



confronting Canada's technical talent shortage

expanding the pool
of STEM-skilled
individuals to foster
innovation and
business success



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is a STEM skills shortage on the horizon?

Does a true, nationwide technical skills shortage actually exist today in Canada? The question certainly generates an ongoing debate and garners a lot of media attention. One thing is for sure, there is plenty of anecdotal evidence from employers struggling to find the skilled technical talent they need to complete important initiatives and fuel innovation. In the near-term, the scarcity of technical talent, even if only regional, is a problem that's only going to worsen as the demand for certain technology skills outpaces supply.

Any actual growth in the availability of technically skilled individuals is primarily driven by an educational focus on the core curriculum of Science, Technology, Engineering, and Mathematics. Although STEM literacy doesn't guarantee a sufficient pool of individuals with the specific knowledge required to meet the demand for certain capabilities, it forms the framework on which those skills can be built.

In this paper, we explore a number of issues related to the current and future availability of technology talent:

[STEM skills - Where do we currently stand and what are the long-term implications for employers needing STEM-skilled talent?](#)

[How might we expand the pool of STEM-skilled individuals?](#)

[What steps can employers take to increase their ability to attract and retain people with the know-how they need to foster innovation and business success?](#)

As highlighted by the Council of Canadian Academics, whether there is an actual countrywide shortage of technology talent is unclear. Labour Market Information (LMI) is neither timely nor specific enough to paint an accurate picture of the technology employment environment.

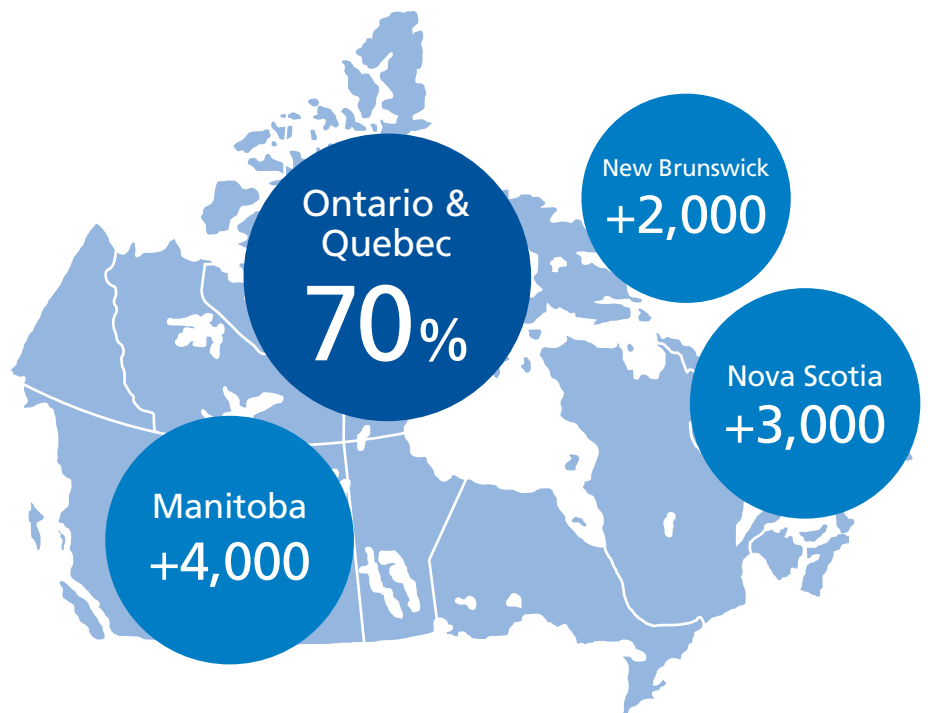
However, from Randstad's experience and the findings of numerous studies, there's no doubt that many Canadian firms are having trouble filling open positions for programmers, software engineers, computer engineers, and other information technology roles.

emerging technologies that will drive demand

Analytics, mobility, big data, security, social, the Internet of Things, and the cloud are going to drive the demand for highly skilled technology talent, not just for technology firms, but for all organizations looking to embrace these technologies for improved customer satisfaction and competitive advantage. Demand for technology skills will cross virtually all industries, compounding the effects of a skills shortage.

