

SKILLS FOR THE POST-PANDEMIC WORLD ∴ JUNE 2021

Innovation in Post-Secondary Education

STACEY J. YOUNG, FIONA M. DELLER,
KAREN E. MCCALLUM



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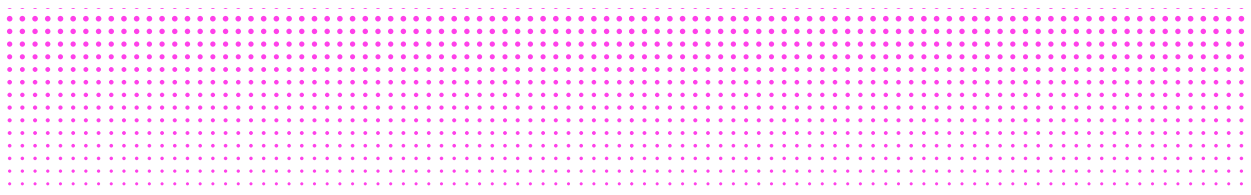


The Future Skills Centre is a forward-thinking centre for research and collaboration dedicated to preparing Canadians for employment success. We believe Canadians should feel confident about the skills they have to succeed in a changing workforce. As a pan-Canadian community, we are collaborating to rigorously identify, test, measure and share innovative approaches to assessing and developing the skills Canadians need to thrive in the days and years ahead. The Future Skills Centre was founded by a consortium whose members are:



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ABOUT THE PROJECT

Skills for the Post-Pandemic World tackles key questions facing policymakers, employers, training providers and workers. It is urgent that society turns to face the fundamental changes in the labour market precipitated by the COVID-19 pandemic, and many players must rise to meet the new conditions of a post-pandemic world.

Society will slowly reopen and business will resume, but there will be no “return” to normal: the pandemic has dragged the future of work into the present. Digitization, work from home, plus other steepened trajectories and intensified shifts well documented in the future-of-work discourse are here now, and likely to stay.

Building on the collaborative success of the **Skills Next** series, the Public Policy Forum (PPF) and the Diversity Institute (DI), funded by the Future Skills Centre (FSC), and with new support from Microsoft, join once more to face these rapid societal shifts head-on, with research looking at the future of skills, training and retraining in ways that will chart a path forward as the pandemic continues to unfold.

The goal of this series is to build a robust policy ecosystem that supports the mobility needed for workers and employers to navigate the new reality. To do this, we examine eight key topics:

1. **Job polarization in Canada: Skills for the post-pandemic world**
2. **Digital infrastructure for the post-pandemic world**
3. **New working arrangements**
4. **Building inclusive workplaces**
5. **Immigration and the success of Canada’s post-pandemic economy**
6. **Innovation in post-secondary education**
7. **The mother of invention: Skills for innovation in the post-pandemic world**
8. **Supporting entrepreneurship and SMEs**

For more information about the project, please contact: **Andrée Loucks**, Policy Lead (PPF) and **Michael Crawford Urban**, acting Director, Research, Special Projects (FSC).

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AUTHORS

STACEY J. YOUNG

Stacey J. Young is the Principal Consultant at Fiona Deller and Associates, and works with Canadian and European education-focused, non-profit organizations. She has 25 years' experience in the education, higher education, government and non-profit sectors in Ontario, with a focus on funding, strategic and sector planning, policy and program development and research and program evaluation. She has held senior leadership positions at Pathways to Education Canada, the Ontario Council for Articulation and Transfer and The Learning Partnership (TLP), where she transformed the way learners were assessed for entrepreneurial and communication competencies. Stacey has a BA and an MA in social anthropology and sociology and a doctorate in higher education from the Ontario Institute of Studies in Education at the University of Toronto. She has taught higher education policy and practice and worked in advisory capacities at the University of Toronto, Ryerson University, OCAD University and York University. She is published in the areas of the history of higher education finance and policy, the political economy of higher education and credit transfer and university differentiation.

FIONA M. DELLER

Fiona M. Deller has spent much of her career conducting research and evaluation, creating policy and designing programs related to student equity, success and access to post-secondary education. Before starting her own consulting business, Deller previously held senior management positions with the Higher Education Quality Council of Ontario (HEQCO), the Council of Ministers of Education Canada (CMEC) and has worked for the Ontario and federal governments. Deller also taught program evaluation and research design for eight years at Ryerson University. She is passionate about designing practical solutions that meet students' needs, and creating an accessible, user-friendly educational ecosystem. Fiona has a BA and MA from McGill in history and a doctorate from the Ontario Institute for Studies in Education at University of Toronto in the field of higher education theory and policy.

KAREN E. MCCALLUM

Karen E. McCallum has a social sciences background with degrees from the University of Waterloo and McMaster University, and a PhD in Human Rights from the University of London (U.K.). After six years studying abroad, she returned to Canada in 2019 and re-engaged with Canadian policy and research, focusing on equity for members of marginalized groups. Previously, she worked as a Senior Research Associate at Ryerson’s Diversity Institute-Future Skills where she published widely on equity and diversity.

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FOREWORD

Innovation in Post-Secondary Education

COVID-19 made a devastating debut on the world scene and launched a new era of how we live and work in our global society. The pandemic ushered in dramatic changes and deepened inequalities: health and economic crises, border closures, lockdowns, mass job losses and the curtailment of educational activities. Nevertheless, it also accelerated innovation and particularly the adoption of new technologies, compressed adoption cycles from years to weeks and transformed entire sectors – government, health care, education, retail, financial services and more.

As we see the prospect of a post-pandemic chapter ahead – thanks in part to the incredible pace of vaccine development and production – we are also challenged to imagine a different way of working, learning and living.

At the Future Skills Centre, we focus intently on ensuring that Canadians have the opportunities and resources to thrive in the future of work. It is critical to ensure that everyone, especially under-represented groups who have been disproportionately impacted by the pandemic, can access opportunities to succeed and share in Canada's prosperity. We are also committed to ensuring employers have access to the talent they need to innovate and grow. As we plan for a future after the pandemic – one in which digital skills and connections have become even more essential – we can't stress enough the urgency of developing skills strategies, policies, and programs that enable us to rebuild better and more inclusively.



This paper, part of the Skills for the Post-Pandemic World series of research reports, explores the role of post-secondary institutions in preparing Canada for a prosperous future and how the pandemic may shape this role in new ways. The pandemic has laid bare the challenges faced by the post-secondary system and its institutions as they seek to respond quickly and efficiently to labour market shifts and challenges. But this report also showcases some examples of institutions' efforts to be more responsive to labour market challenges in a learner-centered and accessible way. The report also highlights how, while Canada's post-secondary system is generally successful in promoting access to learning and training, there remain significant gaps in opportunities for some groups. Addressing these challenges will require a comprehensive strategy and a range of policy approaches. Please join us in considering what these findings mean for skills training and opportunities in Canada.

We thank our partners at the Diversity Institute and the Public Policy Forum for convening this research and these discussions. This is a crucial conversation as we turn our collective energy towards rebuilding our economies and educational systems to be better and more inclusive so that we can all share in a more prosperous future. We also thank the Government of Canada for its support of a national future skills strategy that builds on evidence generation and practical delivery of skills training and assessment programs.



PEDRO BARATA

Executive Director, Future Skills Centre





EXECUTIVE SUMMARY

Canada's post-secondary institutions are well-positioned to prepare the country for a prosperous future — they are accessible and diverse in mission and scope, offering a wide range of program offerings and formats. Despite the constraints imposed by their funding, quality control and regulatory mechanisms, they demonstrate responsiveness and innovation to labour market signals and challenges. For its part, COVID-19 has laid bare both the challenges faced by the system and the institutions within it and their ability to respond quickly, efficiently and innovatively in times of crisis. And although the Canadian system does a good job in promoting access to the post-secondary education (PSE) system, there remain significant opportunity gaps that are being filled by program innovations that circumvent the existing set of rules regarding program approval, quality and funding regimes.

Through the selection of innovative case studies, we highlight examples of how PSE institutions strive to be labour market responsive in ways that are learner-centred and accessible. However, to continue to meet the demands of the future, we conclude with some recommendations for how governments may support greater capacity for program innovation and opportunities for timely and accessible education and training opportunities.

