Is the Future Micro?

Unbundling learning for flexibility & access

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Funded by the Government of Canada's Future Skills Program | Canada Ontario

Publication Date:
March 2021

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Context

Traditional educational credential systems that focus on certificates, diplomas, and degrees have served to measure and accredit achievement across a wide area of knowledge. However, they have not always succeeded in recognizing specific skill sets needed for someone to be work-ready, either post-graduation or between jobs.[1] Some employers have begun questioning the connection between "seat time" and education, noting that they are losing confidence that higher education graduates always possess the skills associated with their credentials upon graduation.

Micro-credentials that demonstrate specific skills acquisition represent one solution to this perceived problem.[2] Micro-credentials focus on assessing the achievement of incremental parcels of learning related to a particular skill or competency.[3] Micro-credentials can validate skills gained through experience or prior learning, opening access to employment, post-secondary programming, and lifelong learning opportunities.

What is a micro-credential?

Growing in popularity, a micro-credential is a certification of assessed learning associated with specific and relevant skills or competencies. In their most developed forms, micro-credentials are part of a "digital credentialing ecosystem." This ecosystem enables information about a learner (i.e., their professional knowledge and abilities) to be shared easily, transparently, and dependably—at much higher levels of fidelity and specificity than was previously possible.[4]

While micro-credentials are not new, they are growing in uptake and popularity around the world and in Canada. Provincial governments—including Ontario, Saskatchewan, and British Columbia—have all moved to invest and expand the role of micro-credentials within existing education systems, and countries like Australia and especially New Zealand have embedded micro-credentials within their formal understanding of the education ecosystem.

Micro-credentials are complementary to existing structures of education, augmenting the value of existing educational credentials, as well as offering a path into education and towards credentials for people who do not have any formal education.

Assessment is commonly regarded as the means through which value is ascribed and confirmed. As such, attaching and affirming transferable value to micro-credentials is critical to bolstering their perceived and real value for learners and employers, helping demonstrate the link between learning acquisition and real-world application.[5]

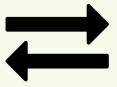
While there are a growing number of names used to describe micro-credentials, most important to understanding them are three key concepts: trust, value, and exchange.

*A **micro-credential** is a certification of assessed learning associated with specific and relevant skills or competencies.*

*While there are a growing number of names used to describe micro-credentials, most important to understanding them are **three key concepts:***

Trust

Value



Exchange

Trust

Learners, educators, and employers need to be able to trust that a micro-credential means something. For this reason, the learning represented by this type of credential must be specific and verified by validated and credible systems of assessment. All stakeholders in the ecosystem have to be able to trust that a micro-credential represents a level of skills acquisition commensurate with its name. For example, a micro-credit in Java means that the user is competent in working with JavaScript.

Value

Value is closely related to trust, referring to the idea that all users in the ecosystem need to recognize value in the micro-credential. For example, there are thousands of courses offering badges online, but if employers and educators do not recognize their value, the learner's skills acquisition will go unrecognized. The key to creating and maintaining value in the system is for micro-credentials to be developed in collaboration with educational institutions, employers, and learners. Verifying and maintaining value across the ecosystem helps to distinguish a micro-credential.

Exchange

Closely related to trust and value is the tenet that micro-credentials must be trackable and sharable. They need to be digital, stored in a neutral location, and seamlessly transferrable from organization to organization. The challenge is for micro-credentials to reliably signify the possession of skills, regardless of where in the world that person resides or where the micro-credential is based. There is ongoing discussion in this space about the use of blockchain technology to store micro-credentials, where they can be accessed in digital portfolios or "wallets."[6] As a design principle, exchange means that all micro-credentials should signify learning that, when completed and assessed, can be taken anywhere and is disconnected from any single organization or employer.

