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Approaches to Stackability of Micro-credentials

Options for Ontario

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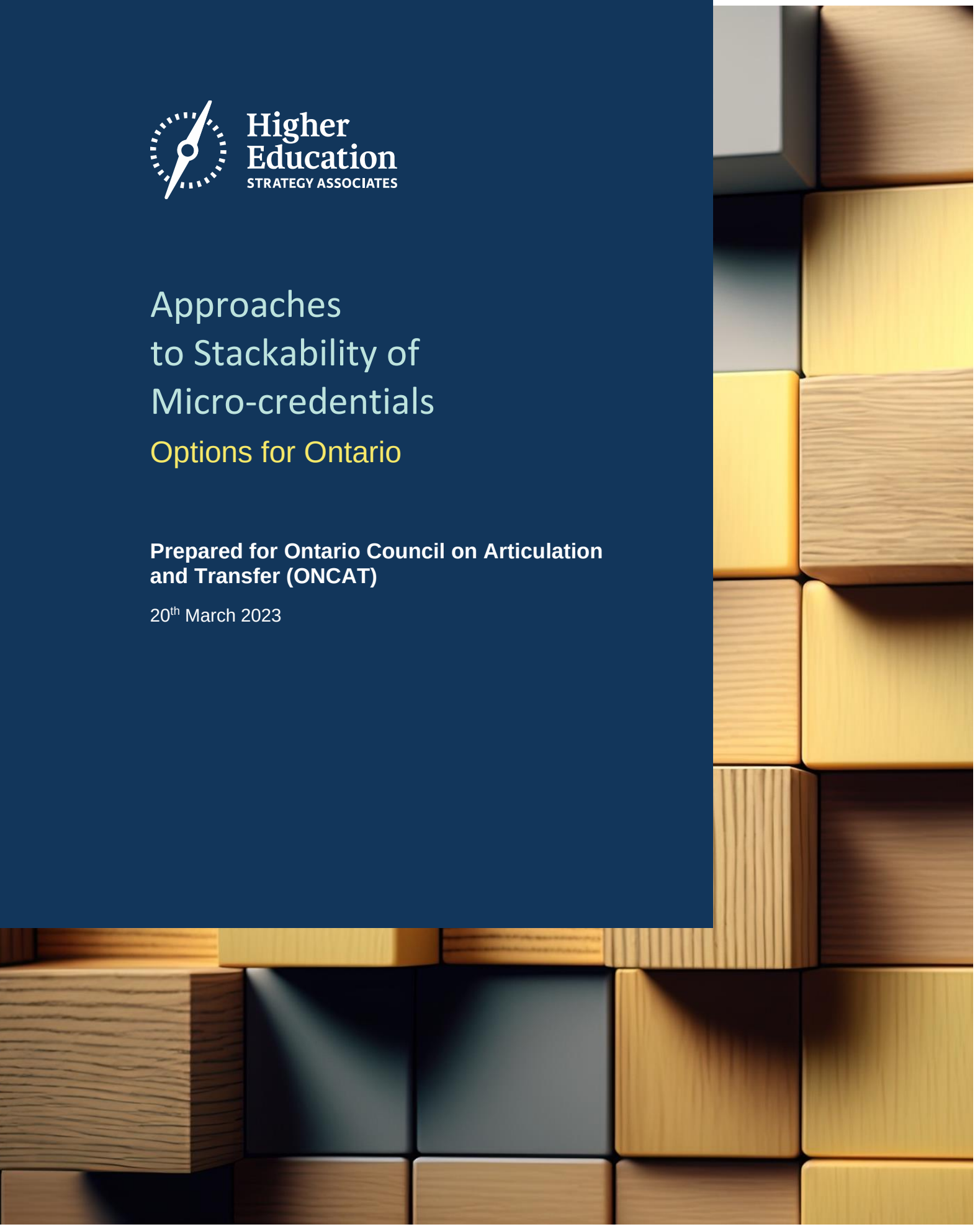

Higher Education Strategy Associates (HESA) is a Toronto-based firm providing strategic insight and guidance to governments, postsecondary institutions, and agencies through excellence and expertise in policy analysis, monitoring and evaluation, and strategic consulting services. Through these activities, HESA strives to improve the quality, efficacy, and fairness of higher education systems in Canada and worldwide.

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"'Micro-credentials' is a new label for an old thing, particularly when you look at the non-credit side of the house" – University Registrar

"Think about the overhead that [stacking micro-credentials] would cost. 'I've got ten different micro-credentials from ten different institutions and I want to show you that's congruent to [one of your courses].' 80% of the material has to be congruent and that has to be assessed by an academic. That would be a nightmare." – University Registrar

Executive Summary

Micro-credentials are proliferating in Ontario. Ontario's current education system creates barriers to stacking these micro-credentials into degrees and diplomas especially when those micro-credentials have been obtained from different institutions. This limits their value in a labour market in which employers and providers of graduate-level education primarily understand diplomas and degrees.

The underlying problem is a lack of verifiable, standardised information about the learning each micro-credential reflects. In order to combine micro-credentials into larger credentials such as diplomas and degrees, the colleges and universities which endorse these macro-credentials need to have clear information about the learning they represent.

Our examination of those Ontario micro-credentials which are posted on the eCampus Ontario portal shows that there is a lack of clear comparable data about the learning. Data about key characteristics including the prerequisite preparation, hours, content and learning outcomes of micro-credentials is inconsistent and often completely absent. There is typically not even a suggestion of how many credit-hours of learning the micro-credential represents or other indicators of how it might compare to a formal course taken for degree or diploma credit.

So long as providers of micro-credentials not offering widely-accepted data on what learning their micro-credentials represent, a learner seeking advanced standing in a degree or diploma bears the burden of showing that they have already mastered part of the material taught in that macro-credential.

The costs of doing this are considerable because there is very little economy of scale. There are so many possible micro-credentials that a learner could potentially present for recognition by a college or university, and the amount of credit towards a degree or diploma for each is so small, that the costs of assessing the prior learning a micro-credential represents could well exceed the cost of simply repeating the material.

The information costs are so high because of how Ontario's processes for recognising prior learning have evolved. To obtain transfer credit, a learner usually

- Follows an established transfer pathway in which the value of a credential is already known to the receiving college or university
- Has to seek an individual assessment of their prior learning through institutions' Prior Learning Assessment and Recognition processes (PLAR)

Transfer pathways mainly make sense where a learner is seeking credit for a formal course and there is already a precedent for granting credit for something reasonably similar. PLAR relies on subject matter experts to individually review the content of courses the learner has previously taken. It is often slow and necessarily expensive to provide and difficult to predict in advance.

Stacking micro-credentials would be much simpler if the provider of the micro-credential were to assign data about its value relative to a diploma- or degree-level course and either back this claim with its own reputation or seek external validation.

We have identified possible models for validating the learning represented by micro-credentials in a way that is easily comprehensible to other institutions, drawing largely on policies which have had some success in other countries.

Options for Ontario include

- mandating that providers publicly state what they think is the potential transfer value of the micro-credential in order to receive public support, for example funding or listing on a provincial portal
    - this will open their claims to public scrutiny
    - details such as the learning outcomes could be collected in a specified format so that they would be easier to process than under the current freestyle approach
- having providers submit new micro-credentials to a third party for assignment of a transfer value
    - in the other countries studied, for example New Zealand, a government agency takes on the role of assessing micro-credentials, but in principle any trusted third party could do so. For example, several private companies already provide assessments of the learning represented by unfamiliar foreign diplomas and degrees to Ontario colleges and universities
- creating a provincial bank of assessments which could be challenged by holders of specific micro-credentials to demonstrate their learning
    - the National Association of Career Colleges historically offered such assessments for sale to career colleges, and there may be a business case for some institutions which do not have widespread brand recognition and value efficiency over autonomy to purchase access to assessments rather than setting their own
- creating a new specialised institution
    - countries including South Korea, faced with reluctance of universities to adapt their processes to recognise learning obtained elsewhere, have created new institutions specifically to recognise prior learning which no other university would stack into any of its degrees
    - this would obviously be a radical option, which would only make sense for learners willing to accept a ‘no-name’ degree or diploma, and seems the least likely option for Ontario. However, it underlines that government has many potential options.

Introduction

Micro-credentials may not necessarily be new, but in principle building governance structures around them which facilitate stackability and portability could open up new ways to provide education.