INTRODUCTION

Canadian post-secondary institutions are well-positioned to prepare this country for a prosperous future — they are accessible and diverse in mission and scope, offering a wide range of program offerings and formats. They are a desirable destination for international students, with foreign students making up a higher percentage of their enrolment than post-secondary institutions in all but six other Organisation for Economic Co-operation and Development (OECD) countries, far outstripping the U.S.¹ Further, Canada has proportionately more tertiary education graduates than all but two other countries in the OECD, despite being ranked 19th in that same group in terms of total government expenditure on education. Despite the constraints imposed by their funding, quality control and regulatory mechanisms, these institutions demonstrate a high degree of responsiveness and innovation to labour market signals and challenges, and have shown great adaptability and resilience during the pandemic.

For its part, COVID-19 has laid bare the constraints under which Canada's post-secondary education (PSE) institutions must work, but also their ability to respond quickly to challenges.

These PSE institutions' responses to COVID-19 have been to expand and accelerate trends in online learning such as increasing the role of micro-credentialing and offering more courses in online and blended formats using advanced technologies like streamed video lectures, augmented and virtual reality technologies (AR/VR) and virtual laboratories.

These adaptations are an extension of trends that preceded the pandemic and many of these innovations will outlast it, changing the way Canadians deliver education for decades to come. Indeed, the vast majority of Canadian colleges (97 percent) and universities (94 percent) intend to continue offering education in an innovative way after COVID-19.²

By international standards the Canadian system does a good job in promoting access to all levels of education — a result of the cumulative effects of provincial and federal student aid reform, novel recruitment programs introduced at the institutional level and a variety of delivery mechanisms designed to promote inclusivity and responsiveness.^{3,4} However, there remain significant opportunity gaps that, in some cases, are being filled through innovations that circumvent government-funded and -regulated program approval and quality-control

mechanisms. In this report, we profile a number of those circumventions and demonstrate the way nimble regulatory and funding systems have allowed PSEs to respond in real time to pandemic conditions.

We also suggest that through a widespread embrace by all institution types of “learning by doing,” — once just the domain of vocational institutes and colleges — further progress can be made toward greater inclusiveness in the system. For example, more universities are embracing workplace-integrated learning (WIL) placements that students can complete while pursuing traditional degrees, even while WIL experiences have been shown to have uneven results for diverse participants.^{5,6,7} Moreover, both colleges and universities are embracing skills-specific, practical micro-credential accreditations like never before, latticing these micro-credentials into existing programs as well as offering them as stand-alone options, helping students demonstrate singular competencies in a transferable way.

A review of international practices suggests that education — coming in the form of college diplomas, university degrees, micro-credentials or employment assistance training and skilling programs — can support upward social and income mobility if learning outcomes are strategic and tied to opportunities in local labour markets.^{8,9} But for education to result in upward mobility for workers, programs need to be designed to meet current labour force needs and must keep pace with the changing nature of skills required in today’s jobs.

More and more people will need to pivot throughout their careers to stay relevant and employed, which can include taking career breaks to retrain, to engage with workplace training throughout one’s career, and to adjust to the adoption of new technologies in the workforce as human skills are augmented with tools such as machine learning and robots.¹⁰

And while overall trends shaping labour markets must inform the programming offered by educational institutions, paying attention to regional variations, variation across industrial sectors and local labour supply is also critical. Educational institutions must stay informed of labour force needs and skills requirements.¹¹

While they are a part of the wider PSE ecosystem, apprenticeships have a particularly important role to play in workplace-integrated learning conversations because of the longstanding importance of this pedagogical model in this sub-area of the education sector. Apprenticeships

are a critical part of the Canadian educational system, offering vocational curricula to learners in the most work-integrated format of the WIL options available across post-secondary education. The employment rate of 25 to 35-year-olds in Canada with upper-secondary or post-secondary non-tertiary vocational education (apprenticeships) is higher than the OECD average.¹² This is unsurprising given the high rate of engagement in Canada between apprenticeship training and employers. All provinces and territories offer youth apprenticeship program (YAP) options that enable young people to work in a trade setting concurrently with finishing their high school diplomas.¹³ Engagement in apprenticeships at tertiary or post-secondary non-tertiary levels has been shown to improve upward mobility for learners at all career levels and to help smooth transitions.^{14, 15} Unfortunately, and as is discussed further below, apprenticeships were greatly disrupted by the pandemic, with students facing delayed or cancelled activities. Still, this model of “learning by doing” that once was mainly the purview of apprenticeship programs, is set to become the norm across a growing proportion of PSE types either through virtual or in-person means.

WIL, micro-credentials and other forms of augmented learning opportunities can also help facilitate a smoother transition for students between graduation and finding work, as well as for mid-career workers transitioning to new jobs. Whatever specific form WIL takes, regardless of socio-economic background, it offers the possibility of a more seamless and successful move into paid work.^{16, 17}

Despite the very promising PSE landscape in Canada — in terms of its ability to attract, support and ultimately deliver its students to the labour market — provincial and territorial tertiary education systems must seek to reward experimentation and risk while supporting stability. This will serve to increase their capacity for program innovations that promote accessible and responsive opportunities for life-long learning to respond to crises such as COVID-19 as well as to known trends in education and work.



OVERVIEW OF THE CANADIAN POST-SECONDARY EDUCATION SECTOR

Canada's post-secondary education system is made up of a loosely coordinated set of institutions including universities, colleges, polytechnics and private vocational colleges. Together, these institutions offer a range of degrees (undergraduate and graduate), diplomas, certificates and vocational accreditations. Each of Canada's 13 different PSE systems operate under somewhat different regulatory, policy and funding regimes depending on the province or territory in which they are located. Each one of these systems possesses its own distinct history, geography and the sometimes-idiosyncratic arrangements with its provincial or territorial governments.¹⁸

Overall, there are 147 public universities and 183 public colleges and institutes recognized by the Council of Ministers of Education in Canada.^{19, 20} There are 13 polytechnic institutes in Canada, which sit somewhere between colleges and universities and are all members of an organization called Polytechnics Canada. Finally, there are several hundred mostly for-profit private vocational colleges. These universities, colleges, polytechnics and private colleges range in size, relationship to the state and mandate — including variations in the amount of applied research in which they engage. However, with the exception of the private colleges, all have a mandate to provide accessible, labour market-relevant post-secondary education with a broad range of credential types and academic and technical content.

Universities are the primary degree-granting institutions in Canada and while they no longer have a monopoly on the granting of undergraduate degrees in all provinces, they continue to be the only institutions accredited to grant masters and doctoral level degrees.²¹ While there is significant variation across universities, it is possible to group Canadian universities into three rough categories.



The smallest of these are the primarily undergraduate universities. These institutions, which generally have fewer than 5,000 students, tend to either serve smaller cities and their surrounding rural areas or follow a classic liberal arts model, both of which offer a limited selection of courses and concentrations. In both cases, the focus is usually on undergraduate education though there are often some graduate level programs offered.



A second category of “comprehensive” universities includes larger universities which offer a wider selection of courses at all levels of degrees. These institutions typically engage in significantly more research than the smaller category of universities and generally have anywhere from 5,000 to 50,000 students.



The third category of universities includes the large research-intensive universities which tend to also include a medical school – though again there is variation in this category. These universities tend to offer the widest selection of programs at all degree levels and are more research-intensive than the smaller primarily undergraduate-focused universities and most of the comprehensive universities.

In some jurisdictions, such as British Columbia, universities are part of a tightly articulated provincial “system” of institutions,²² while in others, such as Ontario, universities have individual degree-granting authority through an act of their provincial legislature.²³ The approval mechanisms of university programs are internal and have their origin in the idea of a collegium, a collective decision-making dynamic that is largely internal and highly autonomous. Decisions taken by the collegium then pass to governments to determine eligibility for funding. Somewhat controversially, the influence of the private sector on program development and quality assurance has also increased as funding from, and partnerships with, industry have risen over the last 20 years.²⁴

Contrary to the traditional academic focus of universities, colleges have traditionally been focused on the provision of vocational training. Colleges are also often defined in particular by their close relationship to their immediate geographic community and associated industries. Nonetheless, there is even greater variation between institutions that call themselves colleges than there is between universities. While colleges previously focused more on vocational and trades education, and tended to offer two-year programs, there has been a shift across much of Canada to include training in more “white collar” occupations, such as in technology and health care, in their offerings. Additionally, many colleges, especially in Ontario, have begun offering three-year programs and awarding degrees. While some colleges have begun to expand their activities beyond the traditional exclusive focus on instruction and have started to undertake applied research, most colleges remain heavily focused on professional education and preparing students in very direct and practical ways for getting and doing a job in a specific occupation or industry. Despite their reputation for being closer to industry and more responsive to its needs, the credentials, such as degrees and certificates, granted by colleges still must go through provincial or territorial approval bodies that can take a great deal of time, making quick responsiveness to industry demand challenging.

