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Home
Contents

A Framework for Research at Canadian Colleges

by Roger Fisher

Abstract

With the advent of the post-industrial 21st century knowledge-based economy and the demands of global competitiveness, Canada's community colleges are under increased pressure to extend their historical mandates (of career-related education and regional economic development) by incorporating *research*, especially *applied research*, into their traditional programs. The recent dramatic growth of college research cultures in response to these pressures, however, is occurring in an unsystematic and uncoordinated manner. The purpose of this article is to propose a comprehensive, integrated framework that provides clarity, focus, and direction for building a productive and sustainable research culture at Canadian colleges. For this purpose, a conceptual analysis of research models in higher education is conducted, leading to a working model that subsequently is used to analyze the implications of building a research culture specifically adapted for Canadian colleges. The six attributes of the working model (*research purpose, research forms, research governance, research personnel, research funding, and research output*) are revised accordingly, and a framework is proposed that reflects and accommodates the unique circumstances in which research is evolving at Canadian colleges.

Introduction

A metamorphosis of mandates and missions is currently unfolding on college campuses across the nation. With the advent of the post-industrial 21st century knowledge-based economy, and in response to federal initiatives to expand applied research and innovation activities in publicly funded institutions of higher learning, many Canadian colleges are now actively engaged in incorporating *research cultures* into their traditional mandates.

Just as federal initiatives of the 1960s, in the form of enabling legislation and capital assistance for the establishment of a pan-Canadian system of community colleges, were designed to accelerate Canada's transition from a resource-based to an industrial-based economy, so too the current federal involvement with college missions is driven by the need to accelerate the evolution of a national knowledge-based economy in a globally competitive marketplace (ACCC, 2008; Bélanger, 2005; Corkery, 2002a; Doern, 2008; Fisher, 2009; Industry Canada, 2007; Ivany, 2000; Levin, 2001; Rae, 2005). The recent establishment of a $50 million college-specific funding

program by the National Sciences and Engineering Research Council of Canada (NSERC) exemplifies this federal initiative to include colleges in the national research and innovation agenda.

In this current climate of innovation and change, many colleges are vigourously espousing a "new emphasis on information technologies, entrepreneurial education, and establishment of centres of specialization, innovation, and transfer of technology to the work place" (Gallagher, 1990, p. 5). For example, in addition to their traditional delivery of employment-related certificates and diplomas, many Canadian colleges are now offering applied, collaborative, and articulated baccalaureate *degrees*. Concurrently, college missions are being extended through provincially enacted legislation to include *research*, especially *applied research* in college mandates. In response to these legislative initiatives, some Canadian colleges are altering not only their missions but also their names, becoming *Institutes of Technology, Polytechnic Institutes*, or *University-Colleges* (Doern, 2008; Fédération des cégeps, 2006; Fisher, 2008b; Jones & Skolnik, 2009).

Therefore, driven largely by a federal initiative to strengthen the capacity of Canadian colleges to contribute to a "new climate of innovation and discovery in our nation" (Industry Canada, 2007, p. 15), and accelerated by the catalyst of provincially legislated inclusion of applied research in college mandates across the country, Canada's colleges are being challenged to reinvent themselves as "engines of economic growth" (Quinlan, 2005, p. 23) and "catalysts of economic innovation" (Colleges Ontario, 2007, p. 1). Consequently, the potential contribution of Canada's colleges to the national innovation agenda has emerged as "one of the top advocacy priorities for the college system" (Corkery, 2002a, p. 1).

Certainly, the rhetoric accompanying this transformation conveys a sense of promise and optimism. *Advantage Canada* (2007), the federal government's long-term plan to improve our economic competitiveness, proclaimed the national goals of increasing public/private-sector collaboration in research, expanding the practical applications of Canadian research and innovation, and making Canada a "world leader [in] entrepreneurial innovation and creativity" (p. 1). At a provincial level, Colleges Ontario (2004) asserted that its colleges were "undergoing seismic shifts" (p. 2).

> Poised on the threshold of the 21st century, college-based applied research [and] business and industry innovation activities are of ever increasing importance; [through] this new, forward-looking provincial research and innovation policy model, Ontario's colleges fuel the economy [on the] pathway to prosperity. (pp. v, 1)

However, while the rhetoric accompanying this metamorphosis of missions is stirring, questions remain as to the extent to which Canadian colleges are, in fact, ready, willing, and able to fulfill the goals of this ambitious new research agenda. Several recent studies

have examined the current capacity of colleges to contribute to the innovation agenda in a meaningful and productive way (ACCC, 2007; Bélanger, 2005; Colleges Ontario, 2006; Corkery, 2002a, 2002b; Fisher, 2008a, 2008b, 2009; Madder, 2005; NSERC, 2007). Describing the recent growth of research capacity primarily in terms of new administrative positions, research offices, updated mission statements, seed grant funds, and so forth, these studies are encouraging, but guarded, in their conclusions. Corkery (2002a), for example, concluded cautiously that "colleges perform more applied research than previously thought [and] are contributing to a more innovative economy" (p. 15). Madder (2005) described a four-fold typology of *developmental stages* of research capacity, noting that only a small number of Canadian colleges had reached the third and fourth stages of, respectively, "Established" and "Integrated" innovation institutions (pp. 34-35). Bélanger (2005) noted that, while Canadian colleges were not originally established to be involved in the systematic production and dissemination of research, some larger colleges were beginning "to carve a more conspicuous and aggressive role . . . within the national research and innovation agenda" (p. 31). Therefore, although Canadian colleges are on the verge of transformative changes, an unambiguous picture of their capacity to participate meaningfully in the national research and innovation agenda has not yet emerged.

Based on the findings of these and other studies, it can be concluded that, while levels of research interest and examples of research activities are expanding at colleges across the nation, this growth is occurring in an unsystematic and uncoordinated manner. This situation is further complicated by the scale of differentiation in terms of provincial legislation, collective agreements, funding guidelines, areas of specialization, and so forth. In particular, there is no established tradition, no clear organizational structure, no prevailing vision, and no coherent framework to guide the development of an effective and productive national research culture at Canadian colleges.

Therefore, the purpose of this paper is to propose a comprehensive, integrated framework that provides clarity, focus, and direction for the further development of a robust, sustainable research culture at Canadian colleges. Consequently, the central research question guiding this project is: What might be the best model for building a coordinated, effective national research culture, specifically appropriate for Canadian colleges? The methodology selected for this study consisted of a three-stage conceptual analysis comprising: (1) an extensive review of current models of research in higher education, particularly at universities, leading to a working model of research in contemporary higher education; (2) an analysis of the implications of applying this model in the current context of research expansion at Canadian colleges; and (3) a proposed framework designed specifically for research at Canadian colleges. The resultant framework arises, therefore, from the basic constructs of the working model of research in higher education, but adapts the attributes of

those constructs to reflect the specific conditions, circumstances, and challenges that characterize the evolving research culture at Canadian colleges.