Micro-credentials are appearing all around Ontario. Many could appeal to degree- and diploma-seekers. In theory micro-credentials could differentiate graduates in a specialised and fast-moving labour market. Alternatively, learners may acquire a number of micro-credentials over time, perhaps as a hobby or in the course of workplace training, and then decide to pursue higher-level credentials.

Colleges and universities are set up to deliver a core curriculum to all graduates within a discipline, with a relatively restricted set of electives available. Most students are not entirely free to choose their own paths. Micro-credentials by their nature offer more flexibility. Stacking micro-credentials, especially micro-credentials obtained at other institutions, could allow learners to choose from a veritable smorgasbord of learning as part of their degrees and diplomas, allowing them to specialise in ways that meet niches within the workforce. Hypothetically, an English student could gain certification in social media skills as part of their degree and prepare for a career with an IT giant or learn to be a blacksmith who can communicate metalwork techniques in prose. Stacking would avoid any time penalty for doing so.

In practice, the current system in Ontario is not compatible with this vision.

This paper explores possibilities for organising the system so that micro-credentials could be stacked into larger qualifications recognized by the Province of Ontario, such as diplomas and degrees.

Evidence

The HESA team has spoken with a number of strategically-placed personnel in Ontario's colleges, universities, Indigenous institutes and private career colleges. These interviews were semi-structured in-depth conversations guided by interviewers with extensive experience. Interviewees were offered confidentiality to ensure they were comfortable expressing their views frankly. Interviewees included leaders of units within colleges and universities which offer micro-credentials, registrars and representatives of registrars' offices, university and college staff with experience of administering prospective students' applications for recognition of prior learning (PLAR) and faculty who have developed micro-credentials. Evidence from these interviews informs all four sections of the report.

Identifying models for making micro-credentials stackable

The HESA team have identified several potential models for making micro-credentials stackable based on experiences in other countries. These include New Zealand,

Singapore, the United States, Australia and European models which are discussed in Section One. Based on this data, in Section Two we have distilled key features to explain why the situation in Ontario is currently different.

Mapping of Ontario micro-credentials

The HESA team reviewed all micro-credentials posted on the eCampus Ontario portal in summer 2022. Section Three discusses the findings, which illustrate the issues of comparing meta-data around micro-credentials in Ontario.

Suggesting possibilities for Ontario

In Section Four, we suggest possible models for making micro-credentials stackable in Ontario.

Exploring the barriers to stackability and portability

As this paper will explore in some detail, stacking micro-credentials into degrees and diplomas raises system-wide issues, particularly if the aim is for colleges and universities to award credit towards their degrees and diplomas for micro-credentials awarded by *other* institutions. While stacking within an institution raises some internal issues of academic governance, portability is a problem for all of Ontario higher education with huge strategic implications.

In Ontario there are barriers to both stacking of micro-credentials into degrees and diplomas and porting between institutions. These barriers mean that degree- and diploma-seekers risk repeating the same learning until they demonstrate it in a format that the system recognises.

There are barriers to transfer between colleges and universities in Ontario, but courses taken at colleges and universities in Canada at least usually take on fairly similar forms. A further barrier to the stackability of micro-credentials is the wide range of forms they can take, making it challenging to assess a credit value. This is important because, in Canada, a credit value is usually needed in order for a credential to contribute to degree or diploma completion. Diplomas and especially degrees typically consist of courses which, as well as being time-consuming (with their level on the Ontario Qualifications Framework reflecting their length) are both sequential and hierarchical. Instructors teaching higher-level courses may set exercises which assume certain specific knowledge obtained previously. Consequently, advanced post-secondary programs often have complex pre-requisite requirements. If this expectation is to be maintained, then stacking implies a judgment about the level and in some case the content mastered by the holder of that credential.

Further, the perceived quality of degrees and diplomas is at the heart of each institution's and the system's reputation. These advanced credentials function as currency in the labour market partly because a trusted institution is certifying that someone has been

tested for and found to have a passable level of specific skills and/or knowledge. Whenever an employer encounters a holder of an electrical engineering diploma who cannot manage simple arithmetic or a history graduate lacking basic syntax that has reputational costs which trouble both administrators and faculty. Procedures for awarding degree credit in particular are often controlled by Senates, on which faculty are heavily represented. Faculty are often insulated from the institution's finances but keenly interested in quality control.

Consequently, even universities which have their own sophisticated continuing education divisions have shied away from linking their *own* continuing education credentials to degree credits. As one interviewee put it:

> *"There was a strategic decision made, you might say, to say that these really bear no direct relationship to degree credit programs. That would have been a much more difficult hill to climb in the university and … we thought that would be an issue to come back to because we thought that understanding of what micro-credentials are was so confused within the institution." – University Continuing Education developer*

This hesitation appears to be common, only increases when institutions consider the possibility of stacking micro-credentials obtained at other (public) colleges and universities into their programs, and increases even further when the possibility of stacking micro-credentials obtained from private-sector providers arises.

> *"Right now my feeling is that it's a bit of a Wild West […] I suspect that some of my colleagues would say this is the worst invention ever because it's drawing away our attention from our core, whereas others who are perhaps more innovative are seeing it as an opportunity to initiate students to the university to then get them into a three- or four-year degree" – University Registrar.*

Ontario Needs to Consider Options

It is possible to imagine options available to Ontario which range from the conservative (improving meta-data) to the radical (establishing new institutions), as we describe in Section Four.

By exploring options for stacking micro-credentials we are addressing a scenario which seems removed from the current state of play but which may potentially become important in the future. Our interviewees indicated that there is not currently much *explicit* demand from learners to be granted diploma or degree credit for micro-credentials that they have completed. Interviewees in a position to know, including registrars, indicated that their institutions received few to no queries about the possibility of obtaining credit for anything other than traditional courses taken at colleges and universities and, at institutions which have flexible Prior Learning Assessment and Recognition (PLAR) processes in place, a few very specific kinds of life or work experience.

This rarity is part of the problem with developing a system for stacking at institution level, since it makes little short-term economic sense for institutions to allocate expensive staff time to developing procedures which will rarely be used. The fact that there are likely to be

few requests to grant credit for most individual courses, leading to few economies of scale and a high cost per credit granted, is a problem for credit transfer more generally. The economic problem is especially significant for micro-credentials because of the huge diversity of providers and the large numbers of micro-credentials which would have to be stacked to make a significant dent in the learning required for a degree or diploma.

The lack of clamour to grant credit for micro-credentials does not mean that there is not *latent* demand among learners. Uptake of micro-credentials has exploded in recent years. Given the costs of replicating previously-covered material, to both learners and Ontario, it seems unlikely that there would not be significant benefits to learners in reducing replication. Furthermore, given the lack of a clear framework it is hard to imagine that many learners would know where to go or even consider that stacking micro-credentials into their degree or diploma might be possible. By analogy, when determining the demand for a bridge across a treacherous river public bodies do not simply point to the absence of swimmers and conclude that a bridge is unnecessary. They firstly establish a set of models for the forms that a bridge could take and then conduct research to establish whether the expense of building one is warranted.

We have explored possible models.

Section I. Developments in Micro-credentials

This review will review the work in micro-credentialing being done by educational institutions in four countries/regions: Australia, New Zealand, Singapore and the United States, as well as by certain corporate entities (Google and IBM) that have embarked on their own process of credentialling. Some examples from Europe will be included but there the emphasis will mainly be on what is happening at the continental level to create a harmonized "European Micro-credential Framework".

As has been observed many times in many places, the term "micro-credential" does not have a universal meaning. Not only does the term change meaning from one region of the globe to another, there are also several places which have types of training/learning programs which look substantially similar to micro-credentials without ever using the term.

A brief definition which applies in all the countries considered here comes from a recent OECD report· *Micro-credential innovations in Higher Education: Who, What and Why?* This document acknowledges the wide range of qualities possessed by micro-credentials in different parts of the world, and suggests that at a minimum, they have three key qualities relative to traditional credentials. First, they are **smaller** in volume (that is study duration or load); second, they are **more targeted** in terms of skills or study topics and third, they are **more flexible** in their mode of delivery. In fact, as we shall see, only the first two of these are actually true because a number of micro-credential schemes are in fact quite *in*flexible in their mode of delivery.