A recent report by the Information Communications Technology Council anticipates that Canada will have to fill 182,000 positions for information systems analysts and consultants, computer and network operators, Web technicians, software engineers, and other technical specialists by 2019.

Canada will have to fill 182,000 tech positions by 2019

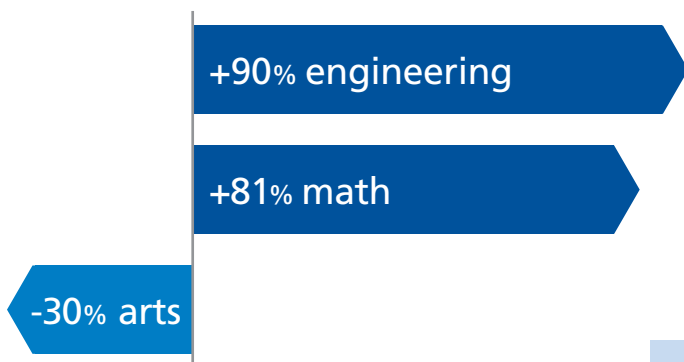


That anticipated nationwide demand affects every region of the country. Although nearly 70% of this demand will come from Ontario and Quebec, no region of the nation will go untouched. New Brunswick will need over 2,000 IT and communications specialists, Manitoba 4,000, Nova Scotia over 3,000 – the list goes on. It appears highly unlikely that there will be enough homegrown talent to meet these demands.

Moreover, an online survey conducted by Nordicity for Industry Canada found that Canadian firms were facing recruiting difficulties, which they attributed to a talent shortage. The study went on to cite that Canadian ICT firms are having trouble finding programmers, software engineers, and computer engineers at both the undergraduate and post graduate degree levels.

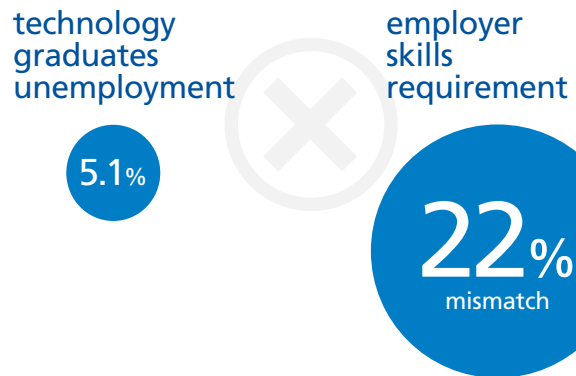
Recognizing the growing demand for STEM-skilled graduates, an increasing number of students have changed their fields of study. From 2003 to 2014, the number of applications to undergraduate arts programs in Ontario fell by 30% while applications to undergraduate programs in engineering and math rose by 90% and 81% respectively. Nevertheless, even in the face of more STEM-focused graduates, a report on underemployment conducted by the Ontario Society of Professional Engineers found that only about 40 percent of Canadian-educated male engineers were actually working in their field of study.

undergraduate applications 2003-2014



One of the problems seems to be a skills mismatch. According to a recent article in The Globe and Mail, unemployment for technology graduates stands at 5.1% but the mismatch between the skills those tech grads possess and those demanded by employers is over 22%.

skills mismatch



The impact on business is significant: businesses that can't attract and retain enough of the skilled talent they need are no longer able to achieve key mandates. Innovation is stifled, and the country's economy feels the impact of lost opportunity and a lack of innovation from Canadian business.

"Talent shortages made us change the way we work and develop our younger workforce through internship and work integrated learning."

