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APPLIED RESEARCH:
College and Business
Partnerships Shaping Success



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“This has been a remarkable year for applied research in colleges. Remarkable!” Trish Dryden’s comment refers to the situation in Ontario, not Canada as a whole. “The whole acceleration of applied research in colleges is really happening. It’s really taking place.”

Still, college and business partnerships in applied research are coming together in many parts of Canada. We’ll get to that. Dryden, Associate VP, Research and Corporate Planning at Centennial College in Toronto, expects a continuing, accelerating ramp-up for a process that began slowly a decade ago.

Listening to Dryden reminded me of sitting through an economics lecture in a past millennium, taking notes on an economic take-off model propounded by W.W. Rostow. Rostow’s model evolved in stages, from Preconditions for take-off, to Take-off, followed by Drive to maturity.

College-business partnerships in applied research have not reached what one might call maturity in any part of Canada, but in many cases they are seriously moving from take-off to drive. It is even apparent that the available college faculty, students and equipment falls short of rising demand: “The need among our small and medium sized enterprises (SMEs) is much greater than what colleges are currently able to provide.”

At this point, Janet Walden adds history. Walden is VP, Research Partnerships, at the Natural Sciences and Engineering Research Council of Canada. NSERC has had a clear mandate for facilitating university-based research for years, but that mandate did not include colleges. “We did a cross-Canada tour in 2003 and noticed how the colleges were changing, attracting people with higher level degrees,” she says. “They were becoming involved in

applied research in a more sophisticated way than before. Provincial governments’ expectations were rising, too; they were granting mandates to colleges for training students to advanced degrees. We were impressed by what we saw.”

The following year, NSERC took a step forward. “We launched a pilot project in 2004 to gauge what would happen in community colleges’ local environments, and in local businesses working with those colleges.

“We had just six colleges spread across Canada for a three-year, \$3.6 million NSERC project. The result was a real enhancement of teamwork between colleges working to help local businesses solve some of their research and prototyping development challenges.

“It was good for the colleges’ students, too; their opportunities to work with local business communities gained them experience and links to potential future employers.

“Our pilot returned enough benefit that we were able to make a strong case to the federal government. In 2008 the government invested \$15 million while making the program permanent.”

That initiative introduced a qualitative shift, as well. NSERC’s mandate was restricted to science and engineering. But college curricula extend beyond that, so the new federal money expanded the 2008 initiative into other fields. The result: NSERC now manages the program in association with the Social Science and Humanities Research Council (SSHRC) and the Canadian Institutes of Health Research (CIHR) – “Now we can cover the full spectrum of research activity right across the country,” adds Walden.

“Colleges and local businesses across Canada enjoyed a close relationship a decade ago, because colleges produced the graduates that businesses hired,” says James Knight, President and CEO of the Association of Canadian Community Colleges (ACCC). “Colleges were already giving input to businesses about emerging technologies and new types of programs.” For at least that long, colleges have been forecasting local labour-market conditions to tailor their syllabuses to match their regions’ needs.

“That relationship was strong,” says Knight. But it was also largely informal. However, that degree of collaboration launched a new discussion: “How could colleges assist businesses with their technical challenges, their marketing needs, product and marketing design requirements, and their need to manufacture prototypes?” For SMEs, collaborating with colleges opened a range of production and development opportunities, such as applying college faculty and

student skills with equipment and technologies – typically leading-edge – which colleges have in place to train their students.

“Canada is ahead of most countries in investing a great deal of public money in research fields,” says Knight, whose ACCC membership now exceeds 150 colleges, cégeps, and related institutions from coast to coast.

“Our granting councils invest considerable sums – in universities. We had to work with ministers and the granting councils to put pilot projects in place before we could see how things went with colleges, too.”

Similar initiatives were converging from several directions. Provincial governments were exploring applied research between colleges and businesses. Quebec led the field, installing some 45 technology transfer centres in colleges that engaged

CONII is more than a key player in linking colleges to businesses to drive forward the innovation economy. Williamson reminds us of the many students who find what may be their first employment with college-linked businesses. “Organizations such as CONII are funnels in a system that provides businesses with the highly qualified, skilled personnel they will need far into the future. That’s our thrust, in my opinion.