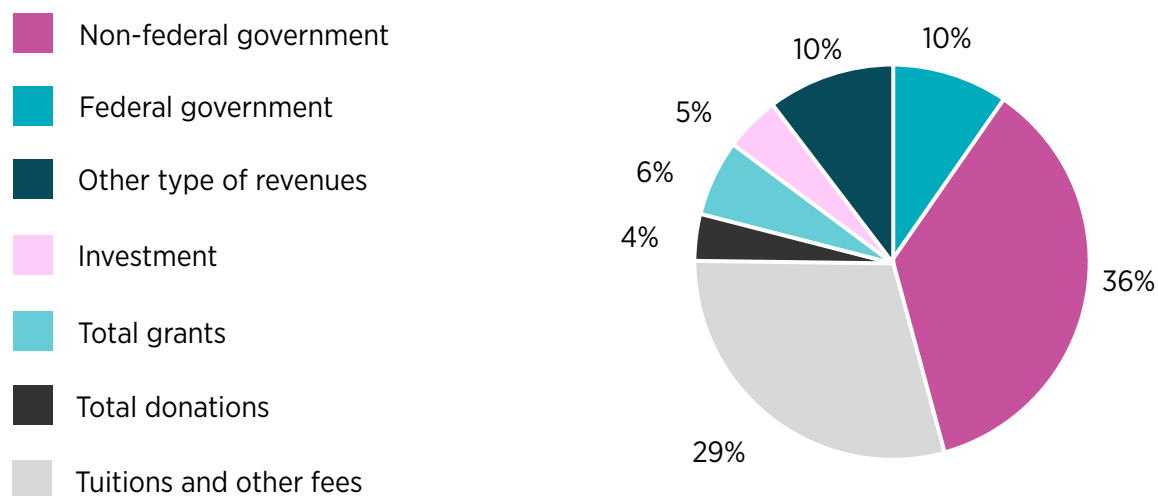
As in many other areas, Quebec stands apart in that it has a relatively distinct approach to colleges which it operates through the *College d'enseignement général et professionnel* (CEGEP) system. Not only is entry into a CEGEP distinct in that it occurs a year earlier for students than in other provinces, there are also two distinct streams. The first is an academic stream which culminates in the awarding of a *diplôme d'études collégiales* (DEC) which is a prerequisite for attending university (consequently, many undergraduate university degree programs in Quebec are only three years in length). The second stream is a vocational/professional stream where preparation of students for direct entry into the labour market is the end goal. One thing that Quebec and the rest of Canada have in common when it comes to colleges, however, is that they tend to be under much stricter control from provincial governments than universities. They also tend to be more open to students from all walks of life and thus more representative of the Canadian population.

For their part, polytechnics are institutions of higher education that provide technical, applied and hands-on learning; they offer applied degrees, diplomas, certificates and apprenticeship training and position themselves as fuelling business innovation with applied research expertise.²⁵ Polytechnics operate primarily in regions of high economic development, focus on seamless school-to-work transitions and are leaders in the business of providing reskilling and upskilling for adults.^{26, 27} Polytechnics are essential for the training of skilled tradespeople, and they work closely with employers and government to identify skills needs for local and national economies. Like

colleges, polytechnics operate under similar quality-control and funding regimes, both in terms of their relationship with provincial governments (their funders) and their own institutional processes for program development and quality assurance. While Canada’s 13 polytechnics distinguish themselves through membership in an “industry group” called Polytechnics Canada, they all also maintain memberships in Colleges and Institutes Canada, the main industry association for Canada’s colleges.

Private vocational colleges, the institutions that may be less familiar to readers, tend to offer more skills-based, labour market preparation, including the in-class portion of apprenticeship training.²⁸ These private, mostly for-profit, institutions offer programs that are generally shorter in duration and costlier to the student, but are considered in some ways more convenient, with rolling program start dates that make completing program modules easier.²⁹ This report will focus on the publicly funded system as it encompasses the educational institutions accessed most often by Canadian learners.³⁰

Figure 1: Revenue sources of Canadian universities and degree-granting colleges, 2018/2019



Source: Author calculations based on Statistics Canada. (2020). Table 37-10-0026-01 Revenues of universities and degree-granting colleges (x 1,000).

Universities and colleges receive most of their revenue from tuition fees and government funding, relying on donations, private grants and other minor sources to bolster their revenue.³¹ Investments from private partners have become increasingly important and central to the university sector, though evidence supporting the argument that public-private partnerships deliver better value for money is uneven.^{32, 33} The rate of private investment in Canadian colleges and universities varies across jurisdictions and over time, but in 2018/2019, an average of five percent of revenue came via

private investment while 10 percent came from the federal government and 36 percent from non-federal governments and governmental entities.

Table 1: Proportion of revenue from universities and college, 2016/2017

Type of revenue	Universities (%)	Community colleges and vocational schools (%)
Government	46.1	61
Private (including tuition)	53.9	39

Source: Author calculations based on Statistics Canada. (2019). Table 37-10-0110-01 University revenues by source, as a percentage of total revenue; Statistics Canada. (2020b). Table 37-10-0028-01 Revenues of community colleges and vocational schools (x 1,000).

Universities receive a higher proportion of revenue from federal investments than degree-granting colleges, due to public research funds and R&D investments, but colleges receive more government support overall, including from federal, provincial and municipal sources. This is due in part to colleges being regarded more as extensions of provincial education and training regimes. For instance, in New Brunswick, Yukon, Nunavut and some districts in the Northwest Territories, the provincial and territorial governments directly play the role of employer to instructors and staff.³⁴ This model is common across the U.S. where PSE instructors are employed by the states as public servants.

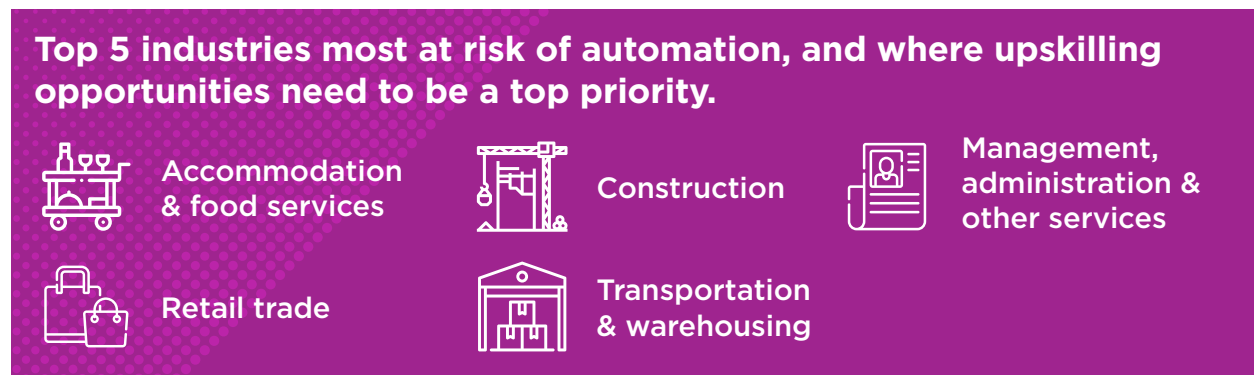
DIVERSE LEARNERS IN POST-SECONDARY EDUCATION

One important piece of the education puzzle is learners themselves. As education and the workforce rapidly respond to the disruptive impact of technology and other changes,^{35, 36, 37} it is essential that educational institutions remain aware of the barriers that prevent many people from accessing the education they need to reach their full potential. Indeed, as the COVID-19 pandemic compounds the challenges posed by technological changes that were already threatening to exacerbate inequality,³⁸ a focus on diversity and inclusion is more important to Canadian education than ever before. Education can help mitigate the most negative impacts of technological disruption.³⁹

The playing field is not level when it comes to entry and access to educational opportunities across different types of schooling. There is extensive discussion in the literature about the disproportionate barriers faced by diverse job seekers and employees,⁴⁰ but many similar challenges exist for learners as well. Indigenous workers, women, youth and racialized workers are all over-represented in low-skill, low-wage work that is vulnerable to automation,⁴¹ and specialized

outreach to members of these groups is essential to improve access and equity in educational opportunities.