Dan Bartoli,
Siemens Canada Ltd.

investing in fundamental STEM skills: long-term impact on innovation and growth

A study conducted by The Conference Board of Canada reported that in Ontario alone it's estimated that through 2012-2013, skills shortages cost the economy over \$24 billion in lost GDP and nearly \$4 billion in provincial tax revenues. The impact on the technology sector is more pronounced. The information and communications technology (ICT) sector accounts for almost 5% of Canada's GDP and generated nearly 10% of GDP growth between 2002 and 2010.

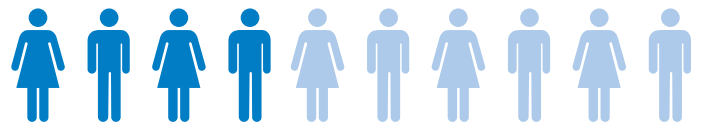
Nationwide, the pace of innovation is unimpressive. Conference Board findings rank Canada 13th out of 16 similar nations on innovation. According to the World Economic Forum's Global Competitiveness Index, Canada ranks 15th in business innovation. The direct relationship between the technology skills shortage and innovation is unclear, but it's hard to imagine innovative breakthroughs without sufficient technical skills to drive them.

going back to basics

As technology-based innovation becomes more embedded in our economy and firms scramble to boost productivity through innovation, the demand for STEM-skilled employees is almost certain to grow. This demand is a double-edged sword: investment in niche skills to address immediate pressures can leave us at risk of not investing in other broader skillsets needed in the years to come.

The Council of Canadian Academies expert panel on STEM Skills recommended investing in fundamental STEM (reasoning, mathematics, computational facility, critical thinking and problem solving), skills that can all be applied and leveraged in technology-rich environments. It concluded, "...long-term, sustained investments in fundamental skills for STEM literacy represent a sensible response to growing uncertainty about the future of technology, the changing nature of work, and expected demands for skills," and added that fundamental STEM skills "equip individuals with essential tools that are required to adjust to change, which is [of] benefit considering future labour market uncertainties."

Are we on the right track? The Canadian Chamber of Commerce found some troubling statistics regarding the Canadian workforce and issues that, if left unaddressed, could be cause for longer-term concern. The study found that an estimated 4 in 10 adults lack sufficient literacy to be fully competent in most jobs and that for Canadians aged 16 to 24, literacy rates had fallen below the average rates of the 34 member nations of the Organisation for Economic Co-operation and Development (OECD). The study also found that Canada's adult numeracy rates are in decline and the level of math skills among 15 year-olds is "disappointing".



Over the longer term, if current STEM literacy rates aren't improved, more companies might find it even harder to find the skilled technical talent they need. A shortage of skilled workers will adversely affect the pace of innovation, business productivity, and economic growth. The time to begin laying the educational STEM foundation upon which more specialized skills can be built is now.

"Our research shows nearly 44% of Generation Y are seeking jobs in transportation and logistics, engineering, construction and manufacturing. When it comes to skilled trades, a shift in thinking needs to be made in schools and at home that the blue collar jobs of today are the white collar positions of tomorrow, and employers and governments need to invest in supporting this. The appetite is there among our youth — let's feed it."

Tom Turpin, President, Randstad Technologies and Engineering

expanding the size and quality of the pool of STEM-qualified candidates

The study conducted by the Conference Board found that innovation was more likely to result from a combination of both technical and “soft” skills. Multiple employer surveys have found a chief complaint to be new hires who have the appropriate technical skills but lack softer skills, like the ability to collaborate, communicate, lead, and solve problems. Many of these soft skills are gained from work experience – creating a CATCH-22. How can recent STEM-trained grads who lack work experience gain the important soft skills required for employment, when those skills are typically acquired through work? Fortunately, it appears that more colleges/universities and employers are jointly developing and embracing programs to help foster these skills.