“Yes, we are here to solve business needs – but not only the technical side of those needs. It’s the student factor, student training and their promise in, and for, the future: That matters, too. It’s a potent synergy: the amazing expertise of what they are looking for, how we can provide it, and how through their work they can help everyone else to build.”

Applied research programs

“ There is growing recognition about the impact that colleges can have on their local communities ”

Janet Walden, NSERC

with local businesses. Things move forward. “As an advocacy body, we” – ACCC – “successfully advocated launching programs a few years ago, and then watched the scope as those programs expanded. The Government of Canada has been extremely responsive, ramping up funds and assigning them into new areas.”

The messages feeding back to Ottawa must have been positive. The 2010 budget doubled the funding available to NSERC’s original, competitive, Community and College Innovation Program. The same budget increased virtually no other program. The funding for CCIP stood out.

Quebec, in effect investing its full college system in working with local businesses in applied research and commercialization, is leading the nation’s way. “Ontario comes next,” says ACCC’s James Knight, with its Colleges Ontario Network for Industry Innovation, (CONII).

“We’re a bit of a matchmaker,” concedes CONII’s executive director, Vanessa Williamson. “We help identify key business partners and connect them to colleges that are right for them. We set up first dates and hope they get into long-term relationships.”

between colleges and businesses don’t work automatically because they seem like the right thing to do. Collaboration is not just a matter of natural fusion. They work because college administrators are making collaboration work on a continuing, systematic basis.

“In Ontario we had federal money from 2004 and provincial money from 2006,” says Centennial’s Trish Dryden. “More and more faculty and students got into the process. More and more industry partners. But industry partners, particularly SMEs, don’t have time to work their way through a college bureaucracy. They need to know right away: ‘This is the office I call, and here’s where I get help.’

“Because we were small we compensated by forming incredibly strong networks provincially and nationally among colleges to share knowledge about best practices. That was crucial in getting the rocks out from under our mattress. We have had some of the frankest collegial conversations about: Why did this work? Why didn’t this work? How do you assess an industry partner for readiness?

“When the FedDev projects – Federal Economic Development

Agency for Southern Ontario (FedDev Ontario) – rolled out, the colleges receiving the funding formed a mini-network. We were all on a conference call every two weeks, asking: What forms do you use for this? How do you calculate that? Each college uploaded its industrial-partner application forms to a new web site, and together we boiled them all down to one.”

However, one problem has long been recognized. Traditionally, university teachers enjoy contracts that assign 40% of their time to teaching, 40% to research, and 20% to community service. College faculty contracts are more restrictive: much of teachers’ time is assigned to teaching. Since education is a provincial responsibility, the colleges’ mandate was to educate, period. Research, pure or applied, was not a college function. That is changing. “We are seeing the provinces giving research mandates to community colleges. There is growing recognition about the impact that colleges can have on their local communities,” says NSERC’s Janet Walden.

Some 195 colleges are spread through, and interlinked with, 900 Canadian communities. NSERC is extending its role again, being careful – “Absolutely not to turn colleges into universities!” stresses Walden. “It’s up to a college and its province to determine how much applied research a college can undertake with SMEs.” NSERC makes a key distinction, using a different set of terms and conditions with colleges (as opposed to universities), while a different team manages relations with them.

NSERC states that its “College and Community (CCI) Program will advance the Science and Technology strategy’s ‘entrepreneurial advantage.’” Translated, that means CCI helps college faculty and students turn their knowledge into practical applications for their business partners. This helps businesses harness research and development to improve their capacity for innovation. The bottom line: colleges help businesses create and spread prosperity.

At present, colleges receive 1.5% of disbursed government funds; university-based research takes the rest. ACCC’s Jim Knight hopes the college component will rise to 5% in the next three years. Centennial’s Trish Dryden comments that college-based research is slated to receive a full \$38 million by 2013-14. “So I’m not sure that the 5% figure matters any more as long as we keep going down this pathway.”

Certainly the effectiveness is already seen to be profound. The number of college students now gaining exposure to innovation and entrepreneurial readiness tell

a “remarkable story,” says Dryden. The Conference Board of Canada reports that, in Ontario, as many as 50% of students working in applied research projects end up being hired by companies they worked for.

