

# The Future of Work and Learning

In the Age of the 4th Industrial Revolution

Canadian Edition

Developed in Partnership with  
Colleges and Institutes Canada (CICAN)



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# Executive Summary

**The Fourth Industrial Revolution is here, and it is changing everything.**

The Third Industrial Revolution (aka the digital revolution) is defined by electronics and IT, automated production, and advanced globalization. It has changed how individuals interact with each other, commerce, and whole communities. However, the changes we are beginning to see, and where we are heading as a result of the Fourth Industrial Revolution, are still hard to imagine and extremely challenging to address. With the convergence of disruptive technologies, including nanotechnology, artificial intelligence, robotics, genetics, and 3D printing, the exponential shift that the Fourth Industrial Revolution brings is altering almost every industry in the world. No part of society will be left untouched, including the education and workforce development sector's role in preparing people for the future of work in this new world.

The future of work and learning—and how these interact—permeate all aspects of society. However, the current system of education and workforce development, including skills training, is lagging behind the innovations of the 21st century to date and, without intervention, will continue to lag behind the rate of innovation in the future. While some education institutions, and individual programs within institutions, are adapting in response to workforce changes, the sector more broadly remains far too unresponsive to the shifting needs of students and workers. Issues such as affordability of postsecondary education and the misalignment between education and labor market needs also continue to persist. According to the World Economic Forum's Future of Jobs Report, by 2020 more than a third of the desired core skill sets of most occupations will be comprised of skills that are not yet considered

crucial to that job today.<sup>1</sup> Although this need for a paradigm shift in learning may seem apparent to many, competing viewpoints and siloed approaches to solutions has led too often to isolated pockets of innovation; not the system-wide transformation required for success.

This paper will highlight the changing nature of work and how societies must embrace new or hybrid learning models to allow individuals and economies to thrive going forward. Without a fundamental transformation in how we think about lifelong learning and skill development, individuals, communities, and whole economies will be left behind.

The research for this white paper has come from a meta-analysis of academic sources, discussions with leaders from across the learning spectrum at the D2L Executive Summit in 2016 and 2017, from D2L's nineteen years working with educators, academic institutions, researchers, students, technologists, and companies all dedicated to learning, and from Colleges and Institutes Canada's feedback and experience. This paper seeks to further the debate of the evolution of learning in the 21st century and how we can break down barriers and transform learning so that everyone can succeed and economies are best positioned to prosper.

Preparing for work is not the only purpose of education, but it is nonetheless a topic policymakers, educators, academics, companies, and individuals all have a stake in. Given the dramatic shifts currently taking place, we would argue it is one of the biggest challenges and opportunities of our time.



# The Changing Nature of Work

To understand where we are going, we first need to understand some of the major trends impacting the world of work.

## AUTOMATION AND AI

*How it will change what we need to know to thrive in the 21st century economy.*

According to the World Economic Forum, 65 percent of today's school children will graduate into jobs that do not yet exist.<sup>ii</sup> A conservative estimate by researchers forecasts that the Canadian economy may potentially decrease by over 1.6 million jobs within the next 10 to 20 years due to the effects of automation.<sup>iii</sup> A recent RBC report, "Humans Wanted, How Canadian youth can thrive in the age of disruption", claims that up to 50 percent of jobs could be disrupted by automation and new technologies in the next 10 years.<sup>iv</sup> This represents a multi-faceted challenge—training youth accordingly and retraining older workers. While the percentage of jobs that may be fully automated is debated, the fact remains the same: AI and automation will have a profound impact on the future of work.<sup>v</sup>

Throughout history, physical work tasks done by humans have regularly been replaced by machines as technology has evolved. With rapid advances in AI however, this is increasingly taking place not just in the physical space but in the cognitive realm.

The advances in automation in the 21st century will increasingly occur in areas of cognitive efforts not seen in the rote, mechanical aspects of 20th century automation.<sup>vi</sup> In other words, these will not just be low-skilled jobs often associated with automation. Real estate brokers, paralegals, accountants, and auditors' roles, in part or in full, could all be automated. Harnessing the potential of automation can help grow the economy; it has been reported that automation contributes between 0.9 percent and 1.5 percent to overall GDP growth.<sup>vii</sup> The World Economic Forum suggests that, "As entire industries adjust, most occupations are undergoing a fundamental transformation. While some jobs are

### Example 1

In 2017, the Canadian federal government unveiled its \$125 million Pan-Canadian Artificial Intelligence Strategy. Led by the Canadian Institute for Advanced Research (CIFAR), this country-wide strategy seeks to enhance Canada's profile in the realm of AI research and benefit the Canadian economy through the commercialization of AI innovations.<sup>xii</sup>

### Example 2

The rise of automation affects all types of jobs; not just low-skilled occupations. Deloitte reports that over 56 percent of functions within the UK financial world could be automated and similarly over 100,000 legal jobs in the UK could be automated within the next 20 years.<sup>ix</sup> ROSS Intelligence, a Canadian start-up, is working to eliminate the rote work involved in law practices. Services like ROSS Intelligence are cost saving measures that can increase productivity but will replace tasks more commonly associated with middle class jobs.