While not yet occurring to the extent needed to level the playing field, this sort of outreach is starting to become more common. Institutes of all types have been working to increase inclusion of Indigenous learners, such as through the **Indigenous Learner Success Strategy** at the Southern Alberta Institute of Technology, which aims to smooth transitions and support Indigenous success and achievement through culturally appropriate wrap-around services.⁴² Other universities and colleges have also been pursuing similar Indigenous inclusion initiatives aimed at increasing participation by Indigenous learners in post-secondary education. Nipissing University's **Wiidooktaadwin Indigenous Mentorship Initiatives**, for example, facilitates mentorship between Indigenous secondary school students and current university students. Given that Indigenous workers are concentrated in the top five industries most at risk of automation (accommodation and food services; retail trade; construction; transportation and warehousing; and management, administration and other services) in Canada,⁴³ ensuring that Indigenous youth and adults receive appropriate supports for the pursuit of upskilling opportunities needs to be a top priority.

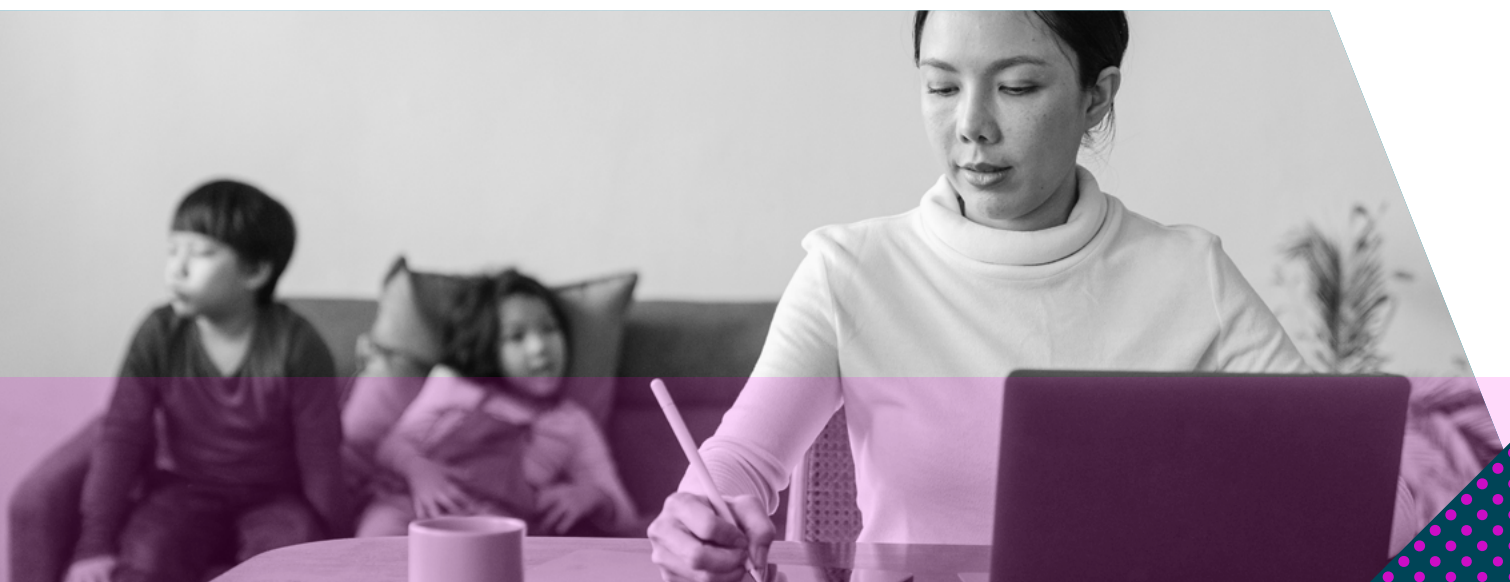


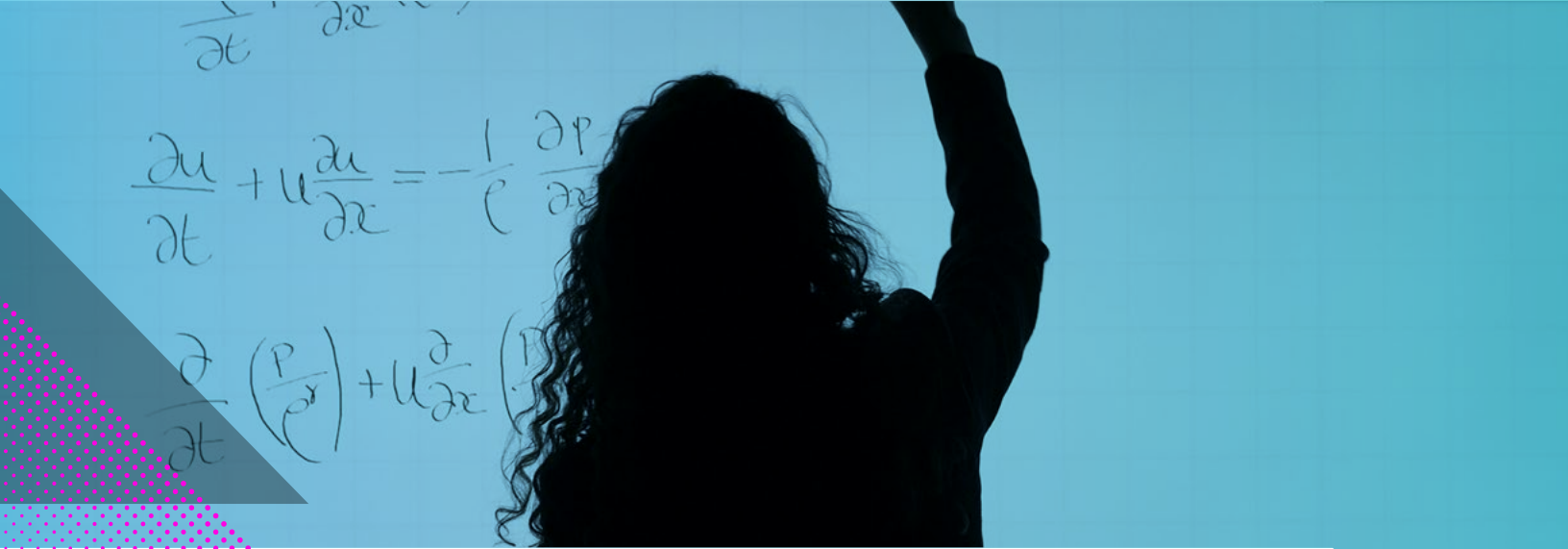
Young people who are not in education, employment or training (NEET) also disproportionately face barriers to educational entry (with Indigenous peoples, women and racialized people all over-represented in this population). Statistics Canada and the OECD regularly publish data on NEET status to track problems in education and the labour market. In 2017/2018, 15 percent of Canadian youth (376,000 individuals) were considered NEET, with two-thirds of them not looking for work.⁴⁴ In most OECD countries, the NEET rate is higher for women than men and is correlated for women with the presence of young children in the household (there is a similar correlate for men but it is not as strong).⁴⁵ Conversely, higher rates of educational attainment are correlated with lower NEET rates among 25- to 29-year-olds. However, once NEET, it can be difficult for individuals to transition to a career or educational path.⁴⁶ This is especially worrying because we know that the COVID-19 crisis

has pushed many educated Canadians, as well as many young people looking for entry-level jobs, into unemployment and/or NEET status.