There is a growing literature on the technical and user-centred design elements of micro-credentials, showing that some designs work better than others.[7] The term "micro-credential" is fraught with confusion caused by a lack of common definition and imprecise use of terminology. However, researchers and practitioners widely agree that micro-credentials are meant to be complementary to, and integrated with, traditional credentials found in higher education such as diplomas and bachelor's degrees.[8]

The unbundling of skills into constitutive parts and their re-bundling into stackable micro-credentials can allow organizations and traditional educational institutions to offer accessible, specific, and new forms of learning recognition.[9]

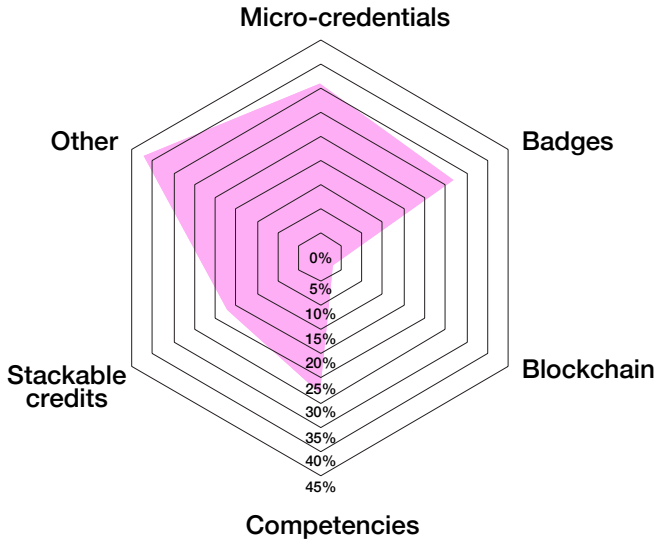
Importantly, and drawing from the model outlined above, micro-credentials should be co-developed between stakeholders, underlining the importance of ensuring that the skills being taught are the skills being sought, as well as proving the value of skills acquisition through rigorous assessment.

Colleges and universities across Canada are rapidly expanding their online offerings, with many introducing alternative credentials of various types—both for new credits and to augment existing offerings. As Figure 1 shows, the distribution of focus across different credentials is dispersed. Further work is needed to share best practices and hone the provincial/territorial approach to online credentialing.

Canadian colleges and universities have also been rapidly adapting to concepts and best practices around online learning. Figure 2 shows changes in perceptions around different aspects of online learning between 2018 and 2019. This trend can be summarized as barriers being reduced and acceptance growing across surveyed higher education institutions. Online learning creates more flexible learning options, signalling a trend towards the kind of on-demand, flexible programs offered by micro-credentials.

FIGURE 1

Distribution of alternative credentials used for online learning

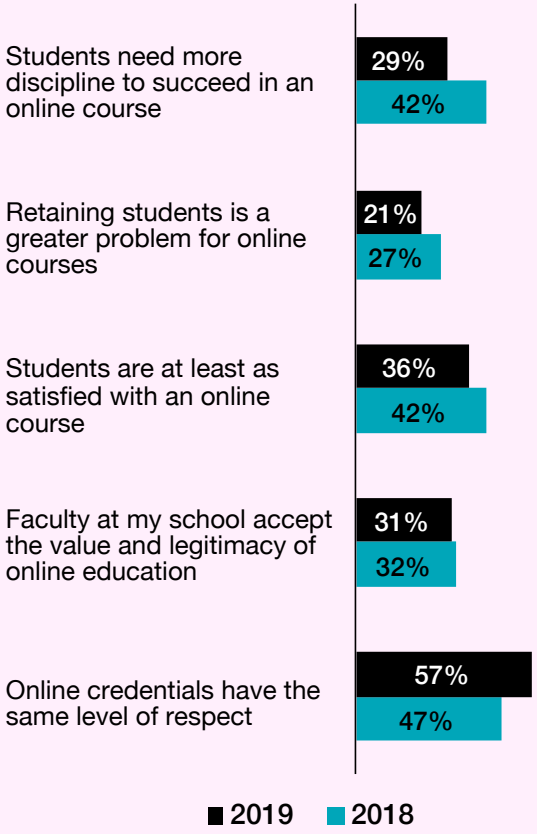


Source: Johnson, N. (2019). *Tracking online education in Canadian universities and colleges: National survey of online and digital learning 2019 national report.* Canadian Digital Learning Research Association. http://www.cdlra-acrfl.ca/publications/

*The unbundling of **skills into constitutive parts** and their **re-bundling into stackable micro-credentials** can allow organizations and traditional educational institutions to offer accessible, specific, and new forms of learning recognition.*

FIGURE 2

Perceptions of online learning: 2018 and 2019



Source: Johnson, N. (2019). *Tracking online education in Canadian universities and colleges: National survey of online and digital learning 2019 national report.* Canadian Digital Learning Research Association. http://www.cdlra-acrfl.ca/publications/