(1) A Working Model of Research in Higher Education

In order to examine, in a structured and systematic manner, the extensive panorama of pertinent international, North American, and Canadian models of research in higher education, this study followed the analytic process described by Miles and Huberman (1994) in which the construction of a conceptual framework:

> relies on a few general constructs that subsume a mountain of particulars. Categories are the labels we put on intellectual 'bins' containing many discrete events and behaviors. Setting out bins, naming them, and getting clearer about their interrelations lead you to a conceptual framework [that] explains, either graphically or in narrative form, the main things to be studied – the key factors, constructs or variables. (p. 18)

In this case, based on a wide-ranging and comprehensive reading in the field, on discussions and communications with relevant participants, and on perceptions, analyses, and understanding of the topic, six categories were selected which were deemed to represent all of the significant themes, models, issues, and factors described in the literature. These categorical constructs were as inclusive as possible, representative of the literature, and encompassed, in a structured and systematic manner, the core components of a comprehensive framework for research in higher education. Following the process of categorization delineated by Miles and Huberman (1994), six key constructs (*research purpose, research forms, research governance, research personnel, research funding,* and *research outputs*) were identified as "the main things to be studied" (p. 18) in constructing a single, comprehensive, integrated working model of research in higher education.

a. Research Purpose.

The traditional purpose of research at universities, to generate and disseminate new knowledge, is currently being extended to include, additionally, the preparation of the next generation of knowledge users and creators, often referred to as Highly Qualified Personnel (HQP). In this context, Neave (2006) noted that "any strategy which seeks to enhance a nation's research capacity has first of all to turn its attention to that part of the research system which involves the conversion of graduates into qualified and capable researchers" (p. 3). By incorporating discussions related to knowledge production and dissemination, to the training of HQP, and to the role of prestige in maintaining and enriching the fundamental institutional mandates of teaching and research, the construct of *research purpose* represents a key component with respect to building a

working model for research in higher education. Also noteworthy for consideration is the issue of *academic capitalism* which, defined as "institutional and professorial market or market-like efforts to secure external moneys" (Slaughter & Leslie, 1997, p. 8), appears to have an ever-expanding influence on situating research purposes within the broader goals of higher education.

b. Research Forms.

The traditional form of basic, curiosity-driven research reflects knowledge production in the context of academic interests, and is commonly organized around fixed, hierarchical structures based on subject disciplines and subject specialists (Boyer, 1990; Pocklington & Tupper, 2002; Turk, 2000; Whitehead, 1929; Williams, 2003). The critical role of *disciplines* as coherent centres of research activity is underscored by Neave (2002), who noted metaphorically that "disciplines are the Mint where the prime currency of academia and its public creditworthiness are smelted and struck" (p. 3). However, the traditional form of basic, curiosity-driven, discipline-centred research is also being extended to include "a broader, more capacious" model of research and scholarship (Boyer, 1990, p. 16) in recognition that traditional forms are no longer adequate to describe the full range and complexity of research activities conducted in contemporary higher education. Noteworthy are Boyer's four-fold model of scholarship (discovery, teaching, application, and integration) and Gibbons' (2003) Mode Two (trans-disciplinary, transient, socially distributed) forms of research.

c. Research Governance.

This construct relates primarily to the manner in which a research system is structured, how and by whom it is organized, the role and makeup of advisory boards, as well as the establishment of institutional policies and procedures related to, among others, academic freedom, research integrity, ethics, conflicts of interest, and intellectual property rights (Bonewits & Soley, 2004; Breton & Lambert, 2003; Clark, 1983; Davenport, 2002; Laidler, 2002; Rhoades & Slaughter, 2004; Rowley, 1999; UNESCO, 2006). Related issues reflect concerns about the increasing pervasiveness of corporate values, the participatory role of faculty, and reconsiderations of intellectual property rights with respect to the output of faculty researchers.

d. Research Personnel.

This construct focuses primarily on the human resource aspects related to employment opportunities, recruitment practices, terms of employment (compensation, benefits, mobility, job security), promotion and tenure, training, incentives, status, teaching workloads, and so forth (Bok, 2006; Chant & Gibson, 2002; Gibbons, 2003; Rowley, 1999). For example, in UNESCO's (2006) matrix for comparative analysis of national research systems, the category of

research personnel focused specifically on "the human resources for research, and specifically on both the initiation of new researchers into the world of research (selection, recruitment, training, mentoring), and on the terms of employment of those working in the research system" (p. 10). Associated issues relate to teaching/research tensions arising from differential incentives and rewards for these functions. In this context Boyer (1990) noted the "shifting priorities both within the academy and beyond" (p. xi), and proposed that "the most important obligation now confronting the nation's colleges and universities is to break out of the tired old teaching versus research debate and define, in more creative ways, what it means to be a scholar" (p. xii). For Boyer, "the problem was that the research mission, which was appropriate for *some* institutions, created a shadow over the entire higher learning enterprise" (p. 12). Echoing the comments of faculty members interviewed in Badali's (2004) study of these competing demands at a Canadian university, Boyer noted that "at the very heart of the debate, the single concern around which all others pivot, is the issue of faculty time" (p. xi).

e. Research Funding.

Discussions of *research funding* in higher education predominantly revolve around processes and procedures related to resource allocation, infrastructure, costs, financial management, and reporting processes (Bonewits & Soley, 2004; Breton & Lambert, 2003; Clark, 1983; Davenport, 2002; Etzkowitz, 1998; Industry Canada, 2007; Kyvik & Skodvin, 2003; Laidler, 2002). Neave (2002) provided a tripartite model that characterized the dimensions of research funding in terms of (1) institution, (2) state, and (3) market sources, and also characterized the relative *influence* of these sources in terms of coordination, orientation, and direction of research activities and outputs. In Neave's model, *institutional funding* constitutes a "gift relationship through which Academia was granted the freedom of inquiry – that is, to pursue knowledge wheresoever it led without hindrance" (p. 11). The second source, "research funding" (p. 13), specifically supports research on a competitive basis and is usually channeled through governmental research agencies or granting councils such as, in Canada, NSERC, Social Sciences and Humanities Research Council of Canada (SSHRC), Canadian Institutes of Health Research (CIHR), etc. This stream of funding, competitive by merit, makes research more directly dependent on performance and output criteria elaborated by government and injected through research councils. The third funding stream, "sale of service" (p. 13), conceives of research "as a service, as a vehicle to ensure income" (p. 12). The concomitant power of funding sources to influence the direction of research represents a critical issue to be addressed in any model of research in higher education.

f. Research Output.

Traditional indicators of *research output* primarily reflect

measures such as the number and quality of faculty publications, public and private research dollars, and faculty awards (Chant & Gibson, 2003; Davenport, 2002; Hewitt, 2008; Laidler, 2002; Slaughter & Leslie, 1997; UNESCO, 2006). Certainly, publications and citations provide a common indicator of research output, reflecting the ubiquitous mantra of *publish or perish* in higher education. “Published research,” noted Bok (1986), “emerges as the common currency of academic achievement, a currency that can be weighed and evaluated across institutional and even national boundaries” (p. 77). However, these traditional indicators of research output increasingly are being augmented with non-traditional measures of research output related to technology transfer, student performance, and faculty participation in cross-disciplinary and cross-institutional research networks (Finnie and Usher, 2005; Gibbons, 2002; Neave, 2002; Rowley, 1999).