More needs to be done to prepare students for the world of work. Business-education partnerships can jointly devise approaches to help students develop their soft skills. Work-integrated learning (WIL) programs such as apprenticeships, co-op programs, internships, applied research projects, and workplace training meld education and work-related experience. It’s been shown that employers benefit as much from these types of programs as the students by enhancing their reputation and boosting workplace morale. Additionally, work-integrated learning increases the participating businesses’ productivity and enhances their ability to recruit needed talent.

women in STEM



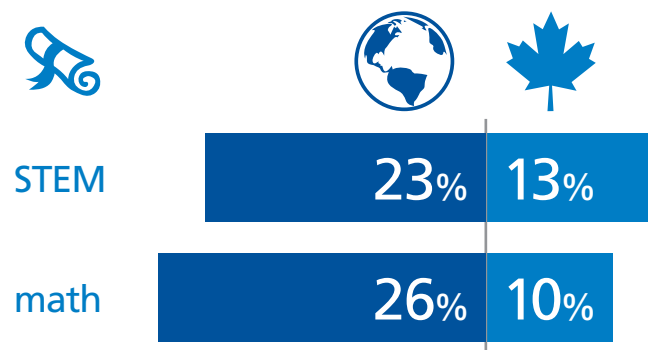
30% women
19% employed

Assuring that underrepresented groups in the workforce, particularly women and Aboriginals, are positioned to help fill the demand for STEM skilled workers is another tactic that could help foster innovation. The comprehensive study of STEM skills and Canada’s productivity conducted in 2013 by the *Council of Canadian Academics* found notable differences in the STEM-related employment prospects of women and Aboriginal peoples.

There is a significant gender disparity in STEM employment. Although nearly 53 percent of post-secondary grads are women, only around 30 percent of those in a STEM field are women and within this group, only 19 percent are employed in a STEM-intensive occupation.

The study notes “...the percentage of women with a STEM credential who are employed in a STEM-intensive occupation is 26.9 percent. Additionally, 23 percent of young immigrant women (ages 25-34) possess a STEM degree compared to 13 percent of their Canadian-born counterparts. Twenty-six percent of young immigrant women have a degree in math or computer science compared to 10 percent of young Canadian women.”

global vs. Canadian degrees for women



Statistics for STEM skills among Aboriginal people are even more discouraging. In 2013, 10 percent of the total working-age population of Aboriginals had a university degree compared with 26 percent of the non-Aboriginal population. Making up 3.7 percent of the adult population, only 2.6 percent of people with a post-secondary degree are Aboriginal. Clearly doing more to promote the study of STEM-related disciplines among the Aboriginal population is necessary. As the study points out, the inclusion of people with diverse perspectives, experiences, and ideas creates a wider talent pool with deeper assets.

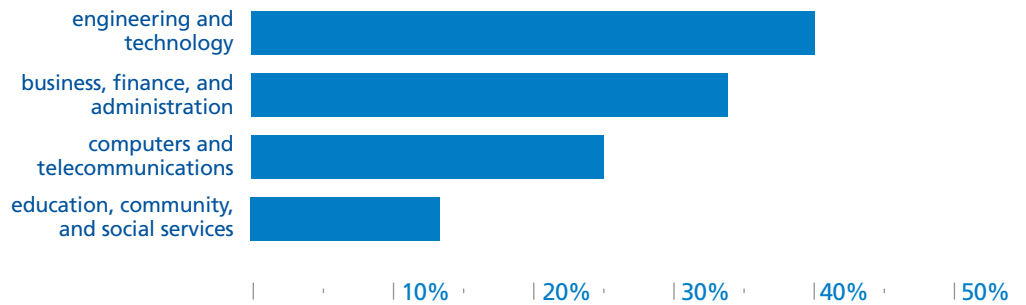
Immigration policy has a role to play in addressing the skills gap as well. A new express entry system launched this year means Canadian employers will be able to hire skilled candidates from abroad if there are no Canadians or permanent residents available. Going forward, flexible immigration systems that target particular skills need to be considered, and immigration policy needs to be developed hand in hand with Canadian businesses to ensure that targets meet the future needs of the economy.

what do employers want?