“The productivity end, and the jobs end, of programs like CCI and FedDev Ontario is spectacular. “It’s a huge value-added for applied research!” In a difficult environment, she adds, “Companies that are gaining in productivity are getting to keep their employees, even taking on new ones.”

At this point, Dryden introduces us to one of Centennial College’s business partners, Nick Efston, President of EfstonScience, “Canada’s leading retailer of scientific and technical products since 1970.”

Nick’s father, EfstonScience’s founder Evan Efston, began selling solar cells and alternative energy experiment kits very early on. Father and son were already ahead of the curve when they built their passively solar-heated flagship EfstonScience SuperStore. Then Nick set up eSolar.ca, a division dedicated to renewable energy solutions. He commissioned Toronto’s first Hybrid Wind+Solar LED Streetlight to be installed at the store.

When you bought a Model T Ford you knew it was bound to be just like your neighbour’s, and probably black. Those days are gone. “Customers all want something different” [in wind and solar energy], says Efston. “We partnered with Centennial in the FedDev program because we needed to set up a test-bed to test different configurations and combinations – turbines, solar panels, batteries – And our customers wanted tools, a troubleshooting tool, and another one they could look at and say, ‘We saved X dollars without dumping Y tons of carbon dioxide in the environment!’

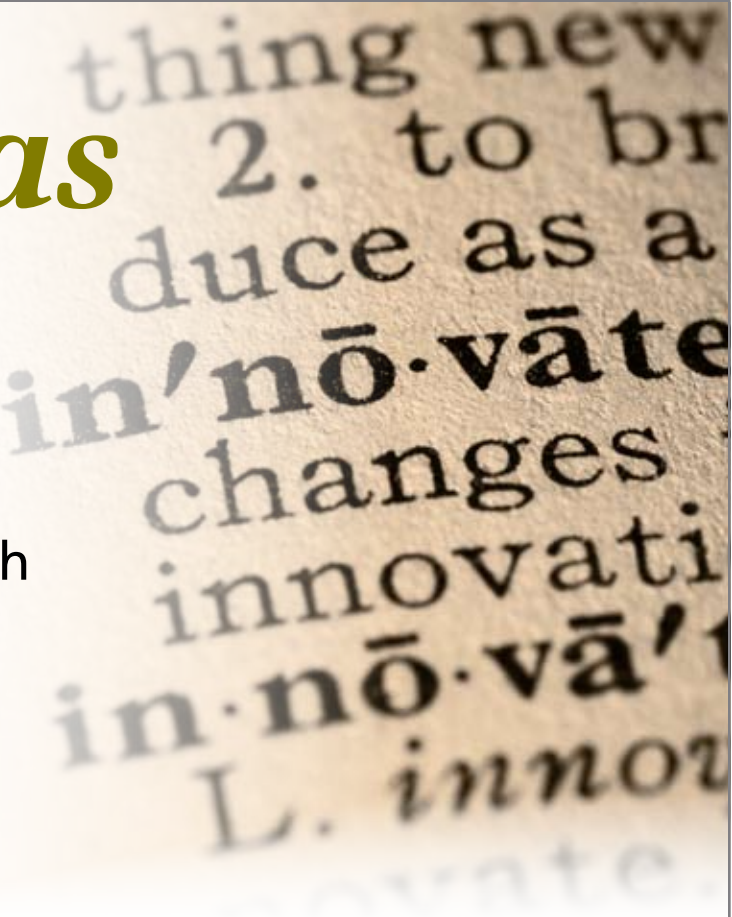
“That’s what we are doing with Centennial, testing for different configurations, optimizing for urban and off-grid lighting, seeing how we can take off-grid power and return it to the grid. Our customers want to sell power at peak times and buy at off-peak. There are lots of things you can do – when you have data that shows what you are producing. You can show real return on investment figures and back them up. Having a third-party independent institution – Centennial College – involved in doing the testing helps everyone.”

That, in a nutshell, illustrates collaborative applied research at work. Coincidentally, the day after I interviewed Trish Dryden, a crew working for Nick Efston began constructing the first of three different solar-and-wind experimental streetlights at Centennial College, outside her office window.