### Example 3

In the U.S., a late 2016 report from the Obama Administration indicated that up to 3.1 million U.S. drivers working today could have their jobs automated by autonomous vehicles. This includes truck drivers as well as Uber and delivery drivers.<sup>x</sup>

Change is happening quickly. Towards the end of 2017, the U.S. company Tesla launched their first electric transport truck, with an auto-pilot mode, and support for platooning multiple vehicles together on the highway.<sup>xi</sup>



threatened by redundancy and others grow rapidly, existing jobs are also going through a change in the skill sets required to do them.”<sup>viii</sup>

These changes are happening faster than most of us realize. We will all feel the impact in some way. Exacerbating the pace of change is that, on mass, skills development by workers is not keeping pace. The sheer number of soft and technical skills already required by most modern companies is exploding. At the same time, the technical skills employees do have are becoming outdated more quickly. We have crossed well over a threshold where the timing of obsolescence for skills is far shorter than the careers of most people.

The implications for the “middle class,” who have largely shifted from manufacturing-economy to knowledge-economy jobs in recent years, are especially significant. High and low skilled jobs have seen an uptick in the distribution of available jobs but the proportion of middle skilled jobs have decreased on average by seven percent across OECD countries within 20 years.<sup>xiii</sup> This hollowing out of traditionally middle-class jobs is a global phenomenon that will only be exacerbated by AI and automation.<sup>xiv</sup> Employment in both high and low skilled jobs in the Canadian labour market increased from 1987 to 2015 (91 percent and 78 percent respectively) but work involving routine tasks like traditional middle-class jobs only grew by 27 percent.<sup>xv</sup> The Ontario economy alone shed nearly 70,000 jobs from 2001 to 2015 within the traditional middle-class job category.<sup>xvi</sup> Either we adapt or watch as many of the traditional middle-class jobs—both physical labour and now cognitive skills—are automated in part or in full.

## SUMMARY

1. The Fourth Industrial Revolution is putting cognitive jobs at risk, in part or in full, due to automation and the rise of AI and other technological advancements.
2. As job functions evolve in this new paradigm, skill sets are relevant for shorter and shorter periods of time.
3. The increase in AI and automation requires ongoing upskilling and reskilling in order to move humans up the value chain.

## QUESTIONS FOR CONSIDERATION

- Can we adapt to the increased automation and do so fast enough?
- Will new types of jobs be created to match the rate of loss to automation?
- How do we prepare students and employees prepare jobs we do not yet know will exist and the constantly fluctuating demand for skills?

## THE GIG ECONOMY: AN EMERGING SKILLS MARKET

*How it affects the future of the workforce and forces us to rethink upskilling and reskilling.*

The labour force and how it interacts with the world has changed. This is no better evidenced than by the shift from traditional employment to the on-demand employment of the ‘gig economy.’

89 percent of jobs created in Canada between October 2015 to 2016 were under the category of part-time jobs.<sup>xvii</sup> A 2013 report on precarious work noted that 20 percent of people within the Greater Toronto-Hamilton Area were employed in precarious positions and another 20 percent were employed in jobs that were similar to those found in precarious work.<sup>xviii</sup> Over 20 percent of the Canadian labour force is either self-employed (1.9 million) or within the temporary employee category (2.3 million).<sup>xix</sup> In both the U.S. and Europe, there are an estimated 162 million people participating within the gig economy; roughly correlating to 20 to 30 percent of the working population.<sup>xx</sup> The international gig economy is currently growing at approximately 14 percent annually.<sup>xxi</sup> If the trend in job growth continues to skew towards gig-type jobs, a large portion of the workforce could essentially become self-employed.

This shift represents an opportunity for many workers, but the flexibility also comes at a price. Where the traditional employment structure has provided workers with a degree of certainty, opportunity, and protections, those within the gig economy framework are generally on their own. Seen as independent contractors, gig workers have less social protection in the form of rights and benefits, are responsible for their own training and skills development, face weaker or less obvious career advancement opportunities, and are struck with greater insecurity about their financial positions. With skills being their most marketable commodity in a highly competitive marketplace, gig economy workers will find it essential to adapt quickly and continually enhance their skillsets to meet the needs of the labour market on an ongoing basis.

The **gig economy** refers to the shift away from traditional employment where workers are full-time employees of one employer to an economy where people are freelancers—working on contracts for multiple employers. The terms ‘platform economy’ or ‘on-demand economy’ are also widely used in some jurisdictions.

### SUMMARY

As the gig economy grows, ongoing, lifelong upskilling and reskilling will be essential for the gig worker to continue to have marketable skills and see a pathway for professional growth.

### QUESTIONS FOR CONSIDERATION

- What skills do students need to develop to be more resilient to changes in the workforce?
- How can ongoing skills development be more flexible, accessible and relevant?





### **DEMOGRAPHIC SHIFTS IN THE LABOUR FORCE: MILLENNIALS, AN AGING POPULATION, AND VULNERABLE POPULATIONS**

Along with a rise in self-directed, gig-economy work, a dramatic change in the socio-demographic makeup of the labour force in many countries is causing a major experience and skills gap. As the “baby boomer” generation (individuals born between 1946–1964) is at retirement age, the workforce is now primarily populated by the youngest generation with the least experience. Over 35 percent of the Canadian workforce is now considered part of the “millennial” generation (individuals born between 1980 and early 2000).<sup>xxii</sup>

For a variety of reasons, many older employees are working longer past the traditional retirement age. This is resulting in longer working careers; exacerbating the problem of quickening skills obsolescence.

