

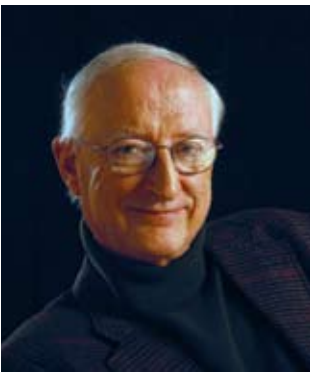
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Colleges: Open to Business



Robert Fripp
Senior Associate
The Impact Group

Administrators at Canadian colleges and polytechnics are sounding happier – even if their happiness is marred by the fact that they can’t move forward faster.

Colleges: Open to Business. That’s our title. Take it literally! Canadian colleges are eager to collaborate with small and medium sized enterprises (SMEs). Colleges have the faculty, students and equipment to work on applied research for companies in many sectors. Already they further productivity, marketability, scalability, innovation – in short, success – for industry partners whose challenges they solve. Examples help set that scene.

ronment in our new health sciences campus. “Ocorant came to us for micro-electronics. They went away with much more. A polytechnic or college is able to offer a multi-disciplined approach to helping industry with innovation challenges.”

Business innovation doesn’t always aim at creating a new technology. Calgary’s Bow Valley College (BVC) teamed with engineering firm WorleyParsons Canada to develop Essential Skills workplace training in partnership with the Association of Canadian Community Colleges. WorleyParsons employs many new immigrants with exceptional technical skills, but who lack Canadian workplace experience.

“This goes beyond English as a second language. It includes cultural communication, culture in the workplace, and how we structure information and processes for workflow,” says BVC’s Krista Medhurst, the Business Leader for Test of Workplace Essential Skills (TOWES), a widely used skills assessment test developed by BVC.

“We have used this model with the aerospace and petroleum industries, but it was the first time we had applied it at an employer’s location to an immigrant population,” adds Medhurst.

Before describing applied research at Algonquin College, Dr. Mark

they were marketing their system.”

Algonquin’s strong competency in ICT and digital media is helping bring in industry from several fields: healthcare and construction currently.

“By the end of 2012 every faculty and department will have been involved in applied research projects,” says Hoddenbagh. “We engaged 500 students last fiscal year; 400 of them are engaged with in-class projects, which means that the students are working for marks in a course that is part of their study program. The student hands-on component is critical to what we do.”

At Centennial College, Trish Dryden, Associate V.P. Research and Corporate Planning, names NexJ Systems as “typical of projects we work on. We are now in our fourth round of applied research for NexJ. The company is developing ‘Next Generation’ Enterprise Customer Relationship Management for Financial Services, Insurance and Health.

“CONII” (Colleges Ontario Network for Industry Innovation) “funded NexJ’s first round of applied research with Centennial, in 2010. Then a second round with CONII escalated to involve researchers from York University. NexJ was creating online games to improve the health of diabetic patients by engaging them with games to provide timely infor-

in working with NAIT on “solutions-based research.” Collaborations range from developing prototypes of robotic equipment involved in conveyor belt assembly automation, to creating a virtual museum for Metis history.

“Industry partnerships and industry needs drive us,” says novaNAIT

leagues,” says Morgan. “They are now working with MaRS Innovation with a second round of funding, about \$150,000 from investors.”

This sort of collaboration between businesses on one side and publicly funded colleges and polytechnics on the other has produced important applied research in many industrial

message: “With its strong public research base, Canada could translate knowledge into commercial success more effectively.”

“In the end,” says Robinson, “it’s about making things. We have a pure high-science culture in Canada, but we don’t have an engineering culture that makes things the way Germany does. That is where specifically applied research from college to business can help.”

Putting students to work on applied research for local firms often gets graduates their first jobs, too. Eighty-five percent of SMEs choosing to work with colleges are small, not medium-sized, firms. They are unlikely to have R&D departments. Trained graduates are especially important as specialist employees.

Six years ago the Natural Sciences and Engineering Research Council of Canada (NSERC) launched the College Community Innovation Program (CCIP). Canada spends \$3.1 billion on science. NSERC gets \$1.1 billion of that, of which \$35 million goes to Canadian colleges.

“That’s one cent in the dollar,” says Robinson. Ironically, that one cent was originally designed to position colleges within their communities, not specifically to handle applied research for local businesses. Applied research done by colleges for businesses produces output to take to market and skilled jobs.

“It’s not enough,” comments George Brown’s Robert Luke. “Canada needs to increase its support for industry-academic applied research collaboration, including that going to colleges for applied research collaboration with businesses. What we have is a start, but demand is fast outstripping supply. We get more than 250 requests for help each year. We can accept about half.”