Relationship to virtual learning

Micro-credentials currently come in a variety of formats, with increasing activity around the development of virtual delivery and the use of hybrid approaches. They also exist under a variety of names other than "micro-credential," including digital credentials, digital badges, and micro-certifications.[10]

Micro-credentials are sometimes built from badges, which are often and increasingly digital. While micro-credentials can be badges, not all badges are micro-credentials. For example, if badges do not have assessment-based accreditation standards—verified and trusted by other stakeholders across the micro-credential ecosystem—then they may not be true micro-credentials.

As a concept, open digital badges were first introduced by the Mozilla Foundation in 2011 and rely on a common technical standard in order to be transferable across settings, such as the Open Badge Infrastructure maintained by IMS Global.[11]

These open badges can set candidates apart in educational and professional settings; however, the learning is not always formally assessed, making it difficult to transfer verifiable value to local stakeholders.

Educators, librarians, and other professional occupational groups have been breaking new ground in the use of digital badges for some time to retrain existing staff in new technologies and competencies.[12]

Micro-credentials are often integrated with higher education programs in a system known as "latticing," where micro-credentials are deeply embedded in course and program curricula.[13]

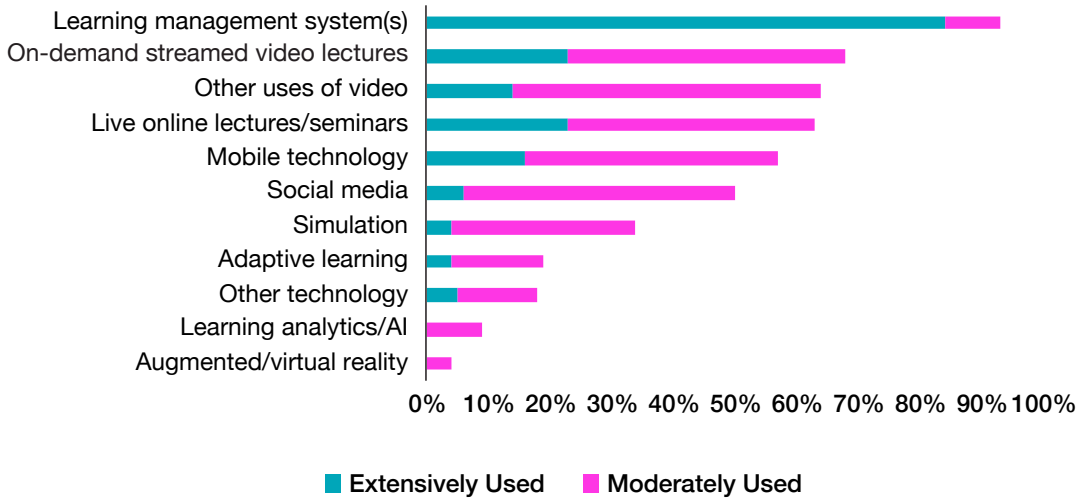
Colleges and universities across the country are using micro-credentials to recognize and augment learning, latticing them into existing curricula. These institutions have begun to offer both non-credit and for-credit options, as well as stand-alone stackable micro-credential programming.

While most online learning is delivered using only a learning management platform, the role of other technological augmentations—such as streamed video, social media, and integration of mobile technology—has already been growing rapidly in the online learning sector (see results from a 2019 Canadian survey presented in Figure 3).

In December 2020, the province of Ontario announced a $50 million investment in the Virtual Learning Strategy. This investment will support technology-enabled lifelong learning.[14]

FIGURE 3

Technologies used in online courses



Source: Johnson, N. (2019). *Tracking online education in Canadian universities and colleges: National survey of online and digital learning 2019 national report.* Canadian Digital Learning Research Association. http://www.cdlra-acrfl.ca/publications/

*While most online learning is delivered using only a **learning management platform**, the role of other technological augmentations—such as streamed video, social media, and integration of mobile technology—has already been **growing rapidly in the online learning sector**.*

Use of micro-credentials in higher education is growing, with an increased focus on developing micro-credentials that have applicable purpose, a high degree of transferability, and clear learning objectives.[15]

The leading Ontario organization in this space is eCampusOntario, which is working with over half of Ontario's colleges and universities, as well as private and public partners, to implement micro-credential projects. eCampusOntario uses a co-created implementation framework that is infused with the principles of trust, value, and exchange to help support the development of micro-credentials. Their mission is to build a micro-credential ecosystem framed by the following components:

Issuing Body

Micro-certifications will be issued by an established agency, organization, institution, or employer.