Such a wide age range of employees creates challenges for employers to address both the lack of skills in the younger workforce and the increasingly outdated skills of their existing workforce. Millennial workers tend to be more transient—58 percent admit they expect to leave their job after three years or less.<sup>xxiii</sup> Given that it often takes three to five years to bring a professional to full productivity, this paradigm shift poses a serious risk for employers.<sup>xxiv</sup> One way to retain Millennial workers is by offering professional development programs. Millennials look for opportunities for growth in their professional life, but training courses can potentially be a cost prohibitive measure for employers.

Likewise, devoting resources to building training and professional development programs for older workers who are close to retirement is a difficult investment for employers.

The education sector, the private sector, and governments all have a role to play in addressing this shift. The education and workforce development system must adapt to serve the growing needs of a transient workforce that will be increasingly responsible for their own training and professional development. Employers also have some responsibility in education and training. They need to play a meaningful role with the education sector in designing and building the programs that will serve their needs if they seek to turn temporary workers into long-term employees and upskill as well as reskill their existing workforce. Not engaging in this process brings another significant, non-monetary cost to business—loss of continuity and institutional knowledge.

Governments also have a stake and role to play by ensuring workforce development programs are supporting working learners; especially individuals in vulnerable positions. The fastest growing youth population in Canada are Indigenous peoples.<sup>xxv</sup> This population will play a key role given shifting demographics and they will require access to local, culturally relevant, and tailored education in order to find employment and contribute to Canada's economy. In this new world of work, it will not suffice to wait to reskill people only after their jobs, or industries, have become obsolete.



## SUMMARY

1. Millennials are job transient. Building institutional knowledge and job loyalty is becoming increasingly difficult for employers.
2. Employees are working longer. Coupled with skills becoming obsolete more quickly, neither employers nor employees can expect skills to stay relevant throughout careers.
3. Building a modern learning organization provides a strategic advantage in the ability to attract, retain and develop top talent, and outperform the competition in this new skills race.

## QUESTIONS FOR CONSIDERATION

- How should employers manage cultural/skill gaps in an aging workforce, while preparing for and engaging increasingly transient young workers?
- If individuals are working longer in a fast-changing skill environment, can employers expect “ready-made” graduates prepared for 40 years of work?
- What role should employers and the private sector play in ongoing workforce development?
- How can governments shift workforce development programs to support upskilling and reskilling of vulnerable workers?

Each of the above shifts have only been explored on the surface. They have, and will continue to, significantly alter the labour market, requiring policy makers and practitioners to rethink education and skills development to prepare workers for the jobs of tomorrow and the constantly fluctuating demand for skills.

# Challenges with the Current State: The Value, The Skills Gap Problem & The Risk of Not Adapting

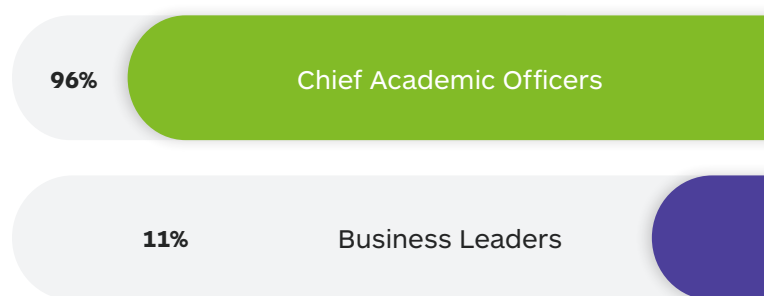
The current system of education and skill development is not accessible nor affordable for many and is not producing the right skills to meet labour market demand. As a result, employers are facing challenges in filling jobs and the impact on economic competitiveness is significant.

## THE VALUE OF CREDENTIALS

The goal of obtaining a postsecondary credential for many students is to provide them with the necessary tools to thrive in the labour market. However, a 2013 McKinsey & Company study of youth, education providers, and employers in nine countries showed that while 72 percent of higher education institutions believe they prepare their students well for the workforce, half of students are not sure if their credentials improve their opportunities at finding a job.<sup>xxvi</sup> This disconnect can also be seen in the private sector where only 11 percent of business leaders 'strongly agree' that students have the vital skills for the labour market, compared to 96 percent of chief academic officers who believed their institutions were either somewhat or very effective at providing the necessary skills to students.<sup>xxvii</sup> While a post-secondary diploma/degree is still proven to be a career asset, the current level of disconnect between what employers want versus what is being taught must be addressed.

"Value" can also be considered in monetary terms. The average tuition in an undergraduate program in Canada during the 2006–2007 school year was \$4,400; within 10 years the average cost of tuition jumped to \$6,373.<sup>xxviii</sup> Taking inflation into account, that is a real rise in cost of roughly \$1,196, or an 18 percent increase in tuition fees.<sup>xxix</sup> Increasing tuition fees are not exclusive to Canada. In the U.S., the average tuition has quadrupled in the past 35 years.<sup>xxx</sup> U.S. public universities had an average

## Do Students Have the Necessary Skills to Thrive in the Workforce?



Source: Michelle R. Weise. "Got Skills? Why Online Competency-Based Education is the Disruptive Innovation for Higher Education," Educause, last updated November 10, 2014. <http://bit.ly/2DbgNJC>

in-state tuition rate of \$9,650 USD (12,320 CAN) per year in 2016 which quickly rises to \$20,090 USD (\$25,648 CAN) when room and board charges are included.<sup>xxxi</sup> Concerns about covering operating costs led the University of Witwatersrand in South Africa to propose a 10.5 percent fee increase in 2015 only to have to scrap it after student protests.<sup>xxxii</sup> In Europe, England outpaces the U.S. with an average annual tuition cost of £9,188 (\$16,409 CAN).<sup>xxxiii</sup> Other European nations charge smaller fees but still struggle with ensuring operating costs are covered as the cost of delivery grows.