Nonetheless, college administrators praise the people at NSERC administering CCIP. Suddenly there has been “more funding and capacity-building at provincial, territorial and national levels. It seems like a sea-change,” says Centennial’s Trish Dryden. “At the Association of Canadian Community Colleges conference people weren’t asking ‘How do we do this?’ any more. They were asking ‘How do we do this better?’ ”

What about funding? “At national level, the federal government certainly sees value unfolding, and colleges are expanding capacity in several ways,” adds Dryden.

Here’s one example of what has been done: the nine members of Polytechnics Canada conducted \$33.1 million of sponsored research in fiscal 2010/11. In fiscal 2011/12 that figure rose to \$44.2 million, up about one quarter in a single year. That figure from just nine colleges is larger than the total amount distributed by NSERC’s CCIP program. Now, if governments were to prime the college pump a little more, what might be possible across this land?

“By the end of 2012 every faculty and department will have been involved in applied research projects... The student hands-on component is critical to what we do.”
Mark Hoddenbagh, Director, Applied Research and Innovation, Algonquin College

Ocorant Inc. makes heart-monitoring vests that people wear while moving around. Electrodes monitor a patient’s chest, recording cardiac data which the wearer reports by phone to a doctor’s office. Ocorant approached George Brown College for help making the sensors. That was just the start of collaboration. Dr. Robert Luke, George Brown’s Assistant V.P. Research and Innovation, explains:

“We have a significant fashion design program, so we were also able to help Ocorant design a vest to position the sensors and technology comfortably. Our engineering faculty and students worked on the microelectronics; fashion students built the garment. Then we linked Ocorant to students in our nursing program. They tested the vest on people in the simulated home envi-

Hoddenbagh reminded us that a college’s priority is to enhance student education.

Hoddenbagh, Algonquin’s Director Applied Research and Innovation, described the college’s work with Impakt Protective. This company designs sports helmets to make it easier to detect whether an athlete may have suffered a concussive blow. “Impakt Protective was working on a sensor and accelerometers you could put into a sports helmet to detect the force and direction of a blow,” says Hoddenbagh. “The system calculates whether an event may be concussive. That way you can get the person to treatment right away.

“Algonquin linked Impakt Protective with a software developer and a wireless specialist – two professors, each working with two students. In less than six months of work with us

mation – to help them make informed choices. Then we did some Flash-based prototypes to give NexJ an idea of how their system would work.

“Now we are among sixteen partners working with NexJ and York University on a \$15.5 million grant under FedDev’s Technical Development Program.” The overall purpose: to build a new people-centred and technology-enabled system that will allow people to better manage their own health and more easily connect with health and wellness professionals, an integral part of Canada’s focus on health and wellness.

In a number of sectors, Centennial is seeing its partner industries “sending us their suppliers as well.”

Five years ago Edmonton’s Northern Alberta Institute of Technology (NAIT) launched novaNAIT, a one-stop shop for industries interested

Director Dr. Klay Dyer. “We do research internally, partner with companies externally, or broker partnerships between companies already working with us.”

Services include prototype development, validation, testing and business incubation; even helping start-ups apply for grants, patents and licences.

Partnering with the City of Edmonton to install a solar photovoltaic research system atop NAIT’s roof also creates industrial opportunities. The project shares live data 24-7. “This has grown to include many start-ups and SMEs sharing expertise,” says Dyer, “as well as the research and data being produced.”

The Dean of Research at the Humber Institute of Technology and Advanced Learning, Dr. Patricia Morgan, describes Humber’s “interest in building a culture of innovation and entrepreneurship.” Towards this goal, Humber operates Innovation Humber Incubator and the New Venture Seed Fund. “Our goals,” says Morgan, made setting up the seed fund “seem like a logical next step.” Students compete by developing a business plan. Committees adjudicate these.

“Each young business is eligible for up to \$8,000. One first year winner was Spently.com.” Designed for merchants of any size, Spently’s product sends one customer, or 3,000 customers, an electronic receipt, usually by email. A receipt can be either generic, as in “10% off your next purchase,” or tightly targeted, “Andrew, this deal is just for you. The next widget you buy from us will be 25% off.”

“Spently has moved to the big

sectors. But never before at this rate. The pace of collaboration is gathering speed; the scale and nature of participation is growing; comfort levels and expectations on both sides are rising; and tangible rewards are winning public exposure and being discussed in influential circles.

“So why are my colleges painted with the same brush as universities, when we talk about what’s wrong with the system?”

That question comes from Nobina Robinson, the C.E.O. of Polytechnics Canada and, last year, a member of the Jenkins Panel, which the government tasked to review “Federal Support to Research and Development.” The Panel filed its report as Innovation Canada: A Call to Action. One part reads:

“Studies have repeatedly documented that business innovation in Canada lags behind other highly developed countries. This gap is of vital concern because innovation is the ultimate source of the long-term competitiveness of businesses and the quality of life of Canadians...”