One of the reasons for the thicket of confusion around micro-credentials is that at the beginning, the term was *tabula rasa* and different policy actors ascribed different meanings and attributes to them. Perhaps the biggest gap in understanding – in North America at least – was between those who believed that micro-credentials were intrinsically something which were based on evaluation of competencies (that is, part of a movement towards competency-based education which flourished in the United States in the mid-10s), and those who thought they were intrinsically something closer to a certificate or other "incremental credentials" which were very much like shorter or disaggregated versions of existing post-secondary credentials.

Globally, however, the debates about the nature of micro-credentials broadly revolve around the role of seven separate properties.

***Stackability of credentials*.** In many jurisdictions, a large part of the point of micro-credentials is to make them stackable towards larger credentials. This is nowhere more true than in the United States where micro-credentials – or, more broadly, "incremental credentials"[1] – are seen not just as a way to promote rapid upskilling, but also as a tool to improve degree completion rates and to provide new ways into post-secondary education. Those jurisdictions which focus on stackability tend to also have a significant focus on Prior Learning Recognition, precisely because of the belief that micro-credentials are most valuable as building blocks towards larger 'macro'-credentials, mainly because these are what the labour market understands and therefore values.

[1] Credentials which can be combined into the longer and more familiar degrees and diplomas.

Portability of credentials. Just because micro-credentials are stackable does not mean they are portable from one institution to another. At some institutions – Northeastern University and its micro-credentials in computer science are a good example here - micro-credentials are designed as a series of stackable "baby steps" towards an ultimate macro-credential (in Northeastern's case, a Master's degree in Computer Science, but they have no wider currency as degree building blocks beyond that particular institution). For portability to occur, two things need to be true: first, an institution offering 'macro'-credentials has to be willing to accept micro-credentials as equivalent to "credits" towards a 'macro'-credential and second, the learning contained inside a micro-credential needs to be sufficiently "legible" that institutions can award such credit with confidence.

The keys to both portability and stackability in micro-credentials are – as we shall see later in this paper – credit equivalency and a qualifications framework. Without these, there is no simple way for an institution to be able to evaluate whether any piece of learning – be it a "credit" or a "micro-credential" - is of sufficient depth to be included in a 'macro'-credential and if so, what fraction of the work required for the 'macro'-credential can be assigned to it. Prior Learning Assessment techniques could of course be used to assess these things, but this is cumbersome and largely negates the value of providing training in a formal setting. PLAR requires that a highly skilled individual with expert knowledge of the field of study, often an academic, review the student's prior preparation. Personnel with the skills to do this are busy and expensive.

Competency-based evaluation. The overlap between micro-credentials and competency-based education ranges from weak to strong depending on the part of the world one is in. At the weak end are micro-credentials which hold no credit value but which attach themselves to transcripts as "badges" - that is to say, the individual is deemed to have displayed important skills (e.g. teamwork) or completed certain tasks (e.g. attended an information session). These are considered "weak" because, generally speaking, there is no hard, replicable standard of evaluation involved.

The strongest form of competency-based evaluation is where credentials are awarded only when the student meets some kind of rigorous and externally validated test. These kinds of credentials have a great deal in common with Prior Learning Assessment and Recognition. For obvious reasons, this type of assessment is seen as key to micro-credentials having a strong employer/workforce orientation (see below) and, provided there is an understood way that skills map on to credit-hour based systems, they can work towards stackability and portability in the same way as any PLAR-to-credit system does. Australia's VET model comes closest to this, mainly because it has a national skills agency (Australian Skills Quality Agency) which has adopted a system of "units of competency" for skills, towards which micro-credentials can be developed. Europe, which has the European Skills/Competences, Qualifications, Occupations (ESCO) model is in a position to do something similar but it has yet to make it into the proposals for the continent-wide framework, possibly because the European framework only looks at credentials which are at the Bachelor's level or above.

In between these two extremes, there is some murky ground. Many time-based courses describe themselves – not entirely without justification – as competency-based because learners are called upon to demonstrate at least competencies directly in a final examination. This is most common in IT/technical programs, where final assessments have some kind of practical component which has a strictly correct/incorrect answer.

However, tech programs are an outlier in this respect: in most fields, it is more correct to say that micro-credential curricula (similar to other courses and programs) are designed to develop certain competencies but students are not strictly speaking assessed on a competency-only basis.

Enterprise alignment. In many countries, micro-credentials are meant to have some kind of alignment with individual enterprises - that is, the curriculum is tailored in such a way as to lead to employment opportunities with an individual employer who desires specialized training. Micro-credentials which are designed this way tend to resemble short-term bespoke training programs which have existed for decades, albeit more at the college level than among universities. This is particularly common in the United States and Canada, though one sees these types of arrangements in Australia and New Zealand as well.

Sectoral Workforce alignment. Singapore is an outlier here, in the sense that its version of Micro-credentials is not meant to align with any individual business needs but rather with nationally-established occupationally-specific skills profiles. This has some obvious benefits to the learner in the sense that taking a specific micro-credential provides them with a measure of achievement which is understood to be requisite to all jobs in the country in a given occupation at a given level of seniority, as opposed to with just one employer. The challenge is that sectors have to agree on skills profiles for different levels of different occupations before institutions can develop courses that cater to those profiles. This is obviously easier to achieve in countries with effective long-term methods of co-ordination between government, industry and educational institutions than in those which lack them. Australia can go some distance in this direction because of the existence of Skills Services Organizations and Industry Reference Committees which work on designing training packages across the country, but it is not yet clear which of these will be involved in developing micro-credentials in the long-term.

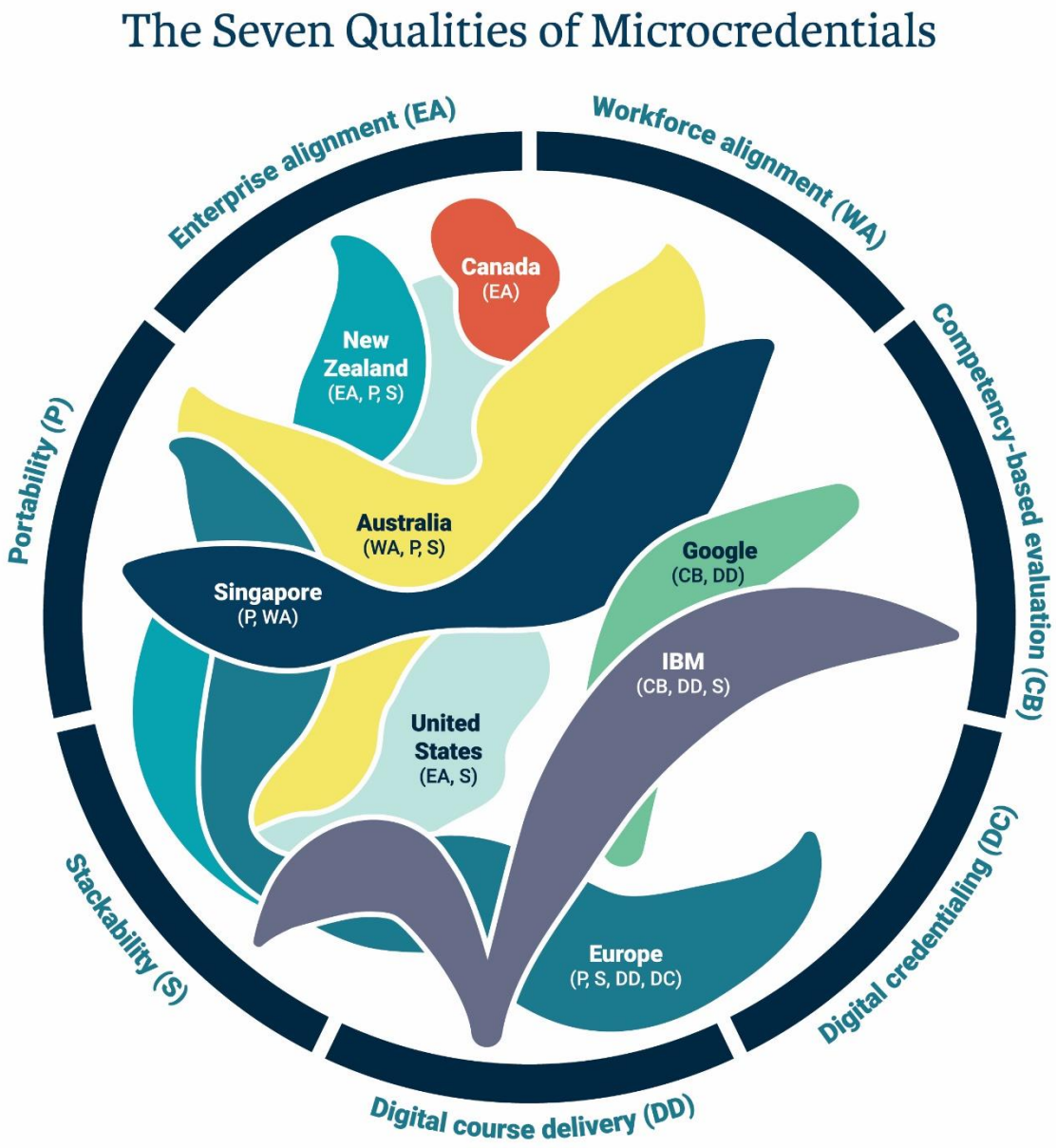
Digital course delivery. At educational institutions in North America, Australia and New Zealand, micro-credential course delivery can take place in a variety of modes - in-person, as well as a variety of blended offerings, or online. The choice is generally left up to the individual institution and is based on whatever the institution believes meets the correct mixture of pedagogical and financial requirements. In Europe, however, the notion of micro-credentials has more or less been driven by big public online open universities and so the very term “micro-credentials” has been entwined with the notion of online learning since the very beginning and is indeed embedded to some extent in the continent-wide micro-credential framework (see the analysis on Europe, below). This is also the case for private micro-credentialing initiatives such as Google Professional Certificates (based on courses delivered via Coursera) or IBM digital badges. In both cases “online” education allows both companies to deliver at enormous scale while maintaining control of content and delivery; and, being in the IT field, competency-based examinations are in effect the norm.