In summary, the purpose of this section was to examine and synthesize the range of frameworks and constructs found in the literature related to research in higher education, especially with respect to universities, and to distill these frameworks and constructs into a *working model* that can be used as a lens to analyze the current efforts to build a research culture at Canadian colleges. Following the process of categorization delineated by Miles and Huberman (1994), six key constructs (*research purpose, research forms, research governance, research personnel, research funding,* and *research outputs*) were selected in order to describe, in a structured and systematic manner, “the main things to be studied” (p. 18) in constructing this working model for research in higher education. Figure 1 graphically illustrates the Working Model of Research in Higher Education.

Figure 1

(2) Implications for Research at Canadian Colleges

In this section, the working model of research in higher education, developed in the previous section, is used as a lens to analyze the current characteristics and circumstances related to the research culture emerging at contemporary Canadian colleges.

a. Research Purpose.

While the purpose of research at universities is focused primarily on “the unqualified pursuit and dissemination of knowledge” (Turk, 2000, p. 3), this is not the case at Canadian colleges. Rather, the primary purpose of research in the college context is to extend and enhance the two integrally related college missions of employment-related education and regional economic development (ACCC, 2006; Dennison, 1995; Fisher, 2008b; Levin, 2001; Madder, 2005; Young, 1992). Whereas at universities the preparation and training of Highly Qualified Personnel is acknowledged as an important but *secondary* purpose for conducting research, at Canadian colleges the *primary*

purpose of building research cultures is to support the instructional/economic college mandate (1) by producing graduates who are *more highly qualified* for their professional roles through their participation in research activities, and (2) by contributing to regional innovation and economic development (ACCC, 2007; Belanger, 2005; Colleges Ontario, 2007; Corkery, 2002a; Doern, 2008; Industry Canada, 2007; Ivany, 2000; Skolnik, 2000).

b. Research Forms.

In the context of Canadian colleges, which lack the tradition of basic, curiosity-driven research so embedded in the university environment, the emphasis shifts clearly toward the emergent, non-traditional forms of research. Certain aspects of Boyer's (1990) and Gibbons' (2003) models seem particularly well suited for developing a robust research culture at Canadian colleges, where the primary purpose of research is to enhance the core missions of career-related training and economic development.

Any form of research or scholarship that contributes to improvements in teaching and learning will complement the fundamental goals of Canadian colleges to the betterment of their students and their communities. In this regard, Boyer (1990) emphasized that the *scholarship of teaching*:

> is particularly appropriate for community colleges. We still have much to understand about how students learn, especially those from less advantaged backgrounds, and faculty in community colleges should be authorities on this task. . . . If the concept of 'teacher-researcher' proves to be a field of research in which community college professionals engage, then this approach to research may well emerge as the most important facet of their scholarship. (p. 61)

In recent years, recognition of the value of conducting research related to teaching and learning has taken root at many Canadian colleges (Drea, 2004; Healey, 2000; Herteis, 2006; Rae, 2005; Skolnik, 2000). A sampling of Canadian college studies in this area includes investigations of, for example, training of beginning college teachers (Fisher, 2006; Lowry & Froese, 2001), college mentorship programs (Fisher & Engemann, 2005; Hargreaves & Fullan, 2000), constructivist approaches to college teaching (Ferguson, 2005), as well as research into student demographics, first-year experiences, and factors affecting retention and attrition at Canadian colleges (Bussière, 2006; Dietsche, 2005; Fisher & Engemann, 2009; Grayson & Grayson, 2003; Lambert, et al., 2004; Usher & Potter, 2006; Wignall, 2005).

Another non-traditional form of research in Boyer's (1990) model, the *scholarship of application*, also appears to be particularly pertinent and applicable to the emerging research culture at Canadian

colleges. Citing Handlin (1986), Boyer suggested that "scholarship has to prove its worth not on its own terms but by service to the nation and the world" (p. 23), and observed that "the work of the academy must relate to the world beyond the campus" (p. 75). This form of knowledge application, commonly referred to as *applied research*, represents a natural extension of college mandates which have always been linked closely to the needs of the communities they serve.

Certainly, Canadian colleges are well situated to conduct this form of applied research, especially in relation to the national research and innovation agenda which seeks to "increase the practical applications of research in Canada . . . [and to] turn knowledge into the products, services, and production technologies that will improve our wealth, wellness, and well-being" (Industry Canada, 2007, p. 9). The adoption of applied research, which tends to focus on practical solutions and lends itself readily to private sector participation, assists colleges in their mission of helping businesses to survive and thrive by employing new technologies and by adopting new and improved products and services. Gibbons' (2003) closely related Mode Two form of research, characterized by collaborative partnerships and professional linkages organized around particular applications, similarly extends the scope and context of research to "a wider, more temporary and heterogeneous set of practitioners, collaborating on a problem defined in a specific and localized context" (p. 110). Like Boyer's (1990) scholarship of application, Mode Two reflects the contemporary circumstances and environments in which research is emerging at Canadian colleges.

c. Research Governance.

In the context of Canadian colleges, great strides have been taken in research governance through the establishment of research offices and implementation of appropriate policies and procedures (Corkery, 2002a; Fisher, 2008b; Madder, 2005; NSERC, 2007). In particular, college engagement with granting councils and funding agencies has been instrumental in accelerating the development of research governance. For example, eligibility to apply for NSERC funding requires the establishment and implementation of policies regarding financial management, academic freedom, research integrity, conflicts of interest, intellectual property rights, environmental assessment, peer review, and research ethics. To date, 46 colleges have earned NSERC-eligibility, with another 35 under review (NSERC, 2009).

However, while colleges are actively developing and implementing appropriate policies and procedures, other complex issues related to faculty participation in governance, intellectual property rights, grant administration, and corporate influence are still evolving.