Robinson comments, “If people understood that college-based applied research is done in collaboration with companies to solve their practical problems, then they could stop thinking of college and university research as competing against each other.

“Where that collaboration is able to happen, it’s working wonderfully,” she adds. “A recent OECD report ranked Canada as one of the highest investing countries in upstream ideas-generation, but we don’t do enough to link applied research and industry.” In September, that report, Science and Innovation: Canada, condensed that



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COLLEGES AND SMEs Getting Innovations Out the Door



James Knight
President & CEO
Association of Canadian
Community Colleges

Stimulating innovation in Canada's small and medium enterprises (SMEs) will do more than any other measure to improve productivity and create jobs. SMEs constitute 98% of Canadian companies and employ 60% of working Canadians, but they often lack the expertise and resources needed to innovate and compete in the global marketplace.

They turn to their local college, institute of technology, cégep and polytechnic for support. These institutions have the expertise, the equipment and the eager young minds to help with product and process innovation, technological improvements, marketing, business planning and growing the pool of highly skilled professionals SMEs need. With

1000 campuses, colleges are accessible in all parts of Canada. In 2010-11, 4,444 private companies, primarily SMEs, partnered with colleges on applied research projects.

According to the OECD Economic Surveys: Canada 2012, "colleges are becoming proactive in directly meeting the needs of small businesses in areas of problem solving, process innovation and technical skills, even though they benefit from little taxpayer support via the granting councils".¹

The Government of Canada has begun to recognize the contribution of colleges to Canada's innovation eco-system. The College and Community Innovation Program administered by the National Sciences and Engineering Research Council provides funding for college based applied research partnerships, and the Canada Foundation for Innovation provides resources for scientific and industrial equipment, both on a competitive basis.

These investments generate powerful outcomes, but constitute only 1.25% of the \$2.9 billion invested annually by the Government of Canada in research carried out institutions of higher education. Further investment to support college-industry partnerships, increasing this amount over time to 5%, would enhance Canada's productivity and competitiveness while creating new jobs.

According to the Canadian Chamber of Commerce, skills and human resource

shortages comprise the single largest factor constraining the business growth. The Canadian Federation of Independent Business reports that where there are skills shortages, four college graduates are required for every university graduate. Applied research is a critical component of education in colleges. Students work with employers to find solutions to real-world challenges. These hands-on experiences produce graduates with highly valued problem solving and innovation skills.

Colleges are growing institutional research infrastructure to create more opportunities for faculty and students, to strengthen partnerships with industry and community organizations, and to build research networks at the regional and national levels.

SMEs report that research partnerships with colleges have stimulated new and improved products and services, enhanced their company's profile and generated market opportunities.

SMEs gain access to state of the art equipment, facilities and highly skilled faculty and students that they could not otherwise afford. Increased revenue resulting from these partnerships enables SMEs to create jobs and to stimulate local and regional economies.

¹ OECD Economic Surveys: Canada 2012, Organization for Economic Co-Operation and Development, page 79

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"Manitoba winter conditions can be problematic for many conventional vehicles. (...) The novel nature of plug-in hybrid electric vehicles (PHEVs) made cold-weather operation and cabin warmth a specific concern. (...) The cold-weather improvements undertaken at Red River College turned out to be a critical success factor for the Manitoba PHEV demonstration. Without these modifications, vehicle failures and reduced performance would have resulted".

Centre for Emerging Renewable Energy, Inc., Manitoba

"The resources at Durham College's disposal are invaluable to a business of our type. Without... the wonderful staff... we would have been greatly hampered in our efforts to take this product to market. It is a great feeling knowing that the resources are out there and others are genuinely concerned and driven to help develop a greener future."

Hotwash Inc., Ontario

"The opportunity to work with the bright students in Sheridan's applied research program was a natural fit for us. We firmly believe that industry has a vested interest in shaping the future workforce. By leveraging the fresh

insight from a younger generation, like those at Sheridan College, PharmaTrust can continue to produce innovative technology, and maintain leadership in patient-focused healthcare."

Patient Care Automation Services, parent company of **PharmaTrust,** Ontario

"We have a great working relationship! The staff at the Office of Applied Research at the College of North Atlantic took a high interest in our project, showing enthusiasm and helping to enhance our process for creating our new product, the Fresh FryTM. (...) They were very accommodating to supply needed equipment, and understood our requirements for product development."

Humber Valley Potato Company, Newfoundland and Labrador

"Lakeland College was a phenomenal partner (...) providing resources, man-hours, equipment, technical support and exposure. They also added credibility to the project. Our town, the community, our businesses and families have all benefited from the partnership..."