Competency/skills targeted

Micro-certifications will adhere to harmonized skills and competency language and will be aligned with a common competency framework, such as ESCO1.

Outcomes

Micro-certifications will recognize performance competencies explicitly aligned to underlying knowledge, attitudes, and skills.

Summative assessment

Micro-certifications will require evidence of achievement of outcomes. Evidence of the value of the micro-credential will be embedded in its design and visible to employers.

Transcriptable

Micro-certifications will be compatible with traditional transcripts, where possible.

Partner endorsement

Micro-certifications will be validated by industry partners/external bodies, where possible. This validation will confirm: 1) the competency is in demand by industry; and 2) the established assessment is reflective of job performance in that industry.[16]

Rapid upskilling

Workplaces require employees to be increasingly nimble. Lifelong learners must have the skills to learn, while also having the ability to demonstrate their learning throughout their working lives—capably using technology and keeping up with rapidly changing systems.[17]

Specific skills can be stacked together to create a portfolio of skills in an area that can be upgraded as required in a transparent, evidence-based way.[18]

Micro-credentials can indicate detailed information about a person's accumulated learning, providing evidence to support claims (such as links to portfolios). Micro-credentials can also be readily shared online through a verified record as well as social media platforms.[19] That makes these forms of learning recognition ideal for the digitally enabled recruitment market and workplaces of the 21st century.

Businesses and organizations implementing small- or large-scale skills upgrading projects to integrate new systems and ICT products have also used job-embedded micro-credential programs with good success, enabling employees to demonstrate learning with transferable badges.[20] Custom-built badging systems, such as the IBM Skills Academy, complement ongoing skills assessment activities and both incentivize and demonstrate skills acquisition.[21]

Micro-credentials and access

Micro-credentials can also help more people access relevant short-duration learning opportunities. They can create bridges into the workforce, break down barriers to transitioning successfully between high school graduation and work, upgrade skills while working, and even build a route into new sectors after graduation.[22]

Skills are the currency of the 21st century, and Canada's future rests on our ability to define, assess, develop, and utilize skills more effectively.[23]

The explosion of online learning and digital education during the COVID-19 pandemic has led thought leaders to anticipate that many more sectors and organizations will move online on a permanent basis, providing significant amounts of professional staff and student training through MOOCs and online modules supported by customized micro-credentials.[24]

The COVID-19 pandemic has disrupted virtually every industry sector and accelerated digital transformation.[25] Recent research has highlighted the importance of adopting new pedagogical approaches and innovative educational systems—including the introduction of micro-credentials—to help all learners access opportunities to upskill and reskill to find meaningful work.[26]

Where are micro-credentials used?

> Micro-credentials can be used to support rapid reskilling in times of work disruption.[27]

> Micro-credentials can be used to augment post-secondary programming and provide alternate access to higher education.[28]

> Micro-credentials can be used to attract, engage, and maintain talent in the workforce.[29]

While micro-credential activity continues to grow, there are parallel needs for a more coordinated approach to micro-credentialing, including a clear definition and guidelines. The following elements are emerging as key to the further adoption of micro-credentials:

> Assessment that verifies skills gained

> Relevance of acquired skills to workforce needs

> Shorter duration to support lifelong learning

> Portable digital record of micro-credential engagement

Barriers to micro-credential implementation

What are the barriers to adoption for micro-credentials to be integrated into more higher education institutions and workplaces? Many argue that a lack of clear definitions, standards, and interoperable technology platforms contribute to a confusing and divergent landscape. While badges and micro-credentials are not exactly the same thing, the following six main roadblocks that have been identified for badge implementation are also applicable to micro-credential implementation:

> variation in badge design

> assessment transparency

> complexities in badge design

> badge interpretation[a]

> badge value proposition

> buy-in for badges[30]