Digital credentialing. Innovations like credential wallets are becoming more and more mainstream across post-secondary education, and so the notion of digital credentialing is one which transcends micro-credentials. And, in truth, the form of the credential is not necessarily linked to the form of pedagogy or delivery. But, under some conceptions of micro-credentials, the fact that the credential itself is digital, and is part of an individual wallet/portfolio (often held in blockchain), is considered to be an essential part of the

identity of micro-credentials. This is notably true in Europe and with American private-sector micro-credentials (again, largely a function of the fact that micro-credentials are conceived of as being “born digital”), but also in Australia, where the government spent millions of dollars creating a “micro-credential marketplace” complete with digital registries very early on in the process of national policy-making on the subject (see the Australia case below)

Below, in Figure 1, we show a stylized version of the foregoing discussion, showing how different micro-credential regimes aim to incorporate varying sub-sets of the seven qualities. In Canada, where emerging provincial policies have tended to encourage rapid skill upgrading and direct alignment between credential content and specific employer skill shortages, the focus has been very tight on the Employer Alignment aspect of the micro-credentials (there are of course exceptions – Quebec has a system which allows the stacking of certificates into a bachelor’s degree). But other countries have chosen different configurations. The US has had a focus on employer alignment, but also on stackability. New Zealand has had a similar employment focus, but has also chosen - to a certain extent – to prioritize Stackability and Portability. Singapore eschews Employer Alignment in favour of Workforce Alignment, but also has a focus on portability. And so forth. The Figure illustrates that micro-credentials in other countries combine qualities that are not typical in Canada.

Figure 1: Seven qualities of (learning labelled as) micro-credentials



To be clear, there is nothing suggesting that any of these other jurisdictions or micro-credential providers have the "right" mix of qualities in their systems. Every jurisdiction will design its micro-credential policies to suit local conditions. However, certain attributes of micro-credential are essentially unobtainable in the absence of certain framework policies. For instance, switching from an Employer Alignment system to a Workforce Alignment system requires having some mechanism for firms to collaborate in order to articulate skill needs. A system of portability requires that individual credentials carry both credit values and an indication of the skill level of the instruction, the latter of which in turn requires an

accepted qualifications framework like those seen in Europe or New Zealand[2]. In the absence of such a system, portability in effect can only work via ad hoc Prior Learning Recognition systems.

National-Level Developments

We have reviewed policy on micro-credentials in several jurisdictions which have higher education systems broadly comparable to Ontario's, in that there is a shared understanding of progress towards degrees and diplomas as the acquisition of credit-hours, and which have potential lessons for Ontario. These include New Zealand, the United States, Singapore, Australia and Europe. These illustrate ways in which the qualifications frameworks can function.

A distinctive element of the micro-credentials space is that many popular certifications are offered by unregulated private providers best-known for providing other services, such as IBM and Google, which illustrate the potential appeal of micro-credentials which are necessarily not designed to be stackable because their creators do not have the legal right to offer higher-level credentials.

New Zealand

New Zealand was the first country in the world to create a national framework for micro-credentials. Key to the country's ability to lead the world in this area were two things: the prior existence of a National Qualifications Framework (the New Zealand Qualifications Framework, henceforth NZQF) [3], and a Quality Assurance Agency (New Zealand Quality Assurance, henceforth NZQA) able to regulate new programs in an effective and efficient manner. The framework provides a set of pre-defined levels into which new micro-credentials can be fitted by the *provider*, rather than the receiving institution having to go through the cumbersome process of assessing each micro-credential according to its own standard.

The NZQF4 classifies all tertiary education programs in the country as being at one of ten levels, from short certificates to a doctorates, and standardizes the minimum number of credits required to achieve each qualification. This level of transparency is not necessarily required at the university level, where the Bachelor's-Master's-Doctorate progression is easily understood, but it is very important at the sub-bachelor's level where there can be considerable confusion about the content of (for instance) "certificates", which can cover a wide variety of expertise. The levels are ordered in ascending order of the skills outcomes expected at each level: so, for instance a 40-credit level one certificate (in a country where 120 credits is considered full-time for one year) would be expected to provide the learner with basic or foundational knowledge, while a 40-credit level 5 certificate would be

[2] In Canada, most provinces have degree frameworks but only Ontario has a qualifications framework which covers other types of post-secondary credentials – though notably not short micro-credentials – and which could in theory permit the kind of portability systems seen in New Zealand.
[3] https://www.nzqa.govt.nz/about-us/publications/insights/aotearoa-new-zealands-rationale-for-micro-credentials/
[4] For an overview of the Framework, see: https://www.nzqa.govt.nz/assets/Studying-in-NZ/New-Zealand-Qualification-Framework/requirements-nzqf.pdf

expected to provide broad operational/technical knowledge as well as theoretical knowledge within a specific field of study.

Having a qualifications framework makes it possible to assign every micro-credential both a level and a credit value. This makes the certificates transparent, facilitates prior learning recognition and makes possible not just the stacking of micro-credentials towards larger credentials within a single institution but portability across multiple institutions as well.

The common rules for micro-credentials, regardless of the sector in which they are delivered (and hence the mechanism through which they are regulated), are as follows:

> *A micro-credential certifies achievement of a coherent set of skills and knowledge and is specific by a statement of purpose, learning outcomes, and strong evidence of need by industry, employers, iwi and/or the community.*
> *They are smaller than a qualification and focus on skill development opportunities not currently catered for in the regulate tertiary education system.*
>
> *At a minimum, micro-credentials will be subject to the same requirements as training schemes or assessment standards and will also be required to:*
> - Be 5-40 credits in size
> - Have strong evidence of need from employers, industry and/or community
> - Not duplicate current quality-assured learning approved by NZQA and
> - Be reviewed annually to ensure they continue to meet their purpose.

The process for regulating micro-credentials looks somewhat different depending on the issuer. Universities in New Zealand are assumed to be largely self-regulating and therefore have the ability to offer new micro-credentials more or less as they please, provided they demonstrably maintain strong internal quality control mechanisms. This self-regulatory status means that at higher levels of the NZQF there are neither centralized rules governing the process of micro-credential creation nor a centralized repository of information regarding the micro-credentials offered. Practices vary with respect to whether such credentials are stackable, and the maximum level at which micro-credentials can be offered, with some seeming to cap it at level 8 (equivalent to an Honours Bachelor's Degree in Ontario) on the framework.

(It is worth noting here that, while New Zealand has gone to some lengths to be make stackability and portability possible, it has also made it a policy to discourage what might be called the "disaggregation" of existing programs into micro-credentials. Thus, if it seems as though existing programs are being segmented for the purpose of awarding shorter credentials more quickly, the application will tend to be rejected.)