NEET: Not in Education,
Employment or Training

Racialized workers also face myriad barriers to educational access and achievement, from barriers to entry due to limited recognition of foreign credentials,⁴⁷ to discrimination by teachers, guidance counsellors and other mentors that impact the choices that young people make and the opportunities they have in the pursuit of training and education.^{48, 49, 50} These impacts can be severe as experiences of discrimination hamper mobility for racialized youth and adults that can persist across generations.⁵¹ Mentorship initiatives such as the **See it. Be it.** campaign can have a marked impact on a person's career aspirations⁵² and transitions.⁵³ Racialized Canadians are over-represented in low-skill, low-wage jobs,⁵⁴ and are more likely to be underemployed relative to their level of education than non-racialized Canadians.⁵⁵ Racialized Canadians bear the brunt of automation, being more likely to report that new information and technology has made their job less enjoyable, more difficult, less well paid and less secure.⁵⁶ Thus, ensuring that racialized Canadians, as well as newcomer and other immigrant Canadians, are able to access the education and training opportunities they need to bolster their skills and manage career and educational transitions in a changing world of work is especially important.⁵⁷





INNOVATIONS AND TRENDS IN POST-SECONDARY EDUCATION

As was alluded to in previous sections, one of the factors that make it difficult for PSE institutions to respond quickly and nimbly to labour market demands are the numerous layers of approval, both internal to the university and within the governments from which they draw their funding, that are required in order to introduce new programs or make significant changes to existing ones. In an attempt to increase their responsiveness and agility, some institutions have developed workaround delivery mechanisms, such as using continuing education and micro-credentials, that allow for speedier development and delivery of curriculum that meets industry's "just-in-time" needs.⁵⁸ However, these types of programs are either only partially funded by government or are unfunded altogether; and the quality control mechanisms or opportunities for the assessment of possible outcomes are not as well developed. Nevertheless, the increasingly rapid pace of change means that education and training providers that can be agile and responsive will have the advantage, which is motivating more institutions to develop new offerings that follow these non-traditional pathways.

In this section, we discuss a number of areas of innovation in the PSE sector which we have grouped together into three themes. These three themes trace emergent trends that are particularly pertinent for PSE institutions and are those that have enjoyed an increase in use, public-awareness and investment during COVID-19:

1. Online learning, massive open online courses (MOOCs) and micro-credentials;
2. Work-integrated, experiential learning; and
3. Targeted training for special populations.

ONLINE LEARNING, MOOCS AND MICRO-CREDENTIALS

Online learning has been growing in popularity and market share for decades, though different educational institutions and educational disciplines have engaged with it in very different ways. The term mobile learning has fallen out of use, but researchers were already predicting in the early 2000s that “eLearning” would create much greater access for students living remotely or farther away from educational hubs, and promote mobility in the learning ecosystem.⁵⁹ We can now see the applicability for eLearning, MOOCs and micro-credentials especially during COVID-19 and expect many current trends in online learning to continue.

More online learning means greater access to education for more students across the country, but also around the world. We could end up seeing that an uptick in online learning results in lower numbers of international students migrating to Canada for schooling.

While PSE institutions could still charge international student fees for online courses, changes in the geographic location of students will have an impact on student life, on long-term immigration to Canada – as students may be less likely to migrate physically to Canada if they have never lived here during studies – and on the overall PSE experience. If some educational offerings go exclusively online, Canada could end up competing in a border-less market for education.

It should also be noted, however, that high quality online learning often depends on access to affordable and dependable broadband internet service. As outlined in another report in this series, **Digital Infrastructure for the Post-pandemic World**, unequal access to the internet risks reproducing and exacerbating existing inequalities around education, skills training and development, and employment. Consequently, the growth of online education will need to be matched by a commensurate growth in initiatives that ensure that those most in need of the flexibility offered by online learning – often those with the least ability to access it – are not left on the sidelines.

One form of online learning that has seen some of the largest growth recently are MOOCs. Canada’s only exclusively online PSE, Athabasca University, registered an uptick in course enrolments of 12.3 percent for undergraduate program enrolments and 10.7 percent for graduate program enrolments by April 2020.⁶⁰ MOOCs have been growing in popularity for more than a decade, with **edX** offering its very first MOOC in 2012 on “Circuits and electronics” to a class of 155,000 registered students, 7,100 of whom passed the course.⁶¹ Video lectures and demonstrations are central to education delivery in a MOOC setting and different courses vary in whether they offer on-demand or real-time educational

offerings, with one study showing that 33.24 percent of MOOCs offered on **Coursera** were on-demand and the remainder were delivered during set times.⁶² MOOCs can be built to include problem-solving tasks and regular assessment options, to allow learners to test their knowledge and proceed at a pace appropriate for their level of retention. MOOCs have been used with measurable success to ensure learning has been acquired to a particular standard.⁶³

Along with receiving education, students are also receiving more and more services and peer support online. Virtual mental health supports have been offered online at an increasing rate over 2020 and students are accessing counselling for a range of needs over the phone or through digital platforms. The **Centre for Innovation in Campus Mental Health** has collated virtual resources for health care and counselling providers, as well as providing resources for people seeking support on their **More Feet on the Ground** eLearning hub. Also, many private companies are offering access to their counselling platforms free of charge during the pandemic. For example, **Good2Talk** runs a 24/7 free and confidential support line that PSE students can call or text for support, and the Canadian Mental Health Association is offering **BounceBack**, its skill-building program that helps people self-manage milder mental-health concerns – including anxiety and low mood – virtually. **Jack.org** is another online resource, offering a youth-focused and driven approach to mental health support through its **COVID-19 Youth Mental Health Resource Hub**.

COVID-19 has also shifted the ways students engage with classes, sparking a trend towards the increased use of online learning resources and more technologically advanced tools in the classroom. Advanced technologies including artificial intelligence (AI), data analytics, robotics, augmented and virtual reality (AR/VR) and intelligent process automation (IPA) are changing our classrooms and workplaces, introducing changes in how people work and even what tasks are performed by humans as opposed to robots.⁶⁴ AR and VR are being used to extend the potential of textbooks, linking digital textbooks with a virtual classroom environment where students can augment and assess their learning.⁶⁵ Other technologies, such as blockchain, can be used to disseminate resources widely around the globe, meeting a need created by the fact that more than 100 million learners are projected to be capable of higher education though unable to access it by 2025.⁶⁶ While augmented technological tools and platforms are helpful during this unprecedented turn to online learning, the integration of advanced technologies into classrooms also dovetails with the need for students to graduate with workplace-ready skills and competencies in the latest technologies.

Another area seeing a rise in interest is micro-credentials. Micro-credentials have been increasing in importance over the past decade, with the Mozilla Foundation introducing the first open digital badges in 2011.⁶⁷ These alternative credentials serve to unbundle skills into constitutive parts allowing issuing authorities to offer more granular forms of learning accreditation than has traditionally been possible.^{68,69} Micro-credentials can be embedded in PSE programs through “latticing,” wherein for-credit and non-credit micro-credentials are integrated into existing course and program curricula.⁷⁰



Box 1. New Zealand Qualifications Authority’s micro-credential system

In 2018, the New Zealand Qualifications Authority (NZQA) introduced a micro-credential system as part of New Zealand’s regulated education and training system. The NZQA micro-credential system outlines NZQA’s expectations for tertiary education organizations submitting micro-credentials for approval.

The NZQA micro-credential system includes a standard definition of micro-credentials, rules for applying for qualification of a micro-credential, including how to partner with other organizations to develop and get approval for a micro-credential, and a registry of approved micro-credentials. Importantly, the review and approval process for micro-credentials is 20 days, a significantly faster review and approval process than currently exists for credential approval in Canada.

Additionally, the NZQA provides information for employers, industry and communities on how they may work with tertiary education organizations to develop micro-credentials that meet their needs.

PSE institutions around the world and across Canada use micro-credentials to recognize specific forms of learning, with New Zealand modelling a way to co-ordinate micro-credentialing through the national educational accreditation-issuing authority (see Box 1). The European Union (EU) has also developed a common framework for the development and recognition of micro-credentials (see Box 2). Micro-credentials are ideal for short-duration, rapid skills upgrading for mid-career workers, but are also useful for enabling the acquisition of credentials through small unbundled learning modules. This allows learners to demonstrate that not only have they received a broad education in a certain area, but that they have immediately applicable competencies. Micro-credentials can also support lifelong learning by ensuring that no matter where a person is in their career or education, they have access to frequent, flexible and low-barrier learning opportunities.