The Conference Board of Canada surveyed over 1,500 Ontario employers who employ over 750,000 people. They reported they need the following kinds of post-secondary credentials:

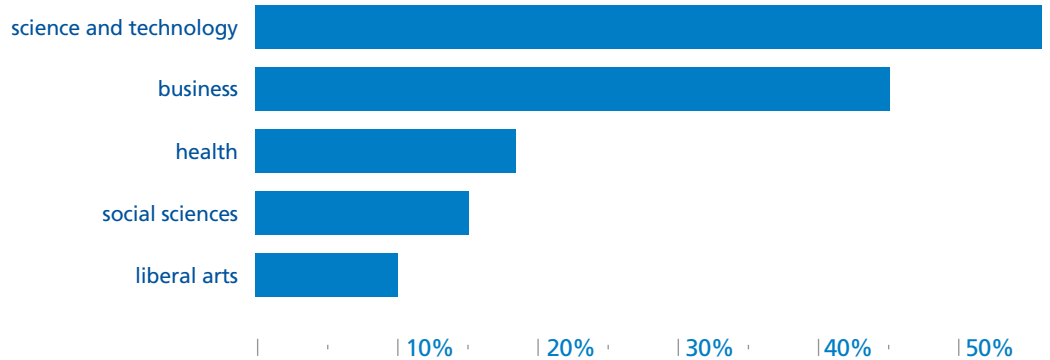
57%

2 or 3 year
college diploma



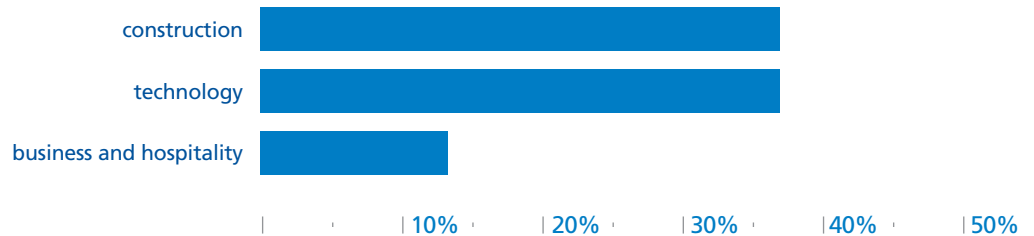
44%

4 year
degree



41%

trades
certification



Source: The Conference Board of Canada

adopting a thorough, strategic approach to talent recruitment and retention

Whether or not you're having difficulty finding qualified candidates now, technology is becoming more pervasive and greater numbers of organizations are already chasing a somewhat static supply of tech know-how. At this time, there is a real risk that our schools won't produce sufficient numbers of graduates with enough STEM literacy to meet the nation's needs.

here's what you can do:



promote STEM-based education through relationships with schools and students

Identifying students with an interest in STEM fields and helping them understand the connection between their field of study and their career opportunities will give your organization a future recruiting advantage.



develop work-integrating learning opportunities such as internships, co-op programs, apprenticeships and field placement programs

Not only do such programs help build the "soft" skills students need, they help build relationships between you and potential qualified employees.



provide more access to training

Finding enough people with skills in some of the "hot" technology fields such as Hadoop, DevOps, cloud security, mobility, etc. might prove fruitless. Demand is likely to far outstrip supply. Build expertise internally in the skills you need through targeted training programs. Such training also helps foster higher morale and makes you a more attractive employer by offering employees opportunities to build expertise in exciting new fields.



encourage and empower women, Aboriginals, and other underrepresented groups of workers to consider STEM fields of study

Make your organization a more attractive workplace for these population segments by putting programs in place that help them build both the operational and management skills necessary to succeed and advance. Consider mentoring/training programs tailored to their needs.

Fashioning a comprehensive employment strategy, one that incorporates the challenges and strengths of the organization, attempts to anticipate future skills required, and objectively assesses tactics that could attract those skilled individuals, can provide Canadian firms with a blueprint that helps alleviate any future national or localized technical skills shortages. The challenges identified here won't resolve themselves. Overcoming potential technology talent shortages requires action.

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