Since the fundamental questions with respect to research

governance involve who and what criteria shape the research agenda, and since the success of the research enterprise ultimately depends on the participation and engagement of the college faculty who will conduct and incorporate research in the context of their instructional programs, it seems reasonable to suggest that more faculty participation on research governing bodies would contribute to a more robust college research culture. In this context, Rowley (1999) stressed the critical importance of involving college faculty researchers as full participants in all stages of research governance. Emphasizing the concept of "ownership" (p. 1) with respect to research governance, Rowley noted that:

> resources to support research activities, while useful, are not sufficient. Any research plan needs to be owned by those who will contribute to its achievement. A participative planning and monitoring process in which group members jointly develop, and monitor, their progress towards achieving the objectives of a research plan is essential. Ownership can only be achieved if all researchers (from research students to professors) have involvement in the planning process. (p. 2)

Another governance concern relates to the need for a clear delineation of *intellectual property rights* in the college context of entrepreneurial collaborations and corporate partnerships, an issue depicted in the university context as a "tension between knowledge as a common good and knowledge as private property" (Daniel, 2003, p. 37). Research in the college setting is commonly conducted through collaborative partnerships where the benefits that accrue to corporate partners, often in the form of increased sales or productivity, are not necessarily shared with the college or the faculty researcher. Results from college research activities are increasingly embodied in technology transfer rights such as patents, licenses, and royalties which collectively "represent a tangible and valuable asset with legal protections" (Powers, 2003, p. 30). Therefore, governance bodies must clearly delineate policies and processes that accommodate and synthesize the commercial needs of business/industrial partners, the economic goals of funding agencies, the instructional objectives of the colleges, and the rights, academic, remunerative, and otherwise, of faculty researchers.

Since research is a relatively recent phenomenon at Canadian colleges, further development is also required at many institutions regarding the administration of research grants, employment of research personnel, integration of research activities into collective agreements, and further development of faculty proficiency in all aspects of the research enterprise. For example, contributions to overhead costs may be expected from college researchers who obtain grants, although these costs are considered ineligible expenses by most funders. Similarly, while *research assistants* at universities are commonly recruited from graduate students, colleges do not have an adequate supply of graduate students to fulfill these roles, and the

consequent need to engage college support staff and part-time employees in research-related activities becomes problematic in terms of collective agreements, job descriptions, pay scales, etc. Models must be established to facilitate the processing of external research grants within the parameters of established financial, accounting, and human resources procedures that are not necessarily structured to administer these types of arrangements.

Finally, with respect to the concern that a "corporate management revolution" (Rhoades & Slaughter, 2004, p. 48) is increasingly pervading research governance bodies, the resolution of this issue appears more manageable in the context of Canadian colleges, where partnerships with business and industry have long been a hallmark of college governance. Since college instructional programs are premised on employment–related relevance and business/community needs, corporate membership on college governing bodies contributes to strategic planning decisions that reinforce and enhance the core mission for all stakeholders.

d. Research Personnel.

The construct of *research personnel* presents many unresolved issues in the evolving context of research at Canadian colleges. Unlike university professors, for whom research traditionally represents 40% of their expected workload, college faculty are employed as full time *teachers*, with no expectation, remuneration, employment, tenure, or promotion specifically related to conducting research. Provincially negotiated collective agreements are predominantly silent on this issue, with only two provinces (Newfoundland & Labrador, and Alberta) specifically allocating funding for college faculty to conduct research within the scope of their employment. Even at the local (college) level, allocation of ever-scarcer resources for internally funded research is a challenge for even the most committed institutions. In this regard, Corkery (2002a) specifically identified "lack of faculty release time [as the] primary barrier to maximizing institutions' potential to stimulate innovation in Canada through applied research" (p. 15). Madder (2005) also identified the lack of funding for faculty release time as "the primary limiting factor for innovation activities at colleges" (p. 32). Similarly, the ACCC's (2006) National Research Advisory Committee identified significant teaching loads and lack of funding for research release time as the key barriers to unleashing the full potential of college research, and recommended "new funding mechanisms . . . for faculty release time" (p. 2).

Despite these challenges, Canada's colleges are frontline players in addressing the changing technological and skills requirements of the 21st century Canadian marketplace, and the benefits of allotting research time to college faculty are well documented (Doern, 2008; Hattie & Marsh, 1996). There is a growing international consensus that all postsecondary students need to graduate with the higher order skills and research experiences that

prepare them for “today’s increasingly super-complex society and economy” (Wuetherick, 2007, p. 1). In this light, the *Teaching/Research Nexus* (Baldwin, 2005; Halliwell, 2008; Krause, 2007; Patrick & Willis, 1998), in focusing on *research in the classroom*, provides a particularly appropriate paradigm to promote these goals in the college environment. From this perspective, applied research and innovation activities extend and enhance the college mandate to produce highly qualified personnel while contributing to faculty currency. Within the *Teaching/Research Nexus*, faculty increase their effectiveness while students learn advanced research and innovation skills directly related to the new economy.

e. Research Funding.

Neave (2002) described three traditional “money streams” (p. 13) (Institution, Government, and Market) that support and influence research in higher education. Colleges, unfortunately, are at a severe disadvantage in at least two of Neave’s (2002) three money streams, namely, institutional and governmental research funding.

With respect to institutional support, which Neave described as a “gift relationship” (p. 11), colleges receive minimal to zero support in provincial operating grants to pursue research activities, and, therefore, those colleges that allocate scarce internal resources to research and scholarship, do so at a cost to other programs and activities (Bélanger, 2005; Corkery, 2002b; Fisher, 2008b; Madder, 2005). Improvements in institutional support of research at colleges will require deliberate and concerted advocacy by stakeholders at all levels to achieve the necessary revisions to provincial funding formulas, operating grants, collective agreements, and local (college) strategic plans.

With regard to the second money stream, government funding councils, colleges are again at a disadvantage in their limited access to research funding from competitive sources such as Canada Foundation for Innovation (CFI), NSERC, SSHRC, etc. Nationally, regionally, and provincially, Canada’s colleges are constrained in the growth of their applied research and innovation activities by systemic bias in favour of universities (Bélanger, 2005; Fisher, 2008b; Madder, 2005), a situation perpetuated by the view that “universities have a proprietary and unassailable role” (Bélanger, p. 36) in the research establishment.

This perception is reinforced by the composition of review panels, selection criteria, restrictions on eligible expenses (especially related to faculty release time), anticipated outcomes, and so forth. While colleges are ostensibly able to apply for funding competitions, the university-centric nature of these competitions precludes equitable access for colleges, or requires that they participate as ‘junior partners’ with universities. Fisher (2008b) found that *less than 1% of CFI* research grants and *less than one-half of 1% of NSERC* research grants had been awarded to colleges. While the recent expansion of

NSERC's college-specific College and Community Innovation (CCI) program recognizes the research conditions and constraints unique to colleges, even this expanded opportunity for the college sector represents less than 1% of NSERC's annual funding for research programs. Clearly, the competitive bias against colleges in university-centric funding competitions and the lack of sufficient college-specific funding opportunities constitute significant inhibitors of future growth for research cultures at Canadian colleges.

With respect to the *influence* of government funding sources on research decisions and directions, Neave's (2002) funding model is particularly relevant in the context of college research. Clearly, research sponsored by government agencies and granting councils is inevitably influenced by the respective mandates and agendas of those sources. For example, NSERC's newly established Community and College Innovation program, specifically dedicated to funding college research, includes eligibility criteria, application processes, and anticipated impacts heavily oriented toward commercial partnerships and economic development. While providing expanded opportunities for applied research projects, this focus is incongruent with the majority of responses in Fisher's (2008a) national survey, where faculty reported much stronger levels of interest in research and scholarship related to teaching and learning, an area that does not pertain directly to the CCI program mandate and goals.