Box 2. The European Commission Micro-credential Framework

In 2019, the European Commission launched a common micro-credential framework (CMF) with its founding platform partners including FutureLearn, France Université Numérique (FUN), OpenupEd, Miríadax and EduOpen. The move was a response to demand from learners to develop new knowledge, skills and competencies from shorter, recognized and quality-assured courses, which can also be used to earn traditional university qualifications.

The CMF establishes a framework for these goals to be achieved across Europe's leading MOOC platforms and the universities within its networks. The ambition is to lay the foundations for a new international credential for universities to meet the needs of lifelong learners, globally.

Importantly, to ensure micro-credential courses are built to high-quality standards, the CMF requires that micro-credential courses be capable of earning academic credit. This requirement ensures courses must be developed within the university's national qualification framework and, in Europe, in line with the European Qualification Framework (EQF), a common European reference framework whose purpose is to make qualifications more understandable across different countries and systems. In order to qualify as a micro-credential within this framework, a course must adhere to a set of requirements, including credit hours and quality-assurance review processes. Additionally, these micro-credential courses will aim to be recognizable between different higher education institutions and thereby create an ecosystem where learners can one day take micro-credentials from within a network of universities that can be used towards a larger qualification, such as a post-graduate certificate or master's degree.

There is also wide scope for micro-credentials to offer on-ramps to formal education for people who otherwise face barriers. An example of a learner-focused, digital education micro-credential offered through continuing education is one offered by the **Humber Institute of Technology and Advanced Learning** (formerly Applied Arts and Technology). Humber is the largest public-assisted college by **student enrolment** in Ontario. It emphasizes “hands-on, career-focused learning” and offers more than 150 programs including bachelor's degrees, diplomas, certificates, post-graduate

certificates and apprenticeship programs. In January 2021, Humber launched the **Digital Fluency for the Workforce** program, developed and designed with community and industry partners. It is accessible only to individuals who are unemployed or underemployed and includes embedded employment assistance and additional wrap-around supports for newcomers, youth (ages 19 to 29), racialized people and others who need to upgrade their essential skills to re-enter or advance in the workplace. The program is the result of the identification on the part of the college and the employer partners that there is a need for cross-sectoral digital-fluency training that is flexible and responsive to learners' levels of readiness and circumstances. With funding from the Future Skills Centre, Humber will offer a set of "stackable" digital-fluency micro-credentials, to be delivered in partnership with community employment centres, providing a recognized, accessible and free alternative to meet the needs of learners and the core digital-fluency skills required by Canadian industry.

WORK-INTEGRATED, EXPERIENTIAL LEARNING

Foresight analysis has suggested that work-integrated learning (WIL) is going to become an increasingly important component of the requirements graduates will need to enter and navigate the workforce. In fact, some have predicted that "reverse internships", where interns pay an employer to offer them workforce experience, may become the norm.⁷¹

In an analysis of the 2018 National Graduates Survey, Statistics Canada researchers found that of post-secondary graduates, college graduates were the most likely (61 percent) to have participated in some form of WIL and that while WIL experiences were not, on average, correlated with a higher probability of employment, they were correlated with graduates securing a job in their field of study and with being less likely to be overqualified for their job.⁷² Further, for graduates with bachelor's degrees, WIL experience was also correlated with a seven percent jump in salary, though the difference was not as pronounced for graduates of other post-secondary types.

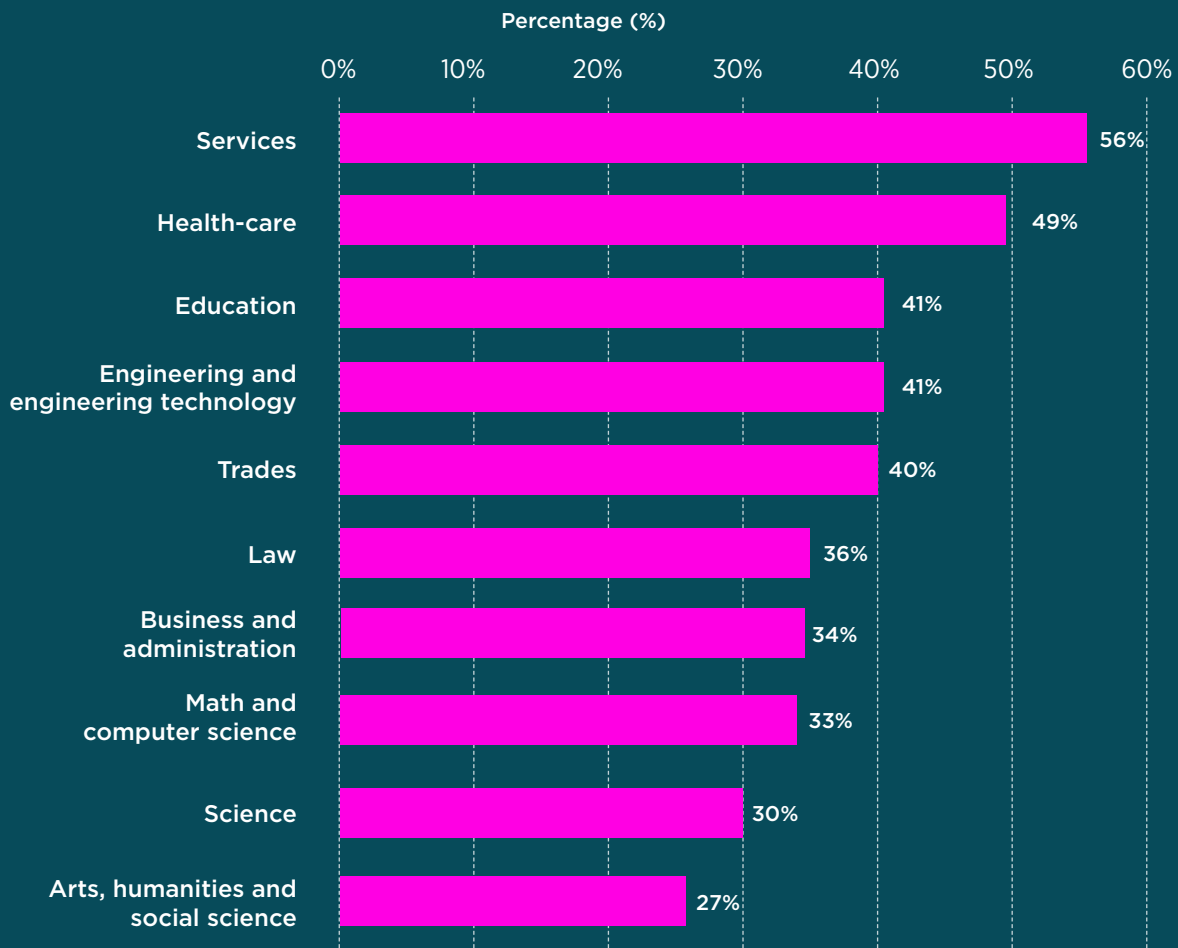
In 2017, the Government of Canada made a significant commitment to workplace-integrated learning through the launch of the **Student Work Placement Program**, a \$73-million program that facilitates PSE student participation in WIL. This program, which is being delivered by **Magnet**, offers wage subsidies of up to \$7,000 to employers who hire students, and works closely with PSE institutions across the country to recruit students into positions. At launch, this program's goal was to create 60,000 WIL positions over five years.

WIL programs that target currently under-represented groups will be critical to ensuring that the future of work is more diverse and inclusive than the present.⁷³ For example, the Advanced Digital and Professional Training (**ADaPT**) program at Ryerson University, funded by the Future Skills Centre, addresses the digital skills gap by providing intensive training for university graduates or senior students that is adjacent to, but not embedded in, formal programming. It is conducted in collaboration with employers and industry partners and includes a paid work term.

The move to remote work that has been made necessary by the arrival of COVID-19 has increased the capacity for some workplaces to conduct their business virtually - a shift that is examined in detail in **New Working Arrangements**, another report in this series. In a similar way, COVID-19 has also spurred the creation for new virtual WIL opportunities. Like work, however, not all experiential learning can be moved online, and not all instructors and institutions have been able to successfully pivot to offering online experiential learning during the first year of the pandemic. For example, in one study, it was found that the learners who were most likely to have had their WIL experience cancelled or delayed due to COVID-19 were those studying in the services field of study (hairdressing, cooking, etc.), and those second most likely were those studying in the health-care field.ⁱ These jobs and these educational degrees require the mastery of physical and technical proficiencies that have been difficult to move fully online.⁷⁴

i These results do not use standard sampling principles and may be used as an indicator, but should not be considered representative of the national population.