As tuition fees and student debt increase, students who want to learn and attend post-secondary education have had mixed experiences in translating



their credentials into earning power. In the U.S., the average earnings for an individual with a bachelor's degree fell 14.7 percent between 2000 and 2012.<sup>xxxiv</sup> Within the Canadian context however, the Education Policy Research Initiative found that on average those with a postsecondary diploma/degree saw an increase in their mean annual earnings by 59 percent and 66 percent eight years after obtaining their credential (college/institute diploma or bachelor's degree, respectively).<sup>xxxv</sup> Empirical evidence has shown that a post-secondary credential is valuable, but whether that value persists in the face of a shifting paradigm on work remains to be seen.

## SUMMARY

1. Knowledge is becoming more accessible, post-secondary credentials are becoming increasingly required but less affordable, and their relevance lasts for shorter periods of time
2. Skills developed in post-secondary programs must increasingly align to labour market needs

## QUESTIONS FOR CONSIDERATION

- How can we increase the value proposition of higher education by making it more affordable, accessible and relevant?

## Rise in The Average Cost of Tuition

2006/07

\$ 4,400

2016/17

\$6,373

Source: Statistic Canada. "Tuition Fees for Undergraduate Degree Program, 2016/2017," Accessed July 10th, 2018. <https://www150.statcan.gc.ca/n1/daily-quotidien/160907/dq160907a-eng.htm>

## THE SKILLS GAP

As the cost of a postsecondary credential has risen, its real value in the workplace is increasingly questioned as employers report having trouble finding qualified candidates for open positions. This can be linked partly to a mismatch in credentials being earned versus those being sought after by employers, as well as outdated skills being taught for sought-after credentials. This skills gap has affected more than a third of international companies.<sup>xxxvi</sup>

Highly skilled workers are needed to grow the Canadian economy. 71 percent of jobs in Canada from 2009 to 2014 were generated by the private sector in highly skilled work.<sup>xxxvii</sup> While these sectors require very technical skills, soft skills such as critical thinking and emotional intelligence are also in high demand.<sup>xxxviii</sup>

In the next few years, the skills challenges presented by various studies are clear:

- 46 percent of Canadians are engaged in some sort of job related training but highly skilled workers are five times more likely to participate in upskilling than lower skilled individuals.<sup>xxxix</sup>
- Approximately 15 percent of Canadian adults state they are underqualified for their current occupation.<sup>xi</sup>
- The Conference Board of Canada reports that 55 percent of Canadian adults do not possess proficient numeracy skills.<sup>xli</sup>
- By 2020, more than a third of the desired core skill sets will be comprised of skills that are not yet considered crucial.<sup>xlii</sup>
- 65 percent of children entering kindergarten in 2020 will end up in jobs that currently do not exist.<sup>xliii</sup>
- With such a rapid production of information, nearly 50 percent of the subject knowledge studied in the first year of a four-year technical degree will be outdated by the time the individual graduates.<sup>xliv</sup>
- 65 percent of all jobs will require training after high school or a post-secondary degree.<sup>xlv</sup>

At the same time, we are seeing pockets of innovation and an evolution of more traditional education models to address skills gap challenges by recognizing prior learning, identifying gaps, and helping transition individuals from roles that are in decline to those that are growing. Lethbridge College's wind turbine technician training is helping laid-off workers from Alberta's oil and gas sector find new applications for their skills.<sup>xlvi</sup> McDonalds is collaborating with colleges in Ontario and BC to have their on-the-job training be recognized for academic credentials.<sup>xlvii</sup>

## SUMMARY

1. Employers increasingly feel graduates do not have the skills required for the labour market.
2. A constantly fluctuating skills market means employee skills are becoming outdated more rapidly and require ongoing training and development.

## QUESTIONS FOR CONSIDERATION

- How can individuals gain the right skills at the right time, and on an ongoing basis to meet labour market demands?
- What barriers exist for schools to access labour market information to inform program development?

## BUILDING A COMPETITIVE WORKFORCE

The necessity for change in education is not just a domestic issue. To remain competitive in today's global environment, Canada must continue to produce and retain students with the right skills for today's knowledge-based economy and develop systems to retrain individuals in full or in part as skills become obsolete. In 2015, 55 percent of the working population in Canada possessed a post-secondary credential.<sup>xlviii</sup> The attainment rate of younger workers is even higher, and continues to grow, with an average of 59 percent for 25-34-year-olds; making Canada one of the most highly educated populations in the world.<sup>xlix</sup> Compared to other OECD countries, this is impressive. However, in OECD countries, the percentage of 25-64-year-olds earning a post-secondary credential has nearly doubled since 1995 from 20 percent to 36 percent.<sup>l</sup>

While we are seeing an increase globally in post-secondary attainment, and the employment rate of

those with tertiary degrees on average is around 84 percent, the skills associated with having a good quality job are drastically changing internationally.<sup>ii</sup> In order for Canada to remain at the top, we must continue to focus on post-secondary attainment rates, but also look to new models of learning that allow individuals to continuously upskill; shifting the focus to retaining the talent in Canada.