As to Neave's (2002) third money stream, *sale of services*, colleges are naturally engaged in providing employment-related training, technical support, and applied research services to support regional economic development, and, therefore, appear ideally suited to benefit from this funding source through their close association with business and industry, especially with small-to-medium size enterprises (SMEs). With respect to the *influence* of market-based funding sources, while there is some concern over the extent of corporatization and privatization (Bélanger, 2005; Parsons, 2007; Quinlan, 2005; Skolnik, 2000), the overall benefits of corporate collaborations in support of applied research activities at colleges are essentially constructive for all stakeholders.

Particularly noteworthy in this context are Québec's *College Centres for Technology Transfer (CCTTs)*, which represent a unique model of college research funding that effectively integrates all three funding streams in collaborative partnerships. CCTTs are incorporated by their respective CEGEP (college) Governing Board with the mission of providing technical assistance, applied research, and training services to support regional economic development. Notably, provincial CCTT policies stipulate that "releasing CEGEP lecturers from their teaching duties is an essential condition to ensure the survival and consolidation of CEGEP research" (p. 59). Through these distinctive arrangements, CCTTs transfer knowledge and innovations to SME clients, while providing renewed currency for college faculty and otherwise inaccessible research skills development for college students. According to the Québec

government's (2005) financial statement, the CCTT system generated $3.1 in revenues for each $1 in base funding from the province (p. 9).

1. Research Outputs.

College faculty have neither a time component in their workload formula nor any explicit expectation to participate in activities related to research, and consequently the traditional measures of research output such as publications, grants, and awards, are not embedded in college cultures or contracts. While college-generated or college-related studies are occasionally published in Canadian scholarly journals such as, for example, the *Journal of Teaching and Learning, Canadian Journal of Higher Education,* or *Journal of Applied Research in Learning*, only one peer-reviewed scholarly journal, *College Quarterly,* is specifically dedicated to publishing research arising from, and related to, Canadian colleges.

With respect to research *grants* as traditional indicators of research output, few college-specific funding programs exist, and few release time or buy-out opportunities are available for college faculty interested in participating. Consequently, college faculty, who are expected to teach full time and who have no release time to conduct research, publish results, or present findings at conferences, are again at a severe disadvantage when competing for research grants against university-based researchers whose CVs often reflect extensive histories of publications and grant awards. Furthermore, only 12% of respondents to Fisher's (2008a) national faculty survey had earned the Doctoral credentials which are a prerequisite for eligibility at most granting councils. Therefore, the traditional indicators employed to gauge university research output (publications, grants, awards) are not valid measures of research activity in the college setting.

However, with respect to the growing legitimacy of non-traditional measures of research activity, indicators related to technology transfer, network participation, and student training seem particularly well suited to the college environment. Especially considering the nature of *applied research* activity at colleges, these output measures more accurately reflect college mandates and research activities, such as: assisting in product and process development, building awareness of new and best practice technologies, assisting with market and product feasibility assessments, providing consultancy/mentoring/brokerage services, disseminating research results through technology transfer, and so forth (ACCC, 2006; Bélanger, 2005; Corkery, 2002a; Fisher, 2002b; Madder, 2005; Powers, 2003; Province of Quebec, 2005). Corkery's (2002a) seminal study of research and innovation activity at colleges, for example, reported outputs in terms of the realization of industrial and private sector projects, development of prototypes, approval of patents and licenses, and creation of spin-off companies.

Additionally, innovative measures related to *student performance* and *research training* are increasingly relevant as indicators of research output at contemporary colleges (ACCC, 2006; Bélanger, 2005; Bok, 2006; Finnie & Usher, 2005; Neave, 2002; Rowley, 1999). While student performance indicators at universities focus primarily on *graduate* students, student performance and training in the college system, which could be more accurately characterized as *undergraduate* in nature, are more appropriately measured by indicators such as participation in real world research projects, involvement in immediate applications of instructional knowledge, contributions to innovative designs and applications, feedback from employers, and so forth. Ivany (2000) described how the dual college missions of employment education and economic development are synthesized in research activities that (1) involve college students, and (2) "extend beyond the relatively straightforward provision of training. . . . Since the impetus for training is often the adoption of a new technology, the college is immediately drawn into the more complex role of supporting technology transfer and diffusion" (p. 11). Ultimately, the impact of college research, in terms of the development college graduates who are *more highly qualified* than previous graduates, will be signified through their long-term contributions to innovation and productivity in the new knowledge economy (ACCC, 2006; Bélanger, 2005; Fisher, 2008b; Ivany, 2000).

Finally, with respect to our emerging framework for research at Canadian colleges, significant strides have been taken by Canada's colleges to enhance accountability by developing appropriate sets of measures and performance indicators that can be used to gauge the multidimensional impact of their applied research and innovation activities (Colleges Ontario Network for Industry Innovation, 2007, Madder, 2005, NSERC, 2008; Polytechnics Canada, 2008; Vista, 2007). The plethora of indicators arising from these various attempts can be condensed into a more manageable and cohesive set of measures to gauge the extent and quality of research output at Canadian colleges.

Reflecting the purposes for which research is conducted, this set of indicators reflects two overarching categories. First, a cohesive set of indicators reflects *institutional output* in terms of expansion of student participation in research and scholarship, enhancement of faculty currency, knowledge transfer and dissemination, growth of institutional research capacity, research networks, a spirit of discovery, and, ultimately, production of college graduates who are qualitatively *more highly qualified* than they would have been without the research experience. The second major category of indicators reflects *regional social and economic output* in terms of business development, employment, real world problem solving, collaborative partnerships, technology transfer and IP benefits such as patents, licenses, and royalties, and other demonstrable contributions to the social and economic improvement of the communities served by each college. Table 1 summarizes these indicators in a proposed set of Indicators of College Research Output.

Table 1

To summarize this section, based on an analysis of the implications of incorporating research into Canadian colleges, the *working model of research in higher education* provides a lens for identifying revisions that are required to more accurately reflect and accommodate the unique challenges, opportunities, and circumstances at Canadian colleges. The following section (Toward a Framework for Research at Canadian Colleges) synthesizes the results of these analyses, revises the working model accordingly, and proposes a single, integrated framework to provide clarity, focus, and direction for the further development of a coherent, robust, and sustainable research culture for Canadian colleges.

(3) Toward a Framework for Research at Canadian Colleges

The purpose of this section is to tailor the working model into a framework that accurately reflects and accommodates the research culture emerging at Canadian colleges. In delineating the attributes of the six constructs in the context of college research, some critical questions are appended to each construct in order to further elucidate and illuminate the proposed model. Figure 2, *A Conceptual Framework for Research at Canadian Colleges*, provides a schematic representation of the final framework which can now be deployed as a research model designed specifically for Canada's 21st century colleges.

Figure 2

a. Research Purpose.