The learning objectives of various micro-credentials differ, giving some micro-credentials inconsistent perceived value to different stakeholders across the ecosystem.[31] Further investment and research into micro-credentials will help unlock their potential to positively impact workforce skills and capacity.[32]

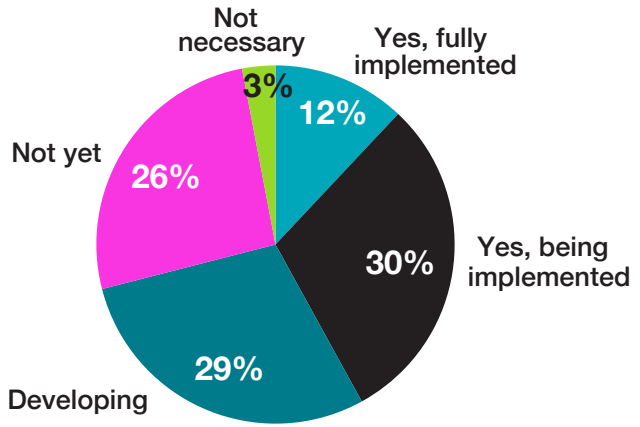
a This was labelled "badge examination" in the original, but the language has been adjusted here for greater clarity.

Despite concerns, there has been momentum in the adoption of micro-credentials around the world, which suggests that substantial social and economic advantages to short-duration learning opportunities are captured and verified in micro-credentials.

Only 3% of Canadian institutions surveyed said that it was unnecessary to develop an organizational strategic plan for online learning, with most others reporting to be in the midst of some sort of strategy planning stage. Micro-credentials form an important component of these strategies for many colleges and universities, as shown in Figure 4.

FIGURE 4

Status of strategic plan for e-learning



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Who are the learners?

Micro-credentials are for everyone: existing students, prospective students, job seekers, and employees. This research moves beyond the binary of the "traditional" and "non-traditional" learner to encompass all individuals, regardless of age or life stage.

According to a 2019 study from the European Union, learners see major benefits of micro-credentials, including that they are focused, practical, up-to-date, personalized, and flexible.[33]

One major advantage of micro-credentials is the flexible nature and short duration of the modules, which make them more accessible to people who already have additional financial, work, family, or community responsibilities.[34]

Despite the potential for micro-credentials to increase access to training for those facing educational barriers, some studies have shown that micro-credential enrollees and completers are most likely to be Caucasian or Asian, already employed, and aged between 30 and 44 years old.[35] Yet research in this area remains limited. As such, we need more research and program development to understand how to design micro-credential programs to meet the needs of diverse individuals.

Emerging trends suggest that equity is key to success in micro-credentialing offerings and that the needs of learners should be prioritized. Proposed solutions include embedding mentoring and guidance in program design and ensuring that micro-credential design is always done in consultation with end users to ensure accessibility.[36]

Key concept: Lifelong learning

Lifelong learning encompasses all learning activity undertaken by an individual. It is ongoing, and often voluntary or self-motivated.[37] Micro-credentials can demonstrate professional growth and commitment to lifelong learning.[38]

Technology and continual transformation in what many are calling the fourth industrial revolution has driven many educators and policy makers to suggest that successful workers will be lifelong learners.[39]

Unlike in previous generations—when the bulk of education took place during a period of formal study followed by entrance to the workforce—people now need to upskill on an ongoing basis.[40] Micro-credentials are ideal for this kind of short-duration, rapid skills upgrading.[41]

Some have argued that the social and economic impacts of lifelong learning are so substantial that the concept of a "learning-integrated life" better encompasses its potential for expansive benefits.[42]

Micro-credentials support lifelong learning by providing access to frequent, flexible, and low-barrier learning and providing on-ramps to formal education. In addition, they provide important milestone markers in a person's career.[43]

Increasing numbers of players are coming online in Canada and around the world to offer online training and promote accessible lifelong learning. The matrix in Table 1 offers a typology that delineates the characteristics of each model, including several Canadian examples.

