, 2006; Fisher, 2010). It is also clear that Ontario colleges are at different stages of development in terms of their applied research capacity and activity. Madder (2005) suggests that colleges and institutes in Canada currently exist along a continuum of four generic models of states: institutions with no formal innovation policies and structure; novice innovation institutions, where formal innovation activities have started relatively recently;

established innovation institutions, where comprehensive research and development policies and practices are in place; and integrated innovation institutions, which have integrated innovation and business support systems to provide integrated support for innovation activities.

According to Munro and Haimowitz (2010), recognizing this continuum is a critical starting point for understanding whether the challenges each college faces are unnecessary and malleable barriers, or simply the challenges normally expected at a certain stage of learning and development. In many Ontario colleges, a lack of administrative support has become a limiting factor for research and innovation activities (Madder, 2005). This lack of administrative support is compounded by the rapidly increasing number of research projects being conducted, not only by baccalaureate students but also by diploma and graduate certificate level students, which require ethics approval. Anecdotal evidence suggests that this type of research is having a significant impact on the capacity and workload of college Research Ethics Boards.

Rowley (1999) asserts that “developing a strategic plan for research in most academic environments requires a different approach from the development of a strategic plan for IT infrastructure development, or even course and curriculum development” (p. 208). In order to effectively provide the applied research, innovation and technical assistance that Ontario SMEs demand, a number of supports are needed. These include frameworks for preparing grant applications, accessing and managing finances, navigating Human Resources logistics, compensating faculty members, prospecting

research partnerships and collaborations, developing standardized databases to track and record research resources and expertise, building capacity on research project design approaches, enhancing institutional capacity to manage research contracts, creating ethics review committees and processes, and sharing best practices and lessons learned (ACCC, 2006; Fisher, 2010; Munro & Haimowitz, 2010). Complementary to these frameworks and approaches, ensuring that they are effectively managed depends on the presence of a sufficient amount of administrative support, including directors of research, grant writers, project managers, industry liaisons and financial managers (ACCC, 2006; Munro & Haimowitz, 2010). Identifying implications for policy and practice related to research at Ontario colleges would mark one significant step towards helping colleges and institutes move toward becoming integrated innovation institutions.

Conclusion

This article provides history and context for the emergence of Ontario colleges as institutions engaging in applied research activities, examines the barriers and limitations that researchers at Ontario colleges face, and identifies some implications for research practice at Ontario colleges in the future while recognizing that everything exists within a fluid state; the system is constantly evolving, and no one solution or framework will resolve all of the existing challenges. Regardless, it is important that researchers and practitioners continue to propel the cultural shift towards investing in and encouraging research activities across the Ontario college sector, which can inform policy and practice that will enhance the culture of applied research and innovation

in Ontario and beyond.

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