The primary purpose of incorporating research into college mandates is to enhance and extend the traditional core missions of colleges (employment-related education and regional economic development) by enriching the student experience and the quality of the preparation of college graduates, by keeping faculty current and engaged in their fields of expertise, and by contributing to the social and economic well being of the communities they serve. In this light, research is recognized and pursued as an adjunct to, rather than a diversion from, the core college missions (ACCC, 2006; Bélanger, 2005; Corkery, 2002a; Doern, 2008; Industry Canada, 2007; Ivany, 2000; Levin, 2001; Madder, 2005; NSERC, 2007).

In terms of enhancing student learning, research activities provide real world challenges, hands-on experience with leading-edge technologies, and advanced training in specialized skills. Furthermore, research activities expose students to the higher order thinking skills increasingly required in the new knowledge-based economy. One fundamental characteristic of the new economy is that it not only "creates new job categories requiring unique skill sets, but it also drives up the *knowledge intensity* of existing occupations" (Ivany, 2000, p. 11). Consequently, college graduates who have been

exposed to and have participated productively in research and scholarship activities should be *more* highly qualified than previous graduates to contribute to the social and economic well-being of their communities.

College research activities also should support the related core mission of economic development by assisting local/regional businesses, especially SMEs that lack the requisite internal resources, in product and process development, building awareness of new and best practices and technologies, assisting with market and product feasibility assessments, providing consultancy/mentoring/brokerage services, and disseminating research results through technology transfer (ACCC, 2006; Bélanger, 2005; Colleges Ontario, 2008; Corkery, 2002a; Ivany, 2000; Madder, 2005; Powers, 2003; Province of Alberta, 2008; Province of Quebec, 2005). With respect to the role of college faculty in this process, "there is little question that the match between the skill sets of college faculty and the practical hands-on nature of applied commercialization stage research is strong and dynamic" (Ivany, 2000, p. 12). By expanding the opportunities to participate in collaborative research activities with regional businesses and industries, the currency of college faculty will be augmented in their areas of professional expertise, while enhancing the college reputation. The multidimensional nature of this purpose was encapsulated in Fanshawe College's (2008) strategic plan:

> The long-term goal is to integrate applied research and innovation activity into programs and daily activities in order to enrich the student experience and the quality of graduates, help keep faculty current and engaged, contribute to the economic well being of our community, and enhance the reputation of the College. (p.16)

As colleges consider their purpose for conducting research, these questions might be considered:

- Does the institution have a clearly articulated purpose for incorporating research and scholarship activities?
- To what extent does the research purpose reflect and align with institutional goals and strategic directions?
- To what extent does academic drift (i.e., the tendency to emulate more prestigious institutions) influence the decision to incorporate research in the institutional plan?
- To what extent does the research purpose pertain to Highly Qualified Personnel, regional economic development, renewed faculty currency, and a spirit of discovery and innovation at the college?

b. Research Forms.

The traditional form of basic, curiosity-driven, discipline-centred research is no longer an adequate reflection of the range of research

activities conducted in contemporary higher education. Especially in the college setting, forms such as the *scholarship of teaching and learning*, *applied research*, and *Mode Two* research (organized around particular applications an solutions)embody new opportunities that resonate with core college missions, reflect the preferred areas of research interest reported by college faculty (Fisher, 2008a), and represent timely and appropriate opportunities for building a robust and sustainable research culture at Canadian colleges.

Faculty respondents to Fisher's (2008a) national survey certainly reported a very strong interest in pursuing research that contributes to improvements in student learning. In the context of building a research culture at Canadian colleges, inclusion of the *scholarship of teaching and learning* in our conceptual framework would encourage "faculty participation in scholarship in a way that is inclusive, meaningful, and pertinent to the individual faculty member" (Dick, 2006, p. 2).

Boyer's (1990) model also recognized the *scholarship of application,* commonly referred to as *applied research*. This form of research represents a natural extension of college mandates, which have always followed the principle that higher education must serve the interest of the larger community. Applied research provides a relevant form where "theory and practice vitally interact . . . as the scholar asks: How can knowledge be responsibly applied to consequential problems?" (Boyer, pp. 21, 23). Based on their historical mandates, colleges are well situated to engage in this form of research and to contribute substantially to the national research and innovation agenda, which seeks to "increase the practical applications of research in Canada … [and to] turn knowledge into the products, services, and production technologies that will improve our wealth, wellness, and well-being" (Industry Canada, 2007, p. 9). Another natural extension of college activity is reflected in the emerging *Mode Two* form of research, where faculty "join networks, enter alliances, form partnerships of various kinds … [and where] problem solving is organized around a particular application" (Gibbons, 2003, p. 113).

Therefore, the construct of *research forms* in our college research model includes the relevant and applicable attributes of the *scholarship of teaching and learning*, *applied research*, and *Mode Two* forms of research. Some critical questions related to *research forms* might include:

- To what extent does the institution support and implement applied research?
- To what extent does the institution support and implement the scholarship of teaching and learning?
- To what extent does the institution support and implement Gibbons' (2003) Mode Two form of collaborative problem solving?

- What is the balance among these various forms of research?

c. Research Governance

Colleges engaging in research need to develop and implement rigourous *governance policies* related to, among others things, ethics protocols, academic freedom provisions, research integrity, conflict of interest guidelines, peer review, and intellectual property rights. Colleges are expected to establish Research Ethics Boards and to implement ethics policies consistent with the Tri-Council Policy Statement (2008). Policies regarding Intellectual Property Rights must also be carefully delineated, especially in the context of collaborative applied research projects with corporate partners, which may result in a range of benefits in the form of increased sales, productivity, and marketability, or embodied in technology transfer rights such as patents, licenses, royalties, etc. Such policies must accommodate and synthesize the commercial needs of corporate partners, the economic goals of funding agencies, the instructional objectives of the college, and the rights, academic, remunerative, and otherwise, of faculty researchers. Clear policies also must be developed to facilitate the administration of grants from external funding agencies within the parameters of established financial, accounting, and human resources departments not historically structured for such contingencies. Finally, colleges should consider including faculty researchers as members of governing bodies, and fostering their participation at all stages of the research enterprise.

In summary, governance should fulfill a *developmental* function in creating a research culture in which research "comes to be viewed as an integral component" (Rowley, 1999, p. 3) of the college mission, while fulfilling an *integrative* function in managing the "interface and balance between research and other institutional activities" (p. 4). At this point in time, colleges have a unique opportunity to develop and implement governance structures, policies, and processes specifically adapted to facilitate and nurture the growth of research cultures in the college environment. Some critical questions related *to research governance* might include:

- Are institutional mechanisms in place to support research?
    - Have specific advisory bodies been established to facilitate governance?
    - Is the membership of governance bodies representative of the full range of stakeholders and participants?
    - To what extent are faculty/researchers specifically represented on governance bodies?
- Are policies in place regarding ethics, academic freedom, research integrity, conflict of interest, intellectual property rights?
    - Has a Research Ethics Board been established?
    - Does the institutional policy on Intellectual Property Rights clearly delineate and fairly balance the rights of all stakeholders and participants?