Figure 2: Impacts on the work placements of post-secondary students in Canada, work placement cancelled or delayed



Source: Statistics Canada. (2020). COVID-19 pandemic: Impacts on the work placements of post-secondary students in Canada.

Limitations notwithstanding, experiential education has continued during the pandemic. And in some sectors, it is likely that virtual workplaces will continue in whole or part after COVID-19 has been brought under control, meaning that a virtual internship will have offered an ideal introduction to this professional setting.

Access to **virtual international WIL** experiences co-ordinated by colleges has been another innovation, the uptake and expansion of which has been spurred by the pandemic. Students who may otherwise not have had the opportunity to build professional international networks are now able to access internships in Europe and Asia. A study showed that the geographic locations of WIL opportunities have historically presented significant challenges for would-be participants from lower socio-economic backgrounds who may find the financial costs of re-location too great,

especially in cases where the participants have dependants.⁷⁵ For these learners in particular, virtual WIL experiences may greatly expand the scope of potential opportunities, levelling the playing field across geographic location. **York University**, the **University of Toronto** and the **University of Alberta** are just some of the universities working closely with private partners to facilitate remote online WIL opportunities for their students with organizations across Canada and abroad.

While the majority of the workforce is expected to return to in-person work after the pandemic, as are the majority of WIL opportunities, in some sectors significant proportions of the workforce are expected to continue working from home. For example, 28.4 percent of the current professional, scientific and technical services sector anticipates that its entire workforce will continue working from home after the pandemic.⁷⁶ Reflecting the use of advanced technology and human-replacing devices in the agriculture, forestry, fishing and hunting sector, 26.1 percent of that sector also anticipates a total work-from-home model.⁷⁷ While jobs and internships in some sectors, such as construction and health care and social assistance, will likely return to pre-pandemic models, there are many unknowns to account for as we imagine the possibilities of virtual experiential education in the future. What is certain is that WIL is being recognized as an increasingly important tool for tightening the links between educational institutions and future employers and ensuring that graduates have the skills they need to successfully enter the workforce.

During the first year of the COVID-19 pandemic, the City of Toronto launched **a collaborative undertaking** in partnership with colleges and universities in the Greater Toronto Area to support pandemic recovery efforts. Partnering with faculty and students, the initiative provides students access to experiential learning opportunities in an applied setting. The City operates a hub that convenes faculty and learners to conduct co-ordinated and responsive research and development (R&D) activities that will be required as part of a post-COVID-19 recovery. The project is intended to help Ontario address COVID-19 by connecting private- and public-sector innovators to support local economic resilience, help with business restarts, and enable businesses to pivot and adapt through research and development partnerships.

The core of the program involves linking college and university faculty and students to specific research questions. Students work virtually on projects that are relevant to their areas of study, with faculty experts who will supervise and help guide the project. Students' contributions and involvement in this experiential learning opportunity is recognized by their earning a micro-credential. Not only does this process create new knowledge, but it features a strong "learning

by doing” component that boosts the capacity of graduates to transition into the workplace. Many of these projects have a strong diversity and inclusion angle, such as one project researching the association between socio-demographic characteristics and COVID-19 incidence and severity, with a focus on the impact of factors such as racialized identity and gender. Similarly, another project focused on digital access is investigating which communities and demographics in Toronto are currently underserved by digital infrastructure and why this is the case.⁷⁸

TARGETED TRAINING FOR SPECIAL POPULATIONS

As discussed earlier, access to education and experiential education opportunities vary across population groups. There are myriad options for educators to support different groups facing barriers, but it is important to remember that tailored approaches designed with the end user in mind are critical for the success of these programs. There is strong evidence that women, racialized people, newcomers (regardless of their education), Indigenous peoples and persons with disabilities are over-represented in low-skill, low-wage roles.^{79, 80} Moreover, evidence also suggests that COVID-19 has affected particular sectors and these low-skill, low-wage workers more than others.^{81, 82} People with lower education levels and people in industries and occupations at a high risk of automation⁸³ were already facing the threat of job disruption or loss before the pandemic as many businesses already intended to replace significant proportions of their human workforce.⁸⁴ Further, U.S. data show that while low-wage earners switch occupations frequently, they often cycle between low-wage jobs, and that people in low- to middle-wage occupations tend to move either laterally or downward.^{85, 86} Bridging people into education and skills training which increases their earning potential is critical to breaking this cycle and to promoting upward intergenerational income mobility.^{87, 88, 89}

One way to promote accessibility for particular population groups in Canada’s PSE institutions is to ensure that skills training opportunities provide wrap-around supports such as childcare, additional tutoring, career counselling and financial assistance.⁹⁰ Most PSE institutions already boast a student accessibility centre to support students with cognitive and physical disabilities, and a growing number are also investing in Indigenous support services that work to support Indigenous students through a range of wrap-around support options. These are good first steps, but there are significant opportunities to grow these interventions and the impacts they produce.

Mentorship and career counselling support can also be highly impactful and may be the lynchpin for mobility and success for many learners. There is evidence that employer mentoring can have a positive impact,^{91, 92} and while the impact may be small, the cost of running these types of interventions are typically modest.⁹³ Additionally, workplace mentorships and partnerships such

as the **Sadie Collective** and the **Black Professionals in Tech Network** (BPTN) are working to help improve the talent pipeline, connecting talented BIPOC graduates and early career workers with roles at influential finance, science and technology firms.⁹⁴

Mentorship and coaching can take place between professionals and post-secondary learners, but it can also start even earlier in secondary schools. These secondary and post-secondary links can be particularly useful ways to enhance diversity in specific professions. For example, one study linked mentors from medical school with high school students from groups under-represented in medicine and found that even two to three years after mentorship had been delivered, student participants continued on a pre-medical career path with no discernible attrition rate.⁹⁵

The pandemic has resulted in uneven results for current PSE students, and different supports are required for members of different groups. For example, more students with disabilities reported challenges adjusting to remote course delivery, and many students who previously had not expressed an accessibility need reported one for the first time due to the remote classroom setting necessitated by COVID-19.⁹⁶ Differences in access to essential infrastructure for learning have also tended to reveal divisions; for example, students with disabilities were more likely to report problems with accessing reliable internet. Furthermore, 54 percent of rural Canadians and 65 percent of those living on First Nations reserves reported being unable to access internet service that meets the standard internet strength required to conduct business and learn online.⁹⁷

Education is not equally accessible to all, but PSE institutions can have a large impact if they work with external partners, invest in hiring the right support staff and deliver on the needs of under-represented groups facing barriers to accessing and completing education.

The University of Saskatchewan's **Indigenous Student Achievement Pathways** (ISAP) program has been operating for almost 10 years, providing culturally appropriate support, career guidance, emotional support, financial advice as well as academic training and cultural activities. They aim to close the PSE attainment gap between Indigenous and non-Indigenous youth and adults, which persists due to chronic underfunding of Indigenous education, essential infrastructure and myriad other factors.^{98,99} Students in the ISAP program can enrol in first-year learning communities that, on a weekly basis, bring first-year students together with upper-year mentors, Indigenous faculty and alumni to participate in learning modules, many of which can be credited towards other certificate and degree programs.

ISAP students can also enrol in the **ISAP STEM** stream or STEM accelerator certificate that connects learners who share interests and academic goals in science, technology, engineering and maths, fields that offer many high skill jobs where Indigenous workers are under-represented.¹⁰⁰ Other learning communities such as the Medicine Wheel Learning Communities for natural and health sciences, and the Star Blanket Learning Communities for the Humanities and Social Sciences, foster a sense of belonging at the university, as Indigenous knowledge is reflected in curriculum and validated with credentials. These programs are complemented with strong connections to personalized career counselling, financial bursaries and scholarships and support with transitions – either from another institution or afterwards into the job market.