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Nobina Robinson
CEO of Polytechnics Canada
and a member of the Federal
Expert Review Panel on R&D

In Calgary, college students have helped an entrepreneur develop a compact energy-efficient hot water boiler. In Ottawa, a builder is providing award-winning shelters to disaster areas, thanks to the efforts of engineering students at a local college. And in Toronto, Game Design faculty and students at a leading college are helping a high-tech start-up to access much-needed venture capital by proof-of-concept work that completed the animation and integration of a game designed to

help children with learning disabilities. Such applied research success stories demonstrate concretely how Canada’s under-tapped colleges are contributing to innovation success in meaningful ways.

Colleges help small- and mid-sized enterprises (SMEs) solve a variety of challenges, from the design and prototype stages of new products to their commercialization. Overcoming these innovation hurdles are undoubtedly among the major obstacles facing Canada’s business sector today.

For their part, Canada’s colleges consider contributing to the country’s economic success to be an integral part of their 21st century mission. At Polytechnics Canada – an alliance of nine leading research-intensive, publicly funded colleges and institutes of technology in key economic regions – and at other leading colleges, we foster economic growth through applied research that addresses commercial needs. Our research is driven by industry requirements, not by academic curiosity. And being close to our clients, we deliver business results quickly and efficiently.

When the recently concluded

Federal R&D Review Panel held consultations across the country, SMEs told us many revealing things:

- speed-to-market is their principal challenge because government does not adequately support “demand-driven” innovation (since so much funding is focused on the “idea-push” model of pushing invention out to consumers);
- most firms, with an average size of half a dozen employees, do not have in-house R&D talent or facilities; and
- financing and capital are difficult to obtain in the time needed.

Many identified the commercialization gap as critical – the vital near-to-market stage when products, processes and service innovations need to be tested, scaled-up or retooled. But this is where colleges can play the role of innovation intermediaries or innovation “midwives,” to coin a phrase. We bridge the “death valley” between pure research and commercial problem-solving. That bridge leads to economic growth

and jobs. Few other institutions perform that role. Yet, the predominant federal response to spurring innovation has been to support discovery and breakthrough research, enticing companies to collaborate on large-scale, multi-year academic research projects with universities.

Clearly, we need to grow the number of innovative firms. Of Canada’s 1.1 million SMEs, less than 20 per cent invest in R&D. This number must grow.

More than a decade ago, applied research projects emerged as a by-product of the training colleges performed for local firms and employers to meet their labour market demands. Armed with the ability to offer high-quality, technology-intensive undergraduate degrees, Polytechnics Canada members, along with other leading colleges, began integrating these research projects into their curricula. As a result, college students have learned to apply their knowledge as they complete their academic credentials.

Now, companies approach colleges for applied research and business innovation assistance services. In response, Canada’s largest

colleges and polytechnics are showing an increasing research-intensity, operating research enterprises that are leveraging both government and private investment.

Since 2008, Polytechnics Canada’s members have serviced more than 2,500 SMEs, conducted nearly 1,200 applied research projects to solve industry-identified problems, involved some 13,500 college students in hands-on applied research projects and developed 560 prototypes for their industry partners.

Federal recognition of these growing trends has been slow and disparate, often supported through small-scale pilot projects. However, through recent programs such as NSERC’s College Community Innovation Program, FedDev Ontario’s Applied Research and Commercialization Initiative and announcements such as the NRC’s new Industrial Research Assistance Program for ICT adoption, modest support is being provided to connect the applied research talents and facilities of colleges and polytechnics with the business needs of SMEs. Even through these very recent programs over 500 firms have increased their

R&D exposure and activity. The time has come to strengthen these programs and think of new ways to support SME innovation, through programs with proven track records such as commercialization vouchers that enable firms to choose the commercialization service provider of their choice.

And now, a new trend is emerging where successful applied research projects at colleges are creating new positions at the client firms that are then filled by the very students who were working on the projects. In this way, college students are not just being trained to fill jobs vacated by baby-boomers leaving the workforce; they’re creating new, high-quality, sustainable jobs that the economy needs. Our graduates have the entrepreneurial talent so needed by small firms to grow commercial success. This is “demand-driven” innovation in action – one effective, albeit underutilized, way to grow SME innovation and productivity in Canada.

Nobina Robinson is CEO of Polytechnics Canada and a member of the Federal Expert Review Panel on R&D, which issued its report in October.



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