- Are quality assurance mechanisms in place with respect to effective research governance?
- Have models been established to facilitate the administration of grants from external research funding agencies?

d. Research Personnel

Colleges face distinctly different challenges than universities with respect to faculty employment arrangements related to research. College faculty are employed as full time *teachers*, with no expectation and, with rare exception, no accommodation in provincially negotiated collective agreements for faculty release time to conduct research. This *lack of faculty release time*, especially in the current economic context of competing demands for ever-scarcer resources, presents the single greatest barrier to building a sustainable research culture at Canadian colleges (ACCC, 2006; Bélanger, 2005; Colleges Ontario, 2008; Corkery, 2002a; Madder, 2005; Skolnik, 2002). Resolution of this issue will require a concerted effort by advocates and strategic decision makers at all levels to re-negotiate collective agreements in order to recognize, incorporate, and *fund* research and scholarship as legitimate (though voluntary) activities for faculty at Canadian colleges.

In addition, the construct of *research personnel* also relates to policies and procedures regarding *non-faculty* participants (part-time employees, support staff, etc.) engaged as Research Assistants or in other research-related roles (such as Technology Transfer or Industrial Liaison Officers), within the established parameters and constraints related to current collective agreements, job descriptions, pay scales, and so forth. Considering the need to produce highly qualified graduates for the 21st century knowledge economy, opportunities should also be developed for college *students* to assume roles as Research Assistants. Within the paradigm of a *Teaching/Research Nexus*, the numerous positive outcomes of incorporating *research in the classroom* can highlight the benefits accruing to all stakeholders, thus providing a strong rationale for including research activities in workload models and collective agreements. Some critical questions related to *research personnel* might include:

- To what extent are decisions regarding employment, promotion, tenure, etc. influenced by prior experience, current participation, or future research intentions of faculty?
  - How are faculty researchers recruited to engage in research activities?
  - How are faculty researchers compensated for their research participation?
  - How is faculty release time for research negotiated/funded at the local (college) level?
  - To what extent are faculty supported in pursuing new and alternative research forms?

    - What systems are in place to mentor, advise, and assess faculty engagement in research activities?
- How are outstanding accomplishments in research rewarded and/or publicly recognized? By whom?
- What is the *status* of researchers at colleges, and how does this impact on faculty careers?
- To what extent are non-faculty (part-time, support staff, etc.) engaged in research-related activities?
- What models have been established to facilitate the participation of non-faculty, part-time employees, or support staff in research-related activities?
- How is the role of Research Assistant facilitated? Do *students* have opportunities to participate as Research Assistants?
- To what extent are the benefits of the *Teaching/Research Nexus* recognized and supported as a paradigm for supporting research in the college setting?

e. Research Funding.

Colleges are at a severe disadvantage vis-à-vis universities in terms of access to traditional research funding sources such as provincial/institutional operating budgets and government granting councils. Provincial operating grants, for the most part, do not include resources for conducting research at colleges, and colleges that wish to build research cultures must allocate scarce internal resources for research at a cost to other programs. Colleges face similar disadvantages in accessing research funding from governmental granting councils, where university-centric eligibility criteria create inequitable competitive barriers for college faculty.

Improvements in institutional and governmental support of research at colleges will require deliberate and concerted advocacy by stakeholders at all levels to achieve the necessary revisions to granting council eligibility criteria, provincial funding formulas, collective agreements, and local (college) strategic plans. Extension and expansion of NSERC's college-dedicated College and Community Innovation program could establish a long-term, sustainable base upon which to build a significant research funding council dedicated to assisting colleges in contributing more effectively to the national research and innovation agenda. Revisions to provincial operating grants could similarly assist in unleashing the full potential of college research capacity.

With respect to research funding drawn primarily from market sources, colleges already have a well-established tradition of collaborative arrangements with businesses and industries to provide specialized skill training, consulting, and applied research services. In particular, Québec's College Centres for Technology Transfer (CCTTs) provide a robust example of the benefits that can accrue through cooperative, multi-dimensional arrangements involving a spectrum of stakeholders. This unique model of cooperative funding merits further study and may provide instructive direction for similar

arrangements in other provinces. Some critical questions related to *research funding* might include:

- What are the principal sources of research funding at the college?
- What is the internal allocation of institutional resources for research and scholarship, expressed as a percentage of overall college expenditures?
- What is the relative balance between government, market, and institutional sources of research funding?
- To what extent do specific research funding sources influence research decisions and directions?
- Do research sources cover only the direct costs of research or indirect costs (for example, overhead costs) as well? How are indirect costs determined and remunerated?
- How is the use of research funds monitored and evaluated? By whom? Using what criteria?

f. Research Output

Colleges are making progress in purposefully examining and developing appropriate metrics, models, and measures of research output to gauge the impact of their applied research and innovation activities in the context of their own missions and mandates. Two recurrent categories of outputs emerging within the college research culture include measurements of: (1) enhanced skills training for college graduates who, as highly qualified employees, can contribute on a long-term basis to national social and economic goals; and (2) increased college capacity for ongoing innovation tailored to the needs of local and regional economies.

Since the primary purpose of college research includes the training of highly qualified personnel who are well equipped to contribute productively in the new knowledge economy, the inclusion of *enhanced student skills* is a relevant and critical indicator of research output at Canadian colleges. Research outputs “that focus only on research without attending to research *training* . . . at best involve only a tactical reform rather than a strategic innovation. They attend to the immediate situation rather than to its outcome in the long or medium term” (Neave, 2002, p. 4). Colleges can measure the extent of student involvement in research, the extent to which research projects are integrated into the curriculum, the number of learning objectives met through increased project-based delivery, the extent of student exposure to and participation in real world problem-solving environments, and the number of graduates in the workforce using research related skills. In this sense, “college research is about putting knowledge to work, and about helping people learn, be aware of, understand, use, and ultimately contribute to our society’s body of knowledge” (Weiler, 2008, p. 26).

In addition, the economic impact of college research can be measured through indicators of client satisfaction, increased corporate

sales, productivity, marketability, and new employment, or through technology transfer measures such as patent applications, patent awards, spin-off companies, equity partnerships, royalties, and licenses. Faculty participation in Mode Two collaborative networks, linkages, and alliances represents another college-appropriate indicator of research output. Since research is an emerging phenomenon at Canadian colleges, further measures could include indicators of both internal capacity building and external knowledge transfer through faculty engagement in research and scholarship activities, delivery of workshops, seminars, and conferences, and increased capacity for scientific and technological problem solving.