The Federal Government's Budget 2017 recognized that women represent 51% of Canada's population, yet occupies only 47% of the workforce.<sup>iii</sup> While the issue of equal pay is still contentious, there are positive trends indicating that more women are increasing their earnings. Between 2005 to 2015, Ontario women's employment income rose by 4.6 percent.<sup>iiii</sup> We know that when women are given opportunities to succeed, economies thrive. Inclusive design of education and training systems and programs are critical factors to ensuring equal opportunity. This is specifically crucial when it comes to addressing the shortage of women entering and completing traditionally male-dominated fields including STEM fields and the trades. Programs such as Conestoga College's Women in Trades initiative offers gender-specific programming and opportunities for mentorship.<sup>iv</sup> In 2016, Canadore College established the Aboriginal Women in the Trades program to provide Indigenous women a pathway for skill development within the trades. The 12-week certificate program has been a success with a 100 percent completion rate since its inception.<sup>iv</sup>

Technology can be part of the solution to break down socio-economic, geographic, gender, or circumstantial factors that limit access to education and training opportunities. Distance and blended learning allows students to attend institutions with limited or no travel requirements. Computer adaptive assessments help students pinpoint learning concepts they struggle with to provide targeted interventions and prevent students from falling behind or dropping out. Prior learning assessment and outcomes-focused models of education can recognize learning outside of the classroom and help individuals progress through a program at a pace that meets their personalized needs.

## EDUCATIONAL INVESTMENT & GDP

Research suggests that an increase in 50 points on an average PISA (Programme for International Student Assessment) score results to 1 percentage point more economic growth in the long term.

Countries that invest in educational attainment and quality, whether at the K-12 level or in higher education, see higher returns in economic growth.

Source: Ludger Woessman. "The Economic Case for Education," European Expert Network on Economics of Education (EENEE) Analytical Report No. 20, Prepared for the European Commission, December 2014, 6

## SUMMARY

1. Development of human capital is essential for countries to be competitive in the global, knowledge-based economy.
2. Jurisdictions that emphasize and invest in lifelong education and training outpace those that do not.

## QUESTIONS FOR CONSIDERATION

- Are we making the necessary investments in education to ensure access for all students without incurring unreasonable debts?
- How can we reduce non-financial barriers to higher education access for students?
- How can we ensure individuals are gaining the right skills at the right time on ongoing basis to meet labour market demands?

# How Education and Skills Development Need to Shift

Over the last few generations, as skills have grown more complicated, we have seen a steady increase in the amount of time people have spent in school and preparing for the workforce. However, when in-demand skill sets are evolving at such a rapid pace and increasing in complexity all while their relevant lifespan is decreasing, it is no longer likely that the traditional pattern of attending school for 20 years then working for 40 can continue to be the norm for most jobs and professions. A lifelong approach to learning is quickly becoming the rule rather than the exception.

Education institutions, including non-traditional education and training providers, all have a role to play in developing a lifelong pathway for learners. The new technologies that are disrupting the workforce and demanding new skill sets can also be leveraged to provide new models of learning and new experiences that can increase access and efficacy.

Primary and secondary schools also play a critical role in preparing students with the soft skills necessary to create the foundation for lifelong learning, such as critical thinking, problem solving, and teamwork. This report however, focuses on the role of postsecondary education and the workforce development system.

## **POST-TRADITIONAL STUDENTS ARE THE NEW NORMAL**

Higher education was established to serve a particular student type—straight out of secondary school, studying full-time, and residing on or near campus.

47% of all Canadian college and institute students have already attended a post-secondary institution and 34% already hold one degree or diploma. 15% have a university degree - more may have attended but not completed a degree.

Source: Colleges and Institutes Canada. "Reskilling and upskilling for the changing nature of work". Accessed October 26th, 2018. <https://www.collegesinstitutes.ca/news-centre/perspective/perspectives-october-1/>

In 2010, 60 percent of part-time students and 13 percent of full-time undergraduate students in Canada fit into the post-traditional student mold.<sup>lvi</sup> The OECD reports that in 2013, 51 percent of adults over the age of 24 participated in adult education; formalized or otherwise.<sup>lvii</sup> Job market forecasts over the next decade note that roughly two-thirds of new job opportunities will arise in occupations that have historically required a post-secondary education.<sup>lviii</sup> As the notion of lifelong learning and upskilling becomes more prevalent, post-secondary institutions around the world will see a rise in mature students.