TABLE 1

Summary Matrix of Business Models

	Solo Unit	Solo Institution	Peer Consortium	NGO Led	Industry Led
Description	Department or subsidiary	College or university-wide	Distributed or rotating leadership	Centralized leadership	Large employer or sector body, or key domain-specific skill provider (e.g., technology platform)
Examples	Madison ConEd, DeakinCo (RPP Credentials)	Coast Mountain College; Fédération des cégeps (Badge Collégial); Northern Alberta Institute of Technology; The Graduate Institute of International and Development Studies	University Learning Store; OERu/Edubits; FutureLearn	Kiron, Amnesty International, Cancer Research UK, Wellness Works Canada	Pearson, Mozilla, Accenture, Entrepreneurial Sales Institute (ESI)
Sample of Programs Offered	Madison ConEd: *Fundamentals of Online Teaching*	Coast Mountain College: *Skills Development for the Entrepreneur*	OERu/Edubits: *MOTAT Tramway Conductor*	Wellness Works Canada: *Workplace Health and Performance Certification*	Accenture: *Digital Skills: Artificial Intelligence*
Effort	LO	MED	MED	LO	LO
Risk	LO	MED	MED	LO	LO
Speed (Time to Market)	HI	MED	LO	HI	HI
Cost	LO	MED	LO-MED (Membership fee)	LO-MED (Membership fee)	LO
Strengths	Potential for most autonomy; Fast, flexible, and "agile"; Emergent practice can inform policy.	More centralized resources, clear branding, and clout; Stability and momentum when up and running.	Bigger footprint and safety in numbers; Shared values can drive a vibrant community of practice.	More agility due to one decision-maker.	Packaged, tested solution; Brand recognition.
Weaknesses	Branding questions; Interdepartmental fragmentation; Lack of resources and scalability; Vulnerability to policy shifts and loss of senior champion.	Consolidating diverse viewpoints and departments can be slow; Preconceived policies can lead to unsustainable practices.	Peer governance can be slow; Can be hard to sustain over time.	Lack of autonomy, control over the agenda, and branding; Leadership may destabilize due to political or funding shifts.	Lack of autonomy; Subsidiary identity and branding; Potential for conflicting goals.

Source: Modifed from: Presant, D. (2020). *Micro-certification business models in higher education.* https://www.ecampusontario.ca/publications-reports/

Micro-credentials around the world

There has been significant global experimentation with micro-credentials in the last two decades, with adopters funding the publication of a framework for understanding how micro-credentials are being approached in that region.[44]

As a world leader in micro-credentials, New Zealand operates a centralized micro-credential framework to guide all educational issuing authorities in their jurisdiction, acting as both a resource and regulation authority on alternative credentials.[45]

Sectors and regions do not have to pick only one strategy for embedding micro-credentials in their education and training ecosystems. Multiple strategies can be adopted by micro-credential providers and sectors.

Providers of micro-credentials include higher education, government, and industry, with significant micro-credential offerings developed by IBM, Google, Amazon, and Ernst & Young. Many of these industry-led micro-credentials have partnered with traditional education providers to provide pathways to obtaining credit towards a degree or other credential.[46]

Micro-credential definitions and frameworks are being developed and piloted by higher education providers across the world:

New Zealand has integrated micro-credentials into their national quality assurance framework.