COVID-19 IMPACTS ON PSE AND TRAINING

The onset of the pandemic has meant that Canadians throughout the workforce have needed to upgrade their digital skills on the job, quickly. Businesses have needed to pivot their processes and operations, as well as their services and goods to meet changing demand.¹⁰¹ McKinsey and Company anticipate that recovering from COVID-19 will require businesses and organizations to recruit additional digital talent and accelerate digital upskilling of entire workforces.^{102, 103} These changes have not lessened the importance of competencies in other more traditional areas, and, for some roles, the introduction of technology may increase requirements for soft skills such as communication and problem-solving.¹⁰⁴ Additionally, the more widespread dispersal of technology can help facilitate improved digital skills and will also increase the value-add that only people bring to jobs, with skills such as flexibility, judgment and complex iterative learning.¹⁰⁵

COVID-19 has also accelerated the trend towards PSE institutions offering online and blended learning, though online learning presents challenges to work-integrated learning options. In 2020, over one-third (35 percent) of students had a work placement cancelled or delayed as a result of the COVID-19 pandemic.^{106, 107} “Learning by doing” while in education is a trend that will only accelerate in response to rapid changes in the workplace, such as a switch to having to deliver services over software, to ensure that graduates can meet employers’ evolving skills needs.

Demand from international students has already fallen in 2020, and they are important sources of revenue for PSE institutions: international students made up 14.7 percent of total enrolments in universities in 2017/2018,¹⁰⁸ and almost one third of mathematics, computer and information

sciences enrolments while one fifth of medical residents were international students in 2018.¹⁰⁹ International students are also an important source of skilled workers in Canada, with 20 to 27 percent of international students becoming permanent residents in the 10 years following the receipt of their first study permit.¹¹⁰ International student migration is particularly important in smaller urban centres where high-quality PSE institutions play an outsize role in attracting this much needed migration.¹¹¹ While international student enrolment is expected to recover, increasingly fully online course offerings will compete in a global marketplace that will likely take a bite out of enrolments in lower tier in-person PSE offerings. It could be that blended and fully in-person models of course delivery will continue to draw international students, but the long-term impact of COVID-19 on international enrolment levels is unknown. Even before COVID-19, there was a paucity of research on best practices in retaining international students as permanent immigrants, and after the pandemic, there will be an even greater need to understand pathways from international migration for education to entry into the Canadian immigration system.¹¹²

Relatedly, PSE institutions that who have traditionally relied heavily on international students as a source of revenue were hit particularly hard by COVID-19 as international enrolment levels dropped. As PSE institutions reflect on their financial and business plans, these unknowns about the future of international student enrolment will have an impact across the board. In order for PSE institutions to stay relevant and financially solvent, there is a need for these institutions to work together, and with appropriate partners, to develop resilient and innovative financing strategies and business models.¹¹³ The need for public and private investments in PSE is not abating and the strength and ingenuity of these relationships will be critical to the long-term viability of any given institution.

Universities, colleges and polytechnics are at their heart innovative institutions, reading signals from government and the labour market to find new growth opportunities and prepare graduates with the skills they will need to thrive in the workforce. Canadians are some of the most educated people in the OECD with 63 percent of 25- to 34-year-olds holding a post-secondary credential.¹¹⁴ While COVID-19 has accelerated the rate of change, all of the trends discussed above had already begun before the pandemic. The intensity of demand for certain innovations to services and program delivery may drop post-pandemic, but many of the pandemic-induced changes will retain value to learners across the country and become entrenched in the culture and activities of Canada's PSE sector.

RECOMMENDATIONS

The themes and examples included in this report provide illustrations of learner-centred and responsive program innovations, some of which were born outside of traditional PSE program approvals and funding processes. These innovations illustrate how universities, colleges and polytechnics are finding ways to circumvent traditional vehicles for new program development. However, workarounds are not sustainable if they are not part of the funding and credentials system. The key to sustainable change is finding ways to embed flexibility and responsiveness into the development of curricula to meet external demands as they arise. Innovation in this area requires flexibility.

The ways in which institutions needed to adapt to the circumstances of COVID-19 were largely unanticipated. While it is impossible to forecast what the next crisis will be, or where the next impetus for change will come from, institutions can learn from this experience and develop more sustained approaches to how they can embed the principles of flexibility and responsiveness into curricular development and credentialing to ensure they can meet the changing needs of learners as they arise.

What these innovations also represent is a relatively recent sea-change in the way teaching and learning methods have evolved, producing fundamentally new pedagogies and program-delivery models. They capture novel ways for PSE institutions to connect with and respond to the needs of the labour market, their communities and their learners – all underlined by a common emphasis on learning by doing.



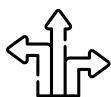
The following policy considerations are necessary if we are to continue to support this kind of innovative program development in the PSE sector in the years to come.



1. Governments must consider the match between institution type and response to an external labour-market need: In times of pressure — when labour market skills are swiftly changing and COVID-19 is simultaneously altering the way we work and creating significant stress for frontline workers — it is tempting to seek out a singular prescription, or a magic bullet, for what ails. However, what are our expectations of the shape and nature of the responsiveness of PSE institutions in their different forms? Which institutions are best poised to respond and in what way? Problems must be properly identified and scoped, and this initial evaluation must be followed by an assessment of which PSE institution types might be best placed to contribute by way of mission, current activity and core business.



2. Fund appropriately: Funding levers must be supportive of innovation and rapid response. The notion of levers is important here, as we are not necessarily arguing for an increase in funding (although a discussion of funding levels is warranted, albeit in another forum). Many of the examples of innovation highlighted in this report fall outside of the conventional ways PSE institutions are funded to deliver curriculum. In fact, the way that funding is currently tied to delivery mechanisms and student enrolment for on-grant programs within institutions can make it difficult to pivot and innovate. Institutions looking for ways to respond quickly to emerging learner needs, labour market changes and additional pressures such as COVID-19 will be inventive and find workarounds in the moment. But if new and emerging delivery mechanisms cannot be fully funded over time, they have less chance of scaling and sustaining high quality over the long term.

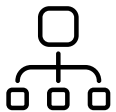


3. Support flexibility: Innovation requires flexibility and PSE institutions are often constrained by their infrastructures, especially those that are funded and regulated by government. For instance, in the college sector, shorter semesters and flexibility for students in terms of when they can start and stop their studies is key to being responsive to the labour market and accommodating working learners. During COVID-19 when frontline workers needed to quickly upskill, this was particularly important. But this kind of flexibility is difficult outside of moments of acute crisis given current regulatory frameworks. Colleges and polytechnics are finding workarounds with continuing education and micro-credentials, but these approaches

need to be embedded in funding and credentialing systems to be sustainable. While we cannot plan for what might disrupt our lives next, we can build greater resilience by allowing institutions the flexibility they need to be able to be responsive when required.



4. Assess quality: Innovative ideas need to be tested and this takes time, which creates tension when there is a need for speedy responses to external pressures. However, there are ways to assess quality within institutional structures and government policy directives that do not require three-year government-led assessment processes. For instance, working with high-quality, full-time faculty; assessing student skills and competencies with validated assessment tools; allowing for — and funding — different content delivery mechanisms through shorter structural reviews rather than full curriculum content reviews; tying funding, or a portion thereof, to evaluation and assessment of impact. In short, funding decisions should be driven by data on what works, rather than box checking exercises. PSE institutions are mandated to deliver high quality research and teaching, and they need governments to find innovative ways of supporting this mandate that do not create unnecessary red tape and bureaucracy.



5. Develop and use competency frameworks: Related to the need to assess quality, there is a need for stakeholders to agree upon a language and taxonomy of skills that are necessary for graduates to use in the workforce. There is often a mismatch between the skills employers need in the workforce and the skills they advertise for and seek out during recruitment. There is also a gap between the skills that PSE institutions believe students need and/or acquire while in education and the skills students have upon graduation. A common taxonomy and language for advanced workplace skills that is vetted by all stakeholders is important to direct PSE instructors' energies in the classrooms as well as to help students define the skills they have and need to successfully transition into work.¹¹⁵ Micro-credentials are a very promising resource to this end, because they are, by definition, developed in collaboration with all stakeholders and should reflect skills needs that are present in real time.¹¹⁶ This development and vetting process could be expanded into a larger framework for assessing new curriculum at all levels, which could register buy-in from all stakeholders and into which micro-credentials as well as traditional credentials could be integrated.

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