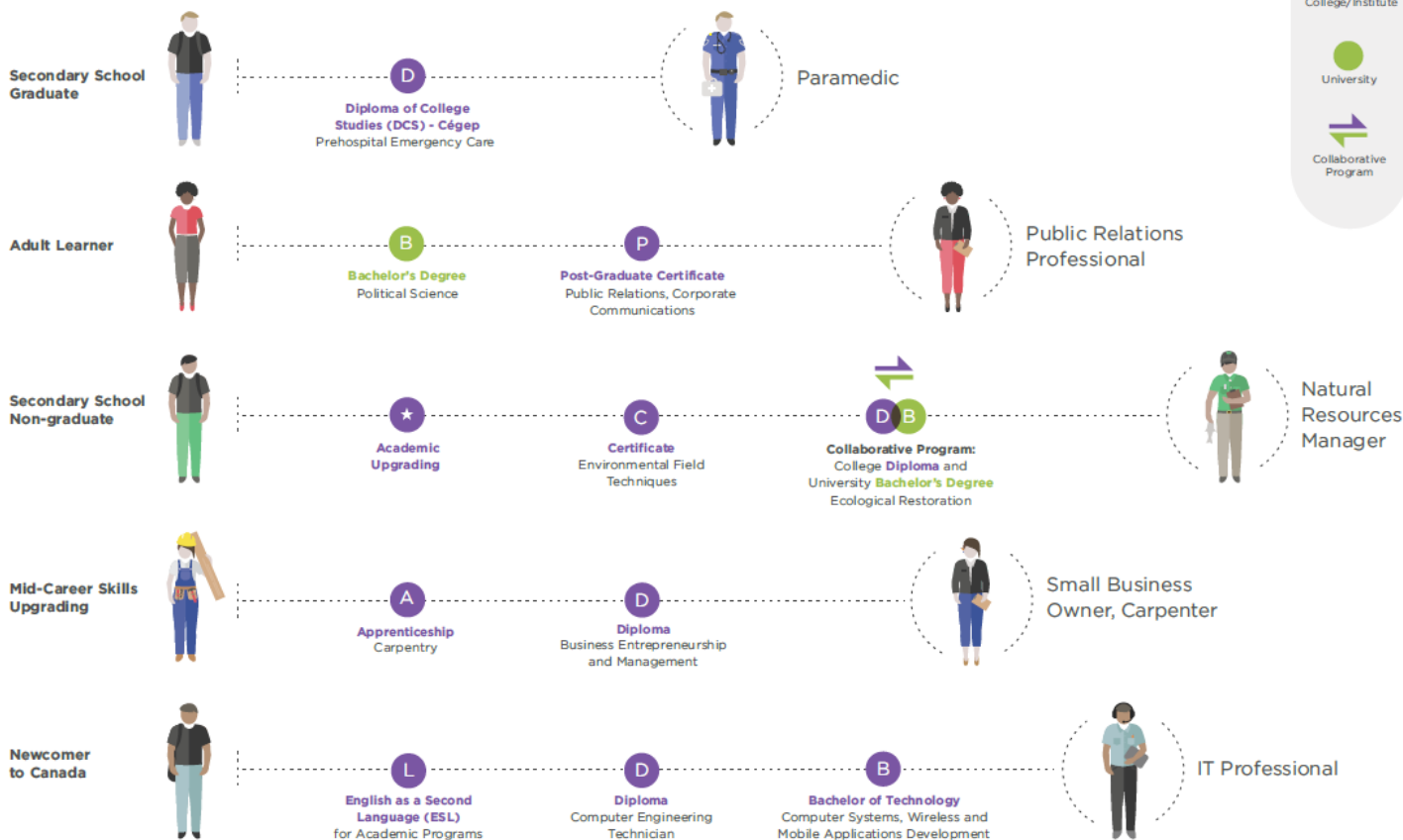
Meeting the needs of these students requires rethinking the traditional program model. Part-time, working students are not necessarily able to sit in a classroom every Tuesday and Thursday for two hours in mid-morning for a semester.

# Post-Secondary Pathways in Canada

## the Role of Colleges and Institutes

Canadians have access to many different pathways to achieve their education and career goals thanks to a variety of widely recognized credentials (degrees, diplomas, and certificates) and flexible points of entry. In addition, thousands of **articulation agreements** between colleges, institutes, and universities **facilitate transferability** between post-secondary institutions.

Examples of different post-secondary pathways include:



[collegesinstitutes.ca/pathways](http://collegesinstitutes.ca/pathways)

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Those same students may also be seeking to learn a particular skill rather than earn a full degree—a four or even two-year program may not be the right fit for them.

Similarly, students with existing skills from their careers or previous study should be able to apply such pre-existing knowledge towards their credential, through prior learning assessment and recognition (PLAR). We are seeing institutions across Canada take new and innovative approaches to expanding the application and definition of PLAR, for example at BCIT's SITE Centre. Such policies can work to make postsecondary education more accessible and appealing to the broader population.

The BCIT SITE Centre of Excellence undertakes prior learning related research and assessment activities which result in advanced placement education options for British Columbians.

Source: "BCIT SITE Centre of Excellence". BCIT. Accessed October 19th, 2018 <https://www.bcit.ca/business/site/>





### **BUILD THE VALUE PROPOSITION**

Higher education must redefine its value proposition for students and employers. The “value” to date has largely relied on the premise that earning a degree is enough to secure a good job. In a world where having a postsecondary credential is no longer exceptional, such a generalized value proposition is out of date. Yet despite the growing ubiquity of the postsecondary credential, the skills gap continues to persist.