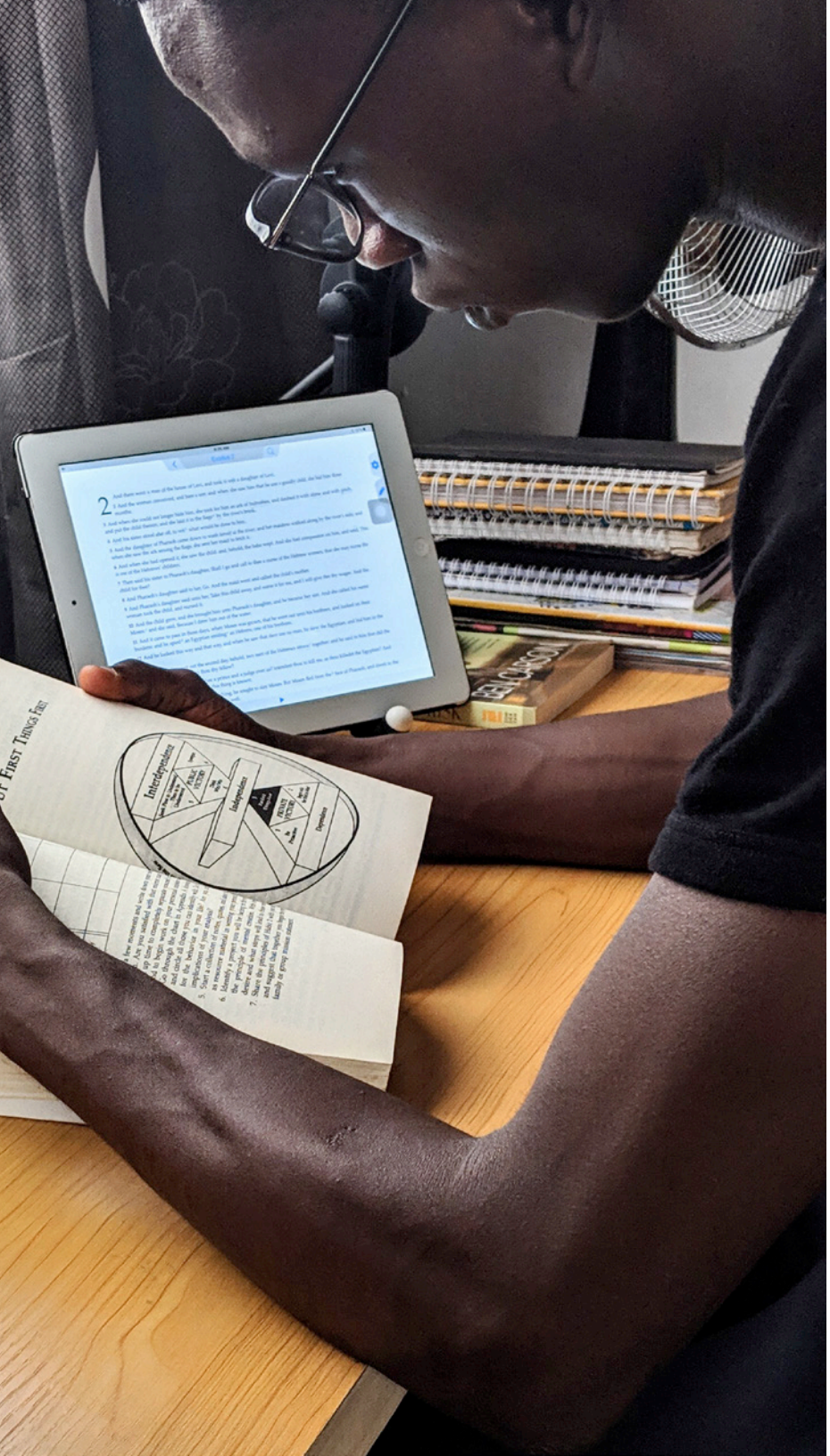
Australia and Malaysia recently adopted OpenCreds to support micro-credential development in line with existing quality assurance frameworks.[47]

Singapore developed a Skills Framework based around short courses that address existing workforce needs.

The European Union is developing a micro-credential strategy for rapid reskilling related to the needs identified by the European Skills Agenda.

In the United States, the Credential Transparency Description Language (CTDL) provides a searchable database of credentials to find commonality around nomenclature, quality, and content. IBM has led a partnership to create a verifiable blockchain-based digital record of learning, The Learner Credential Network (LCN).

Digital systems or passports that can log credentials have been developed in Korea, China, Singapore, and Europe.[48]



Micro-credentials in Canada

An ecosystem of relevant, accessible, and portable micro-credentials can support rapid reskilling in Canada across provincial and national borders.

A national report on the distribution and characteristics of micro-credentials across Canada shows that terminology varies across regions and types of partnering educational institutions. For example, universities are more likely than colleges to report using the terminology of "badges," while both report an equal likelihood of using the terminology of "micro-credentials," suggesting that badges at some colleges may be referred to as micro-credentials.[49] Although each term is clear in its own context, attaining clarity on terms across the country would represent an achievement for the regional micro-credential ecosystem.