Though most institutional policies at least make a nod towards including prior learning recognition in determining eligibility for micro-credentials (i.e., entrance criteria), the impression left by various institutional policies is that portability and stackability of micro-credentials is less of a priority at the university level than below it. In part, it would seem, this is a reaction to the NZQA policy that micro-credentials "not duplicate existing quality-assured programming", which seems to limit the possibility of breaking up existing credentials into smaller pieces. This is in contrast to some emerging practices in the United States where the breaking-up of existing credentials is sometimes seen as a major potential selling point of a micro-credential.

Outside of universities, providers wishing to offer micro-credentials must submit a curriculum and a self-assessment for examination by the NZQA, as outlined in the document *Guidelines for applying for approval of a training scheme or a micro-credential*[5]. Applicants are required to present evidence of employer/community need for the micro-credential, evidence that the micro-credential meets an unmet need, as well as information with respect to basic features of the credential, including structure, content, delivery method, resources/staff, assessment and moderation methods as well as plans for ongoing evaluation/monitoring. Key among the requirements is that the institutions proposing the micro-credential assign both a credit value and a qualification level to the course (5 credits at level 1, 10 credits at level 3, etc.). Having these assigned at the outset, and approved by a government agency, provides transparency at the outset and means that an institution receiving many micro-credentials can opt to rely on this information rather than going through the time-consuming process of assigning a value and level to each of them. The NZQA will not accept an application which does not indicate a value and level where that would be appropriate.

Applications are assessed by NZQA's Quality Assurance division, which is also responsible for assessing training schemes. There are approximately 30 trained assessors in the unit, of which 6 or 7 tend to work on micro-credential files. When an application arrives, it is given to an analyst for examination, with the expectation that the entire process will take no more than ten business days. (New Zealand has a separate evaluative approaches for institutions using Māori language or that are based on Māori culture known as Te Hono o Te Kahurangi; the two are meant to produce similar outcomes despite differing approaches.)

In the first two and a half years since the micro-credential policy was passed, roughly 130 such credentials have been approved by NZQA. This is somewhat fewer than was expected at the time of policy implementation; however, officials note[6] that it took several months for institutions to grow to understand the nature of and requirements for the new credentials, moreover COVID-19 has probably acted as something of a damper on demand[7]. Overall, the policy is cautiously deemed to be a success[8].

It is generally assumed that these kinds of credentials will be funded either through tuition, by employers, or by institutions funding them themselves through existing resources[9]. However, a process does exist by which institutions can apply for funding with calls for funding from the Tertiary Education Commission (TEC) held monthly and decided upon within two weeks, which is very quick by international standards. The TEC is a dedicated agency responsible for distribution funds to tertiary institutions, this process is entirely disconnected from the process of credential approval by NZQA. This type of funding is conditional: fees for micro-credentials are capped at NZ$60 (roughly C$50), except in cases of high operating costs and/or strong industry need. As of summer 2020, roughly one-third of all NZQA-approved micro-credentials had received TEC funding.

[5] https://www.nzqa.govt.nz/providers-partners/approval-accreditation-and-registration/micro-credentials/guidelines-training-scheme-micro-credential/
[6] Interview with NZQA official, 2020/21
[7] The New Zealand border closures meant international mobility was restricted but there were relatively fewer restrictions on work and everyday life than in much of Canada.
[8] Interview with NZQA official, 2020/21
[9] Interview with NZQA official, 2020/21

The United States of America

It may seem odd that although the term “micro-credential” originated in the United States, and the country is home to most of the private-sector initiatives and companies who operate in the micro-credential space, there is perhaps the least common understanding of what micro-credentials are or might be.

There are three key aspects to the situation in the United States.

First, the notion of micro-credentials as badges – that is, denoting skills acquired in the course of taking regular time-based classes, but without measuring those skills through some kind of impartial or third-party examination – is still relatively common and drives a number of companies such as BadgeCert which work with a variety of actors in the education space (not just post-secondary education).

Second, a significant portion of the micro-credential market lies outside the public sector with private trainers. Among the most important of these are Google and IBM, which are profiled below under *Private-sector micro-credentials*.

Third, not only is there no single national framework for these credentials, in practice there are two separate policy paths being taken by the various states. The first favors a stacking approach backed by statewide policies to encourage degree completion (mainly at the Bachelor or Associate level). In policy circles which focus on this type of approach, the term “micro-credential” is to some extent being replaced by “Incremental credentialling” (see especially the work of *Credential As You Go*). This effort is trying to avoid making a strong distinction between “new” micro-credentials and the hundreds of thousands of existing short certifications/credentials which have existed for decades. The real problems these initiatives are trying to solve are around quality control and prior learning recognition so as to make it easier to put them together to give learners a quicker path to ’macro-credentials’ such as degrees. Unsurprisingly, many of these efforts are taking place at the sub-bachelor’s level; equally unsurprisingly, to the extent these credentials are delivered by traditional institutions, they tend to be for credit. As of late fall 2021, 12 states plus the District of Columbia had policies which were focused on completion and stacking.

(A “luxury micro-credential” market also exists for very specific courses in fields like computer science at elite universities like Northeastern or MIT that can stack towards professional master’s degrees from those institutions, but this is a fairly niche market).

The other approach is closer to the Employer Alignment model wherein state governments use financial incentives to encourage widespread institutional-employer collaborations to meet local labor market/skills shortages. As of fall 2021, 16 states provided incentives for micro-credentials for rapid upskilling via local partnerships (of these, only four – Texas, Utah, Kentucky and Virginia – are simultaneously pursuing a state-level completion/stacking approach). Usually, these are non-credit micro-credentials since the goal is not building towards a degree but gaining a direct line to employment. However, there are exceptions. The State University of New York, for instance, allows its campuses to engage in similar direct-to-employment agreements with local employers, only using bundles of repurposed, already-existing courses and curricula. For instance, at one campus in up-state New York, completion of a bundle of four tourism courses plus a short internship at a local holiday resort leads directly to employment at that resort.

Singapore

SkillsFuture is the branch of the Singapore government tasked with ensuring the training the Singaporean labour force. It brings stakeholders together from higher education institutions (referred to locally as “training institutions” even though this encompasses globally-prestigious institutions such as the National University of Singapore), employers, business consultants, labour unions, and government agencies, as well as students and employees at various stages in their careers. Focused on the lifelong learner concept, SkillsFuture seeks to assist these stakeholders in facilitating the transfer of skills to workers through professional and academic training supplied by the institutions and companies themselves.

SkillsFuture runs a number of different programs, including financial aid for mid-career training. But perhaps the most important things SkillsFuture produces are its “Skills Frameworks”, which are developed by working groups in various industries which at least in composition and spirit somewhat resemble Canada’s former “sector councils”. There are currently 33 industries covered by these frameworks. Each framework looks at a number of typical occupational career ladders common to that industry, and comes up with a list of desirable skills at each level of that occupation. This helps corporations do their own planning for training, but – critically – it also marks out precisely for workers which skills they need to be upgrading as they progress through their career. This enumeration of skills then permits various training providers to design courses designed to meet those particular skills.

Although these courses are not called micro-credentials per se, they clearly fulfill similar functions. They are short (course durations can vary from a couple of hours to a couple of months; most last only a few days), they are directly aligned with workforce requirements and can be used to climb the career ladder or to port over to a new occupation. And they “stack” in the more limited sense that there are sequential levels. Taking a level 2 course in – for example – airport logistics follows on from the level 1 course and then in turn leads to levels 3, 4, etc.

Because colleges and polytechnics already provided programs that are professional and career orientated, the adaptation required to teach these kinds of micro-credential courses was relatively minimal. Of perhaps more interest was the fact that research universities such as National University of Singapore (NUS) and Nanyang Technology University (NTU) also became involved in offering courses for individuals at more senior levels, and in fields with higher levels of technical orientation.

In this particular instance, the government’s role in convening the various partners is crucial in “creating” a market. Because the industry councils make strong links between skills and work promotions, learners know that specific courses will have value in the labour market and so are comfortable seeking out the credential (SkillsFuture also makes it easy by linking specific skills to specific courses offered by approved providers on its website). Because institutions know that students see value in the credentials, they are comfortable designing courses in the knowledge that there will be significant demand for the program. As a result, dozens of training institutions compete to provide programs, ranging from private small for-profit schools to major public research institutions such as those who are usually part of the top 200 list of most prestigious universities in the world. Although training centres are free to apply to any segment they see fit to deliver a

SkillsFuture course, over time institutions have generally developed a niche. For example, NUS is dominant in the data science field.