Increasingly, programs and credentials must be developed with the needs of the labour market in mind; building upon both the skills sought by employers in the moment and the soft skills that will endure and transcend jobs. The ability for programs to regularly and rapidly revise curriculum and instructional materials based on changes to a given industry or occupation’s required skill set is critical to justify the cost and time commitment for students and workers. Canadian colleges and institutes across the country regularly make use of program advisory committees. These committees are comprised of local employers helping to define the requirements to ensure programs are alive and constantly evolving.

An opportunity exists today for higher education to rethink, with input from employers, the skills components of academic credentials in given career fields. For example, an aspiring mobile app developer pursuing a computer programming diploma/degree

could be required to learn marketing and design skills in addition to the programming knowledge. This kind of “mixed skillset” credential or customized program, would be far more valuable for both the student and potential employers. One example of this hybridized skillset can be seen in the Business Technology Management (BTM) degrees found in 19 post-secondary institutions across Canada.<sup>lix</sup> Developed to meet the needs of ICT graduates who did not possess the business skills sought by companies, the BTM curriculum standards were developed by industry partners, academic institutions, and feedback from the Information Technology Association of Canada (ITAC). This collaborative

### **OUTCOMES-BASED OR COMPETENCY-BASED EDUCATION**

The Higher Education Quality Council of Ontario defines competency-based education as “a model that focuses on the knowledge and abilities students demonstrate, regardless of the amount of time they spend in a classroom”.

Source: Jackie Pichette and Elyse K. Watkins. “Competency-based Education: Driving the Skills-measurement Agenda,” Higher Education Quality Council of Ontario, October 19th, 2018. <http://www.heqco.ca/en-ca/Research/ResPub/Pages/Competency-based-Education-Driving-the-Skills-measurement-Agenda.aspx>



endeavour has been a success as BTM applications have increased by an average of 24 percent per year.<sup>ix</sup> As AI and machine learning advance, and automate or replace entry-level programming skills, the student will still be marketable in the workforce and able to reskill in another area of expertise.

While individual institutions have been making strides over the last few years to improve the value proposition of some of their programs, the change of pace has been inconsistent and has left both employers and students feeling a disconnect over the effectiveness of many postsecondary education options.

### **EMBRACE NEW PEDAGOGICAL MODELS FOR THE 21ST CENTURY**

To truly cater to today's students and develop an education system to serve lifelong learners for careers that do not yet exist, higher education must break out of the time-based, "sit and learn" instruction delivery mold. Institutions that are

servicing today's students and employers well have been embracing innovative instruction delivery models that are learner-centric, flexible, responsive, and adaptive.

For example, outcomes-based or competency-based education (CBE) models have allowed students to leverage their existing knowledge and skills to expedite the learning process and focus more time and energy on those skills which they lack. CBE models disentangle the concept of seat time from earning a degree or diploma; allowing for students to learn at their own pace. Students are then only able to proceed through a program if they demonstrate mastery of the required skill sets—however long (or short) that takes. The focus is not on demonstrating how long you learned, but what you actually know—a much more appropriate measure of learning. In 2017, Queen's University became the first post-secondary institution to adopt a Competency-Based Medical Education (CBME) as its new framework in residency education.<sup>lxi</sup>

Recommended by the Royal College of Physicians and Surgeons, this CBME model allows residency students to demonstrate their skills in an individualized, learner-centric manner. Durham College's Practical Nursing Flex Program<sup>lxii</sup> and Cambrian College's various flex programs in Business, Community Services, Health and the Trades are also examples of this alternative delivery model at work.<sup>lxiii</sup>

Other innovative models, such as blended learning, work-integrated learning, and online education have also shown they are equipped to address issues of access, affordability, personalization, time to completion, and quality, especially in underserved areas.

In addition to innovation in program delivery, higher education must also start the harder process of reimagining the structure of programs. Breaking programs down into stackable micro-credentials creates the building blocks for recognition of lifelong learning by giving students and workers clear on and off ramps to the education system. These smaller credentials allow individuals to acquire the specific skill sets they need to advance in their careers, without redundancy, while keeping costs in check. The Federation of Cegeps in Quebec piloted a project to recognize students digital skills, via 24 different badges, with five colleges: Ahuntsic, Édouard-Montpetit, Limoilou, Lévis-Lauzon, and Valleyfield.<sup>lxiv</sup> The project badgecollegial.ca is being expanded this year to cover many more competencies and skills.

For employers, the on and off ramps of a system of stackable credentials can be leveraged to provide ongoing education and skill development for employees rather than having to resort to building in-house programs. This type of system can also help to better target potential employees with the right mixed skill set necessary for particular job functions.

These new pedagogical changes depict a shift towards a learner-centric model that focuses on the individual. Flexibility, accessibility, and adaptability

are the central tenets for new pedagogical models to redefine the way students learn, centered around the learner's experience. Technology within the education sphere today is allowing institutions, corporate entities, and instructors to personalize the learning experience—from curriculum to assessment, content, design, and delivery—in a manner that is affordable and scalable.

Mohawk College's new Centre for Health Care trains students to perform complex and invasive procedures with the assistance of 3D monitors to increase students' skill levels before they are in a clinical environment.

"Some advantages to simulated learning are: the ability to experience a crisis situation before it occurs in the clinical setting; the ability to evaluate and reflect on the activities in a non-threatening arena; and the predictability of being able to artificially create situations which may never occur in any other way. Simulations also assist with the already overcrowded, hard-to-get clinical sites and many state boards of nursing now allow some simulation experiences as clinical time."