***76%** of Canadian higher education institutions **offered online courses for credit** in 2019, and that proportion is likely to have grown in 2020.[50]*

At a national level, the Future Skills Council recommended micro-credentials as one strategy to support the development of more customized, short-term training to respond to individual and employer needs.[51]

In Ontario, eCampusOntario leads micro-credentialing at a provincial level, having completed research exploring micro-credential governance and business models and led 36 micro-credential pilots since 2017.[52]

Thompson Rivers University, in British Columbia, is the first university to include micro-credit transfers towards university degrees. Others in the province are also involved in micro-credentialing, including badging at the University of British Columbia (UBC) and micro-credit courses at Simon Fraser University (SFU).[53]

Saskatchewan is developing a common province — and sector-wide definition, framework, and principles for micro-credentials.[54]

The Fédération des cégeps in Quebec piloted a badging initiative to develop 24 different skills across five institutions.[55]

Table 2 lists examples from each province and territory, demonstrating the reach of current micro-credential programs in Canada (Yukon and Nunavut are excluded due to a lack of available examples).

TABLE 2

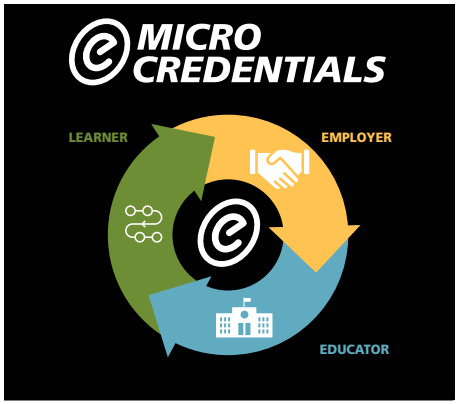
Micro-credential programs in Canada

Province	Program example	Institution type	Institution name
British Columbia	Writing for Business Success	PSE	Thompson Rivers University
Alberta	AI Simulation for Managers	PSE	Bow Valley College
Manitoba	COVID-19 Vaccine Administration Course	PSE	Red River College
Newfoundland and Labrador	Amazon Web Service Cloud Computing	PSE	College of the North Atlantic
Northwest Territories	Organizational Team Leader	PSE	Aurora College
Nova Scotia	Document Use	Industry	Skills Training Atlantic Canada
Nunavut	N/A		
New Brunswick	Municipal Management Training Program	PSE	Université de Moncton
Ontario	Essential Skills for Truck Drivers	PSE	Fanshawe College
Prince Edward Island	Professionalization	PSE	University of Prince Edward Island
Quebec	Dégager les éléments d'information considérés pertinents	PSE	Fédération des cégeps (Ahuntsic, Édouard-Montpetit, Lévis-Lauzon, Limoilou, Valleyfield)
Saskatchewan	Accounting and Finance for Non-Finance Managers	PSE	Saskatchewan Polytechnic
Yukon	N/A		

Note: "PSE" refers to postsecondary education

A framework for micro-credential development

A micro-credential ecosystem model, piloted by eCampusOntario across colleges and universities since 2017, unbundles learning by bringing together learners, post-secondary education providers, and industry in a reciprocal relationship built on *trust*, *value*, and *exchange*.[56] These relationships must involve all stakeholders—learners, employers, and educators—in order to ensure they retain these principles:



> **Trust** ensures that learners are assessed to verify skills gained.

> **Value** refers to the relevance of skills gained to workplace needs.

> **Exchange** allows for a portable record of micro-credential activity that is accessible and transferrable for learners.

The project: Is the Future Micro?

Is the Future Micro? is a collaboration to advance understanding of micro-credentials in support of economic recovery and lifelong learning.

eCampusOntario is working with the Diversity Institute and Magnet at Ryerson University to conduct research on micro-credentials and their implications for learners, postsecondary education (PSE), industry receptivity, and labour market preparation and mobility. The *Is the Future Micro?* project is funded by the Government of Canada's Future Skills Centre.

Specifically, the project will:

> Review current trends and knowledge

> Undertake an evaluation of eCampusOntario's 36 micro-credential pilot projects

> Assess the utility of the new eCampus Principles and Framework, which offer a blueprint for the Ontario PSE sector to launch micro-credentials at scale.

eCampusOntario has established itself as a leader in this space by building on previous research and conducting several research projects that examine business models and the policy and regulatory context for Ontario.[57]

Over the last three years, eCampusOntario has worked with a variety of partners on pilot projects to test the value of the framework in practice and develop micro-credential initiatives at Ontario PSE institutions. This research project will serve to assess and improve the framework, and thus further enable the development of micro-credential systems across the province. It will also contribute to the national understanding of micro-credentials, supporting the growth of a connected and coordinated ecosystem that serves all Canadian learners.

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