SkillsFuture courses are highly concentrated around digital skills, including computer science, social media, data analytics, business information, data science, and data analytics. Courses are often delivered on campus, which is something of a contrast with institutions in North America that often push for micro-credentials to be offered online. SkillsFuture courses can be credit or non-credit. If they are for credit, they are stackable, and there are a couple of pathways to obtain more credits to build or complement a more traditional degree.

Australia

Australia has been one of the later entrants into the field of micro-credentials policy. This is not because the potential of these programs has been misunderstood (they were being discussed at a policy level as early as 2017). Instead, it is because there has been a great deal more debate about how to make micro-credentials fit not just with the country's National Qualifications Framework but also with its system of "units of competency" which underpin much of the National Skills Framework. It has also taken time to try to create a framework which satisfies the two core constituencies for micro-credentials – those who see them as pathways to degrees and those who see them as pathways to jobs.

Australia's National Micro-credentials Framework – released in November 2021 – is therefore a somewhat more complicated affair than its cousin in New Zealand. Formally, the definition of a micro-credential is "a certification of assessed learning or competency, with a minimum volume of learning of one hour and less than an Australian Qualifications Framework (AQF) award qualification, that is additional, alternate, complementary to or a component part of an AQF award qualification". This can therefore include (i) Vocational Education and Training skillsets or units of competency, (ii) modularised, assessed components of existing higher education curriculum or subjects, (iii) industry learning that is assessed (such as vendor certifications, professional learning) and (iv) other forms of assessed learning or competencies (e.g. Vocational Education/ Higher Education /Industry courses not currently accredited by a regulatory authority, and those by other providers). However, it specifically excludes things like badges which are given without formal assessments and anything which is already recognized as a "macro" credential through the Australian Qualifications Framework.

Though this definition may make it seem as though the primary goal of the Australian micro-credential system is the provision of academic credits, there is still a very heavy steer towards preparing Australians for employment. The "unifying principles" of the Framework prioritize "responsive(ness) to industry need". In addition, the development of the framework took place alongside the roll-out of the "Job-Ready Graduates Higher Education Reform Package" which was implemented in 2020-21 and which had a significant employer/workforce edge to it.

Arguably, the central pillar of the framework is its acceptance of the fact that micro-credentials may equally respond either to a stackability/portability agenda or to an employer/workforce one. The framework focuses on ensuring that micro-credentials all possess certain meta-data needed to make them "legible" to other organizations, be they

educational institutions or employers. In this sense, it closely resembles the European Framework which came out in 2022.

The Micro-credentials Marketplace, which as of May 2022 is still in its design phase, has undergone one change since its inception. Originally, the intention was to list *all* micro-credentials, including those provided by Australia's relatively large private sector training organizations. However, in March 2022, it was announced that the Marketplace would only list those micro-credentials offered by public post-secondary institutions.

Europe

Understanding the progress of micro-credentials across Europe requires grasping three separate sets of developments. The first are changes going on at the national level, the second is the large push for Europe-wide micro-credentials, and the third are the actions of the European Commission.

With respect to national-level developments, the progress of micro-credentials is highly uneven across the continent. They are perhaps closest to coming into the mainstream in places such as Ireland and Scotland, where local Qualifications Authorities have taken the lead in developing a framework and, in the case of Ireland, the government has put several million dollars into a consortium project to bring micro-credentials into the mainstream. The Netherlands and the Flemish Community of Belgium (who share a higher education accreditation agency) have been allowing institutions to introduce and credit new programs on their own for two years now. Finland, Sweden and Norway all have programs which have been described as "micro-credentials" even though few Canadians would describe themselves as such (they closely resemble nothing so much as Canadian universities granting "special student" status to an individual in order to take a few courses without being admitted to a degree program). But it is the development of micro-credential policy at the continental level which is perhaps most striking.

The EU contains a significant number of large "Open" education institutions that wish to deliver MOOCs and thus have an interest in driving high common standards in order to make the credentials better understood and valued by learners and employers. These organizations banded together in the European MOOC Consortium, which is made up of FutureLearn (UK), FUN (France), MiríadaX (Spain and IberoAmerica), EduOpen (Italy), and OpenupEd/ the European Association of Distance Teaching Universities (EADTU). In the spring of 2019, this group released a document known as the European MOOC Consortium Common Micro-credential Framework (CMF). This Framework was much narrower than most other frameworks, in the sense that it was very directive about the quanta of learning to be covered by a micro-credential (4-6 Credits under the European Credit Transfer System in which 60 credits = 1 year of studies) and quite limited in the levels of the European Qualification Framework for which micro-credentials would be granted (levels 6 through 8, equivalent to Bachelor's level or above). Though this initiative emerged mainly outside a governmental framework, it was developed very much in accordance with Bologna Process principles; that is, basing recognition on existing Qualifications and Quality Assurance frameworks.

Finally, in December 2021, the Council of the European Commission itself issued a "recommendation on a European Approach to Micro-Credentials for Lifelong Learning and

Employability". Since the European Commission does not itself run or oversee any educational institutions, the focus of this document was to create common approaches (not standards) to the issue of micro-credentials – specifically with respect to their definition, design, issue and description.

The Council's description of a micro-credential, similar to others we have seen, refers to a "small volume of learning", but suggests that the credential itself consists of "the record of the learning outcomes acquired" during the learning event (that is, in effect, it is not the diploma but the transcript which matters). Apart from this, the document outlines a set of common data elements (i.e., meta-data) to describe micro-credentials for purposes of mutual recognition. These data elements substantially mirror those adopted by the Government of Australia in its NQF and are described in more detail in the next section. The recommendations also include some non-binding advice to countries about how to promote a healthy eco-system for the development of micro-credentials.

Private-sector micro-credentials

Private-sector organizations offering training and certification is hardly new. MacDonald's, famously, has its own university (and, more broadly, a global management training system) which issues credentials of various kinds; in Canada, the five chartered banks and their in-house training regime are probably the largest private-sector trainers, all of which are attached to certifications of various types. Arguably, these are "micro-credentials" of a type, but because they are issued in-house, they tend to not to be portable or visible to the market, and their value to the holder lies in the way that they can use them to gain promotion and seniority within the corporation.

However, some types of corporate-issued credentials – most notably in the technology industry – have long been seen as having validity in the job market outside the companies that issue them. Microsoft and IBM, for instance, have long had various kinds of competency-based credentials which have been used in the IT industry for years. Here, we shine a spotlight solely on two specific sets of corporate micro-credentials: those from IBM and from Google.

IBM, through its Training Division, offers over a thousand "badges" to recognize and document skill in specific areas, and over 150 "certifications" to demonstrate ability in Analytics, Business Operations, Cloud Computing, and other areas. The badges are generally free of cost: those wishing to obtain such a credential simply log on and take a test, making them essentially fully competency-based. The certifications are longer, and consists of a number of short courses. These can be taken directly from IBM – either on its own platform or through Coursera – or from one of a number of certified IBM trainers world-wide. The credentials gained are purely "digital credentials", but they do not ladder into any other credentials.

Google offers a number of career certificates using Coursera as a platform: IT support, Data Analytics, Project Management, User Experience Design, and Android Development. These certificate courses generally take three to six months to complete. Users set their own pace, so the time it takes to finish varies. Most are offered for $39 a month each, so a six-month course is $234 (though it could take more or less time depending on effort); for the Associate Android Developer Certification there is no cost, but the certification exam

costs $149 per attempt. All courses are taught by Google employees. As with IBM, the credentials which come out of these programs are digital in nature and do not ladder into any other credentials.

The fact that private micro-credentials are flourishing mostly in the Information Technology field is not an accident. The tech industry is quite unlike most other kinds of industries in the sense that most “testing” is implicitly competency-based, and can be done online without necessarily having any kind of human assessment. This is because when it comes to programming the only real criteria of success is that a coding sequence – whether to create something or to de-bug something, or what have you – acts the way it is intended to act. Answers either work or they do not, and can be checked by machine code and hence have infinitely scalable forms of assessment. It is notable that the earliest MOOCs - the ones which caused such a stir in 2011-12 - were all in precisely the fields of artificial intelligence and machine learning where these scaling effects are most apparent - something which is not really true in any other field).