Source: "The Institute for Applied Health Sciences (IAHS)." Mohawk College. Accessed October 18, 2018. <https://www.mohawkcollege.ca/donors-and-supporters/mohawk-momentum-our-causes/institute-for-applied-health-sciences-iahs>.

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# Recommendations

As higher education leaders and policymakers think about how to prepare for the future of the workforce, the education and training system must be at the core of any solution. The following key principles and recommendations are meant for discussion to help develop a lifelong learning system that responds to the challenges and opportunities ahead.

## Increase the Connections Between Learning and Work

### 1. ALIGN PROGRAMS AND CREDENTIALS TO LABOUR MARKET NEEDS

The educational system must become more responsive to changes in the labour market, including regular examination of the relevance of program offerings and where to invest limited education resources with a learner-focused approach. The use of labour market information such as employment statistics, unemployment rates, and wages and salaries, as well as connections to industry, should be foundational components of such regular examination.

On the student side, labour market information is an invaluable asset in academic counseling and advising services—ensuring informed decision-making by students as they chart their paths to the workforce.

### 2. PREPARE YOUTH FOR THE JOBS OF TOMORROW BY EXPANDING WORK-INTEGRATED LEARNING (WIL) OPPORTUNITIES

Building on the success of recent investments in work-integrated learning programs, expand programs to ensure all Canadian post-secondary students, no matter their location or background, have access to at least one work-integrated learning experience.

### 3. LEVERAGE INDUSTRY AS A PARTNER

Including industry partners in the design and

execution of educational programs is essential to ensuring alignment of skills taught to skills sought. Organizations increasingly recognize they have a role to play in helping their employees upgrade their skills and stay competitive—whether that be partnering with educational institutions, providing the training themselves, or providing the flexibility to employees to seek out training. Meaningful involvement of industry can also give additional validation to credentials—improving their value to students as well as the broader labour market.

## Prioritize investment in, and modernization of, a true lifelong learning system to keep Canada's workers and economy competitive in the face of ongoing disruption

### 1. PRIORITIZE INVESTMENTS TO ENSURE CANADA'S EDUCATION SYSTEM IS AN AFFORDABLE, ACCESSIBLE, FLEXIBLE, RESPONSIVE AND LIFELONG SYSTEM.

Recognizing that learner demographics are dramatically shifting, education systems must adapt to the reality of a post-traditional learner. Today's student body requires personalized or customized programs designed to be learner-centric—delivered to them when they need it, where they are, and in a form that they can best utilize. Innovative models, including combinations of PLAR, competency or outcomes-based education, blended learning, and online education are

proven models that can respond to the growing demographic of working learners.

Policymakers should re-evaluate policies and regulations that hinder innovative program design to ensure all of these needs are met and learning duplication is reduced. Eligibility restrictions related to age should also be revisited in a life-long learning context. In measuring quality or effectiveness of program design, the focus should be on assessing outcomes of programs.

## **2. INVEST IN RAPID UPSKILLING AND RESKILLING PROGRAMS THAT ALLOW WORKERS TO RETRAIN AND DEVELOP THEIR SKILLS ON AN ONGOING BASIS.**

Governments must rethink existing workforce development programs to include a focus on working learners. With the ever-evolving nature of skills-in-demand, programs should support individuals to upskill or reskill while working, instead of waiting until massive shifts leave significant numbers unemployed. Supporting and incentivizing employer-based programs, while increasing support for and removing access barriers to post-secondary programs, are all part of the solution.

Ensure prior learning assessment and recognition (PLAR) and training are key components of employment programs and transfer agreements. In particular, ensure programs are developed to support vulnerable groups access training and gain recognition for their skills acquired outside of formal education.

## **3. IMPROVE LABOUR MARKET OUTCOMES OF INDIGENOUS PEOPLES AND SUPPORT ECONOMIC DEVELOPMENT IN INDIGENOUS COMMUNITIES THROUGH INCREASED SUPPORT FOR LEARNERS AND TAILORED PROGRAMS .**

A competitive Canada requires that all of its citizens have access to culturally appropriate education and training.

## Recognize the Shift to a Skills Market

### **1. DEVELOP “HYBRID” OR CUSTOMIZED PROGRAMS WITH SKILL SETS FROM DIFFERENT FIELDS**

To enhance the value of a postsecondary credential for students, ensure that transferable soft skills and critical thinking are both included in curriculum and also captured in a meaningful way to demonstrate skill attainment. This is increasingly more desirable by employers.

### **2. EXPLORE APPLICATION AND RECOGNITION OF STACKABLE MICRO-CREDENTIALS THAT PROVIDE VALUE ALONG THE WAY, NOT ONLY ONCE A DEGREE/DIPLOMA IS EARNED.**

The creation of stackable credentials based on skill sets can be used to design programs for specific career fields and to retool them as labour market needs change.

In addition, a reinvention of the standard degree program is necessary to create easier on and off ramps to education for working students. A flexible program structure built on stackable micro-credentials would allow for and recognize rapid upskilling and reskilling.

## Closing

Our hope is that this paper will serve as a basis for dialogue and debate on how we must shift to ensure individuals are best prepared for the new world of work and the roles various partners have in making this shift possible.

We are forever thankful to the many customers, partners, mentors, friends, and experts who constantly push our thinking, set examples, and chart new pathways forward.

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