Development of appropriate indicators can enhance accountability for the college research initiative and provide important insights for future direction and improvement. While there is, as yet, no single set of metrics that is entirely satisfactory in all cases of college research activities, the proposed *Indicators of College Research Output* provides a condensed and manageable metric model that synthesizes a plethora of measures and indicators currently under consideration by a range of stakeholders. Further collaboration on the development of local, regional, provincial, and pan-Canadian measures of research output and impact will prove fruitful as colleges expand their collaborative activities in applied research, scholarship, and innovation. Some critical questions related to *research outputs* might include:

- Do the institutional measures of research output accurately reflect and align with the institution's articulated research purposes?
- What mechanisms or governing bodies are in place to evaluate research output? How is research output assessed? Who is responsible for evaluating research output?
- To what extent do publications, grants, and awards influence expectations with respect to personnel decisions (hiring, promotion, and tenure)?
- To what extent are alternative indicators of research output (faculty participation in networking, technology transfer, student performance) recognized and rewarded with respect to personnel decisions (hiring, promotion, and tenure)?
- Are policies in place to clearly delineate Intellectual Property rights related to college outputs?
- Who is responsible for recording, reporting, and disseminating research outputs?
- What institutional plans are in place to enhance the quantity and quality of research output?

Conclusion

In summary, the proposed *Framework for Research at Canadian Colleges* employs the six constructs comprising our working model of research in higher education, but delineates the attributes of these constructs specifically in the context of the college environment. This

framework, and the knowledge base that undergirds it, can fulfill many purposes in the evolution of research cultures at Canadian colleges. The proposed framework will, hopefully, provide coherence, clarity, and focus for discussions about the emerging research enterprise, bring increasing consensus and shared direction among stakeholders both within the college community and within the larger communities they serve, and, ultimately, enable us to chart more clearly the future dimensions and directions of the research cultures emerging on contemporary Canadian college campuses.

However, certain *limitations* in the potential value of the framework arising from this study should be acknowledged. For example, the current embryonic stage of the college research initiative was reflected in a somewhat narrow range of sources and studies specifically related to research at Canadian colleges. Another constraint experienced in developing this college-specific framework arises from the spectrum of diversity that characterizes the pan-Canadian system of colleges, and the resultant lack of consistency in form, function, structure, and terminology with respect to research and scholarly activities. Furthermore, many businesses and industries involved with colleges in collaborative funding arrangements are reluctant to share information or to report benefits arising from those partnerships for fear of losing the competitive edge inherent in those collaborations.

A related limitation of this study, in the context of the goals of the national research and innovation agenda, is the emphasis on world-beating new knowledge and applications. While “promoting world-class excellence” (Industry Canada, 2007, p. 11) is one of the core principles guiding the national research agenda and influencing the eligibility criteria and anticipated outcomes of funding programs, the reality of college/industry collaborations occurs primarily on a much smaller scale. Most partnerships involve SMEs (Small and Medium Enterprises) and, in particular, “small” enterprises, usually with fewer than 10 employees. These small local companies often approach colleges with issues related to economic *survival*, where adoption of new technologies may help companies simply to *stay* in business, and where world-beating applications are not priorities.

Similarly, in terms of outputs, the ubiquitous indicators of publications, citations, grants, and awards that typify the traditional measurement of research output in the university setting do not seem appropriate in the context of the evolving college research culture. At colleges, the long-term impacts of producing highly qualified graduates, increasing faculty currency, fostering a spirit of discovery, and contributing to the social and economic development of the communities they serve, represent outputs that are much more difficult to measure than traditional university indicators of research output.

While the adoption of this model can contribute to a more coherent and systematized approach to research that is highly

contextualized and viable within the college context, it nevertheless raises questions in terms of the *potential impact* of incorporating research into college environments. Initially, such a framework could assist administrative decision-making with respect to the critical question of whether or not to participate in the college research agenda. However, those colleges that choose to participate must subsequently consider the potential impact of implementing a research model, especially in terms of the requisite shifts in strategic plans, allocations of resources, modifications in collective agreements, changes in faculty expectations and workloads, and other impacts.

For example, the transformation of a community college from a *teaching-only* institution to *teaching-and-research* institution will necessarily entail adjustments and modifications related to, among other considerations, the research experience and expertise of both the institution and its faculty. In this context, while college faculty expressed very high levels of interest in participating in research activities (Fisher, 2008a), only a minority (29%) reported research-related degrees at the masters level, with even fewer (12%) reporting doctoral degrees. Colleges Ontario (2006) similarly found that only 20% of college faculty held research-based masters or doctoral degrees (p. 3). The development of research cultures at colleges, therefore, will require the provision of professional development and mentoring services to enhance faculty research skills, as well as institutionalaccommodations in hiring practices and legitimization of faculty release time for research-related activities.

The findings of this study also suggest several *areas for further study*. Certainly, the potential of Quebec's unique model of CCTTs merits further examination regarding its applicability in other provinces and consideration as a possible template for national funding programs specifically designed for the college sector. Another area for further study is the applicability of the *Teaching/Research Nexus* paradigm (focusing on *research in the classroom*), especially in enhancing both research instruction and research advocacy. In concert with a commitment to the *scholarship of teaching and learning,* this approach could lead to the development and implementation of college-specific research programs and activities that further enhance student learning and produce graduates who are, compared to previous graduates, better prepared, more highly qualified, and more imbued with the spirit of discovery and innovation that may be a critical determinant of Canada's future social and economic prosperity.

Finally, any systemic change, such as the currently unfolding integration of research into the traditional college mandate, will inevitably generate some degree of resistance and concern from a range of stakeholders. However, a coherent framework can provide a common perspective for considering and articulating the extent to which research activities can enrich the educational experience of college students and faculty and contribute to the economic and social

well being of Canadian communities, especially in the context of the evolving knowledge-based economy and the concomitant skills increasingly required by contemporary college graduates. With respect to change, Skolnik (2004) notes that:

> The most fundamental characteristic of the community college may be its capacity to reinvent itself as the needs and problems that it is asked to address change. Such plasticity is very difficult for any human organization to achieve, and at every point in the evolution of the community college there have been strong voices declaring the final destination has been reached and further change would destroy it. Yet the evolution goes on, because that is the essence of the institution. (p. 44)

Canada's prosperity in the 21st century will depend increasingly on our ability to innovate, and colleges "can contribute to this prosperity, not by changing our mission, but by adhering to our founding principles and revitalizing our approaches" (Ivany, 2000, p. 13). The purpose of this study has been to contribute to this evolution of college missions by synthesizing and systematizing the existing bodies of knowledge on this topic, and by proposing a comprehensive, integrated framework that begins to provide clarity, focus, and direction for the further development of a coherent, robust, and sustainable research culture at contemporary Canadian colleges.

While this framework is tentative and exploratory, and while the preceding conclusions are to be viewed with some caution, nevertheless, it is hoped that this proposed model will initiate a new conversation and lead to future improvements. To that end, this proposed framework invites and challenges all stakeholders to participate in further delineating the emerging landscape of research at Canadian colleges.

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Roger Fisher is a Professor/Researcher at Fanshawe College in London, Ontario. This article represents a distillation of his doctoral thesis in Educational Studies completed at the University of Western Ontario (2009). He would like to acknowledge the contributions of his thesis committee members Dr. R.Macmillan, Dr. A. Edmunds, and Dr. J. Engemann. He can be reached at rfisher@fanshawec.ca.

Contents