These examples illustrate that there is a market for many micro-credentials which are seen to have value independent of any potential stackability and are designed to be standalone. That said, they could in principle be incorporated into degrees and diplomas by receiving institutions. If a shared framework exists, that decision could be made once for each micro-credential.

The models followed by other countries discussed illustrate that it is possible to develop coherent frameworks into which micro-credentials can be fitted by providers. An agreed terminology for talking about the exchange value of micro-credentials is important.

Section II. Getting to Portability and Stackability

While the previous section looked at portability and stackability as two of seven major properties associated with micro-credentials, this section will focus on the processes of enabling micro-credentials to be both stackable and portable; namely, making them "legible" to others by assigning credits and levels, and then attaching these and other forms of meta-data to the credential. This discussion considers the easiest possible case in the current system, in which students are not required to demonstrate mastery of any specific skills or knowledge as part of the core required subject matter of a degree or diploma. Even if subject-matter content were not a factor, as if the macro-credential were made up entirely of electives, there would still be barriers to stackability and portability in the status quo.

Micro-credentials can have value without stackability or portability, but it limits their potential

It is important to be clear from the outset that nothing in this paper denigrates the value of micro-credentials which are not stackable or portable. Micro-credentials can have value independent of degrees and diplomas and are often awarded by the non-credit arms of the same institutions which award these official macro-credentials.

We understand that there are several ways in which micro-credentials can add value to students' experiences of college and university without stacking, and our interviewees pointed to several. These included enabling students to obtain certificates which act as "badges" alongside their degrees and diplomas, which signal skills to potential employers. One interviewee (a developer of Continuing Education for a major university) described this as the potential value of "sidecar credentials" in which full-time students "may be doing their degree but they may be interested in competency certifications that micro-credentials provide, related to their degree area." But they cannot use those credentials to reduce the time needed to complete their degrees.

There is also nothing in the status quo to stop colleges and universities from developing micro-credentials which parallel the individual courses they already offer, in effect quantizing the skills and knowledge obtained from a post-secondary program into discrete blocks which can each carry independent certification (at a lower level). This does not add any new knowledge but may appeal to students as a means of signaling to potential employers or customers, for example if they are seeking an internship or setting up a small business prior to graduation, or simply to make the process of completing a four-year degree in the face of unpredictable personal circumstances seem psychologically less daunting. It also means students who do not complete macro-credentials gain some credentials from their time as students.

While these benefits can be pursued now, they also fall far short of the potential benefits of stacking and porting seen in other countries.

Defining Stackability

Stacking is not something new that is specific to micro-credentials. In a very real sense, stacking is something that already occurs hundreds of thousands of times a year in Ontario, *within* degrees, diplomas and certificates. The reason it is easy is that the building blocks being stacked are called “credits”, each of which has implicitly been assigned a “level”. To understand how this works, it is worth taking a brief detour into how both credits and levels actually function.

Credits

The idea that degrees (and, later, sub-degree credentials) are awarded based on the amount of time spent in study goes back to the earliest universities in Italy and France. However, the notion of breaking up degrees into “credits” is an early 20th century notion. As Amy Laitinen shows in her work *Cracking the Credit Hour*, the logic of credit hours was never meant to define units of student learning: in fact, it was developed by the Carnegie Foundation as a way to measure units of faculty teaching (which was of importance to Carnegie as it was related to its work creating the earliest pension schemes for professors). Gradually, however, in a process that would take many decades, the idea that a degree took (for example) three years became a rule that meant it took fifteen full-year classes which in turn eventually became a rule that said it required 90 credits.

The switch from years to classes to credits was in some sense imperceptible in the sense that it did not necessarily change the amount of time students were spending in classes, but it did provide institutions and therefore students with a little more flexibility in the sense that the number of credit hours assigned to some types of courses could be higher than others (e.g. 4 credits for a laboratory class vs. 3 credits for a lecture class). The way that accumulated credits counted down time on a degree also made it somewhat easier for students to transfer from one institution to another since a student’s progression towards a degree became more transparent, and hence made it easier to establish a student’s place in the progression towards a degree in a new institution.

However, in North America, the credit revolution never quite got to the point where the system was universal. While all degree-granting institutions in Canada use credit hours, they do not use a common system to measure what a credit hour is. This is not simply a question of institutions being unable/unwilling to count the accumulation of classes in a similar manner (e.g. a half-year lecture course at Carleton is 0.5 credits, while at York it is three credits), there is no consistency either within or across universities in defining what counts as credit. Within institutions, there is often very little effort expended in order to determine whether the *content* (i.e., student or professorial workload) of courses with similar credit values are consistent; instead, credits are often simply linked to some kind of standard around contact/teaching hours. However, *across* institutions, there is little consistency in contact hours: even in a single province like Ontario, at some institutions, three hours per week is the norm while at others it is two. This significantly complicates things like credit recognition/transfer since what is being counted as credit varies from one place to another.

Countries of the European Union, when faced with a similar problem after the introduction of the Erasmus mobility program in the 1990s, chose a very different path than North

America. Uptake of Erasmus was limited in the early years because students often found that work completed at foreign institutions could not be counted towards graduation at their home institution because the home institution – faced with differing practices in the context and delivery of education, had no way to know how to assign value to the work done abroad. This prompted all countries within the EU to require their universities to assign each class a credit value (some countries had previously done this, albeit on differing bases, but in other countries, credits were unknown at the time). But, more importantly, they required countries to do it on a basis which was – in theory at least – consistent on a continent-wide basis. This system is known as the European Credit Transfer System.

Under the ECTS, a year of study is equivalent to 60 credits, and – in theory at least – one ECTS is equal to 28 hours of study on the student's part, including both time in class and outside class. Most courses have a load of either 5 or 10 credits (i.e., 140 or 280 study hours). Actual teaching time or "contact hours" is not part of the calculation except insofar as it counts towards the 140 or 280 hours of total work, which makes the ECTS quite different from North American credit systems. In theory, this makes credits not just legible but "standard" across the continent, although in practice there may be some considerable divergence even inside a single institution as to how close the estimates of 28 hours per credit are to reality. Still, the adoption of a single standard was an enormous boon to Erasmus as it made credit transfer much more frequent and predictable, which boosted take-up of the program enormously.

In short, in order to have micro-credentials contribute to stackability, they need to have properties similar to credits, which are currently the building blocks of close to 100% of all credentials at the diploma level and above. There is certainly a complication here in that there is no standard definition of credit in Ontario and the term can mean very different things at different institutions: however, institutions across the province manage this diversity when it comes to granting transfer credit, and there does not appear to be any reason why micro-credentials could not be treated in a similar fashion.

Levels

Over the past few decades, most higher education systems have developed what are known as "qualifications frameworks" or "credential frameworks". These are meant to systematize and clarify the meaning of a variety of credentials. The number of levels in these frameworks varies a bit: the pan-European framework has eight levels (some individual countries within the Union have more) while in Australia and New Zealand it is ten. What they have in common is that all are hierarchical ordinal lists of credentials with the ordination built on the nature of the learning outcomes. At the lowest levels, education is about preparing individuals for the simplest type of work, to be completed under supervision. As the levels increase, the expected learning outcomes are to allow individuals either to take on more rigorous or supervisory work, or to perform work with increasing grades of autonomy. At the highest level – the doctoral degree – individuals are also expected to be able to generate new understandings.

In North America, these frameworks are often just focused just degree-level descriptions: that is, they are degree frameworks which focus just on the bachelor's, master's and doctoral degrees, meaning that anything below the bachelor's level is not really defined

(and to a certain degree not regulated very much either). One of the very few jurisdictions which does include levels below the bachelor's degree is Ontario which has a thirteen-level system The Ontario framework, shown below, is somewhat different from other systems in that three of the levels are typically not considered "levels" in other systems (levels 3 and 4 are usually excluded because they lead to certifications which are not part of the post-secondary education system, and levels 6-8 are usually just divided into two categories).