Town of Elk Point, Alberta



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POLYTECHNIC APPLIED RESEARCH: OPEN FOR BUSINESS INNOVATION



Robert Luke, Ph.D.
Assistant Vice President
Research and Innovation
George Brown College

Canada's polytechnics and colleges offer industry-facilitating applied research solutions that fill gaps in the country's R&D pipelines. Our focus on applied research, innovation and commercialization supports industry innovation needs in ways that are complementary to established, discovery-based research institutions. This is a strength, and a necessary facet of a healthy R&D continuum.

Since 2008, the institutions that comprise Polytechnics Canada (BCIT, SAIT Polytechnic, NAIT, Conestoga, Sheridan, Humber, Seneca, George Brown and Algonquin Colleges) have worked with 3,759 Canadian companies, 95% of which are small and mid-sized enterprises, conducted 2,481 applied research projects solving industry-identified problems, involved 22,515 college students and 1,978 college staff or faculty in applied research activ-

ity, and developed 948 prototypes for their industry research partners. Colleges across the country are involved in similar activity, as Canada initiates investment in college applied research as a vital lever in the R&D toolkit.

The breadth of industry partnerships that polytechnic and college applied research enables was noted in the recent Council of Canadian Academies Expert Panel Report on "The State of Science and Technology in Canada, 2012." The report shows that as a country we excel in many fields of research, and punch above our weight in terms of publications and international research influence. However, we fall short of unlocking the potential commercial value of the outcomes of basic research. In addition, Canadian businesses perform much less R&D as compared with our international counterparts. Our collective historical identity as "hewers of wood and drawers of water" has meant that ideas are just another basic resource that we draw from the land and export without adding value. Our competitors are exploiting our research to their commercial advantage.

Polytechnics and colleges focus on speed to market and engaging our students in industry innovation. We offer industry and universities alike four key advantages:

- Access to talent – our faculty who are industry professionals, and our students. By engaging our students in applied research we train the highly qualified and skilled people needed for the innovation economy, who gain crucial innovation skills as part of their applied education.

- Access to state-of-the-art facilities – our industry-focused teaching facilities double as applied research labs for companies or scientists who do not have equipment or need help making a prototype or product.

- Access to markets and networks – we leverage our close ties to industry to help our research partners develop products and sales.

- Access to capital – government funding provides matching capital for companies to engage in innovation partnerships, creating economies of scale for firms with ideas but lacking in-house R&D capacity.

The 2007 federal Science and Technology Strategy gave impetus to college applied research capacity through the creation of the College and Community Innovation Program. Yet, the CCIP is the only federal program for polytechnic and college applied research. It is underfunded as compared to demand: we currently turn companies away both for lack of funding and capacity, limiting our ability to be "open for business innovation."

Firms in Canada are not yet making effective use of the postsecondary research facilities we have, but this is changing. Polytechnic and college applied research can play a more robust role in strengthening national and regional capacity to innovate. We work with research centres and industry partners to enhance competitiveness in the sectors we serve. Our applied research centres offer services to industry that are not currently

widely available in Canada – the applied research, commercialization-focused "last mile" services that industry needs in order to test market assumptions.

Canada needs to encourage industry-academic partnerships and have each party play to their strengths, be this basic research, applied research, or industry focused innovation. We need a better balance between the input and output sides of the innovation equation. Broadening the potential outputs for R&D by supporting applied research will foster

increased productivity, enable Canada to realign R&D expenditure imbalances, and correct our longstanding poor record on industrial innovation.

There is work to be done by the polytechnic and college sectors in continuing to build the applied research capacity while finding better ways to measure outcomes. This requires us to focus on outputs and on collaborative data gathering to show the return on the (modest) CCIP investment. We would do well to encourage greater linkages among university, polytechnic and

college research institutions, and greater industry-academic partnerships overall, building a true innovation system that plays to the strengths of all its parts. By working together, we can increase Canada's global competitiveness.

Dr. Robert Luke is AVP, Research and Innovation, George Brown College, and Chair, Polytechnics Canada Research Group. He served as a member of the Council of Canadian Academies Expert Panel on Science and Technology in Canada, 2012.

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Alisa is carrying on the rich tradition of applied research at Bow Valley College.

A TOWES staff member, Alisa partnered with the Vermillion Energy/YWCA Skills Training Centre to conduct an in-depth essential skills case study using the TOWES (Test of Workplace Essential Skills) tools.

TOWES is a shining example of how applied research can be commercialized and used nationally. From its humble beginnings as a Bow Valley College applied research project, it now has more than 43 distributors across Canada and 70,000+ test cases to quantify the important role of essential skills in all workplaces.

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