Table 1: The Ontario Qualifications Framework

		Outcome Emphasis	Typical Duration
1	Certificate I	a level of skills, knowledge and attitudes to allow graduates to meet narrowly defined job requirements.	40 instructional hours
2	Certificate II	a level of skills, knowledge and attitudes to allow graduates to work in a limited range of activities within a prescribed range of functions.	240-500 instructional hours
3	Certificate of Apprenticeship	the skills and knowledge in a specific trade or occupation. Training is workplace-based.	Up to five years
4	Certificate of Qualification	successful completion of the qualification/certification examination for a trade or occupation.	n/a
5	Certificate III	a level of skills, knowledge and attitudes to allow graduates to perform in a defined range of varied activities within a prescribed range of functions involving known routines and procedures.	600-700 instructional hours
6	Diploma I	a level of skills, knowledge and attitudes to allow the graduates to work within a broad range of technical and/or administrative requirements, coordination and evaluation.	1000+ instructional hours
7	Diploma II	a level of skills, knowledge and attitudes to allow the graduates to work within a broad range of technical and/or administrative requirements, coordination and evaluation, and engage students in learning in disciplines outside their main field of study.	1200-1400 instructional hours
8	Advanced Diploma	knowledge, skills and attitudes to enable graduates to work within a broad range of technical and/or management functions in a broad range of occupational areas.	1800-2100 instructional hours
9	Post-Diploma Certificate	Programs either deepen knowledge and skills already gained through a diploma or advanced diploma program or provide graduates of baccalaureate programs with specific knowledge and skills related to an applied occupational area.	600-700 instructional hours
10	Baccalaureate/ Bachelor's Degree	Programs provide some broad knowledge and conceptual sophistication, including specialized knowledge in at least one discipline or field.	6 semesters

11	Baccalaureate/ Bachelor's Degree (Honours)	Programs provide more conceptual sophistication, specialized knowledge and intellectual autonomy. Students learn appropriate applications of conceptual frameworks. Normally require students to prepare, under supervision, a terminal research paper, thesis, project, exhibition, etc.	8 semesters
12	Master's Degree	Programs require the student to develop and demonstrate advanced research skills under supervision. Some programs require students to demonstrate the necessary research, analytical, interpretative, methodological and expository skills in course exercises.	3-5 semesters
13	Doctoral Degree	demonstrated high degree of intellectual autonomy, ability to conceptualize, design and implement projects for the generation of significant new knowledge and/or understanding, and their ability to create and interpret knowledge that extends the forefront of a discipline, usually through original research or creative activity.	3-5 years

Levels are an important complement to credits because while credits define time/effort, levels explain the degree of sophistication of the material covered and the expected learning outcome/ level of mastery. Knowing one without knowing the other is not especially helpful in understanding the actual nature of the course.

In practice, most Ontario universities have used a few of these levels to determine advanced standing in transfer courses for decades. When transferring from one undergraduate university program to another, it is understood than most credits will be level 10, with possibly a few credits at level 11 (generally represented by courses that begin with the number "4": 400-level, 4000-level, etc.). When transferring from a college program to a university one, nearly all credits will be at level 8 or occasionally 9. This is not a "language" that most institutions speak to each other when exchanging information via transcripts, but it is in fact how the process works.

Where it becomes more complicated is with respect to shorter programs aimed at older learners, for instance through continuing education programs. Note that the lowest recognized level is expected to have 40 instructional hours. Because these kinds of courses have not hitherto been thought of as "building blocks" to larger credentials, institutions have not been in the habit of assigning them "levels". This would need to change in order for stackability and portability to become a reality.

How Levels and Credits Combine

In order for stacking to occur, micro-credentials need to possess meta-data indicating two specific qualities: the "level" of education at which the credential is delivered, and a credit value. Note that the issuing body for the credential need not actually award any macro-credentials at that level of education, nor does it need to award credits itself. However, in

order for micro-credentials to stack, the knowledge they embody needs to carry values which are clearly understood by other institutions who *may* be willing to use these as building blocks towards macro-credentials.

It is useful here to think about how a regular undergraduate degree or a diploma is constructed. Each degree or diploma is made up of “credits”, most of which are either at the same “level” as the credential or one level above or below (for instance, most of the credit in a level 11 Bachelor’s degree (Honours) is actually work done at level 10; 4+1 pathways programs are usually some mixture of levels 8/9/10 etc. There are in addition restrictions around the number of credits required in a particular area or concentration (i.e., a “major”), and within that smaller group of credits, there are also usually a few very specific individual courses which must be taken no matter what (i.e., ”pre-requisites”), which complicate things somewhat, but the point here is that for any individual piece of learning to count towards a larger credential (e.g. a diploma or a degree), the outcome of that learning must map on to some kind of learning outcome (that is be at a certain “level”, and it needs to be translated into some kind of credit value.

Technically, not all of these previous outcomes need have come through formal learning with credits attached; Prior Learning Recognition (PLR) can be used to translate informal or non-formal knowledge into the language of levels and credits and in so doing make this learning “legible” for the purpose of stacking and portability. And, technically, micro-credentials could become stackable by this method. However, as is well-known, PLR is a time-consuming process which is challenging to make work at scale. A much simpler way to make micro-credentials stackable and portable is for providers to simply to assign levels and credits to micro-credentials at the point of offer, as New Zealand does, and then include this information as part of the meta-data associated with each credential. It is to the issue of the meta-data that we now turn.

Europe, Australia and the focus on Meta-data

Of particular interest in micro-credential-related policy developments over the past 18 months are developments of new frameworks in Australia and Europe and in particular the convergence of the two frameworks in their stress of the importance of meta-data (that is, data about data). In the context of micro-credentials, what it means is the codification of what data is made available with respect to each micro-credential. By standardizing the data made available about each micro-credential, the “legibility” of each micro-credential is improved. As we have already seen, this is important for the purposes of stackability and portability but it turns out that it is can also be very valuable for the purpose of making micro-credentials.

In both Europe and Australia, the micro-credential frameworks are agnostic as to the actual purpose of micro-credentials (i.e., credential completion/stackability/portability vs. labour market alignment). Indeed, in both cases, the frameworks are designed to enable both pathways. Remarkably, both jurisdictions arrived at the same conclusion, which is to say that take-up of any type of micro-credentials is reliant on their transparency. As a result, both frameworks focus very heavily on the meta-data associated with each credential. As shown below in table 2, both jurisdictions have made it mandatory for the issuers of micro-credentials to attach certain forms of meta-data with each credential. In the EU the “required/optional” data standards tend to be described as “open standards”; in

Australia, the “critical/recommended” elements are designed to be mandatory, with failure to provide data in all categories being made a requirement for courses to be placed in the “national marketplace” for micro-credentials (something which in conception at least is not too far from eCampusOntario’s Micro-credential Portal).

The status quo in Ontario, however, allow meta-data to be very patchy.

Figure 2: Micro credential Meta-data Requirements under the EU and Australian Frameworks

European Union	Australia
Required/"critical" information elements	
Title of Micro-credential	Title of Micro-credential
Name of provider	Name of provider
Country of Issue	Content/Description
Date of Issue	Date of Delivery
Learning Outcome Description	Learning Outcome Description
Workload (in ECTS)	Learner Effort (workload hours)
Level	Credit/recognition (includes level of qualification)
Type of assessment	Assessment
Quality Assurance	Quality Assurance
Form of participation in learning activity (i.e., delivery mode)	Delivery Mode
	Certification
	Prerequisite
	Language
Optional/recommended elements	
Integration/Stackability	Stackability
Prerequisites	Expiration of credential (if any)
Identity verification	Depth of learning
Grade Achieved	Jurisdiction of issue
	Industry Support
	Recommended prior knowledge/experience
	Industry/Occupation
	Industry Alignment

Section III. The Situation in Ontario

> *"PLAR is a huge burden because individual [evaluation of a transcript] takes time" – University Registrar*

Despite the challenges of attributing an exchange rate between their own courses and education obtained elsewhere, Ontario institutions do have established mechanisms for awarding transfer credit. These include pre-negotiated block transfers of credits between institutions, in which institutions gather enough data about each other's course offerings to rank them as equivalent, and PLAR, the labour-intensive process in which subject matter experts read documentation of an individual's past achievements and attempt to assign credit. One assigns credit to specific courses at specific institutions, so future students taking those courses will know they can receive transfer credit, and at least in theory the other involves an examination of an individual's whole past career. Both involve the receiving institution making its own judgements about the level of content of prior learning by reviewing syllabi and other records and therefore are expensive.

Ideally, a model for stacking micro-credentials should satisfy certain criteria. The process needs to be:

- Quick
  - From a learner's point of view waiting to receive credit has significant opportunity costs
- Cheap
  - As always in higher education, resources are limited and staff time is expensive
- Transparent and consistent
  - If learners are uncertain about whether their credentials can be stacked then they are potentially less likely to pursue them and very probably less likely to go through the process of investigating whether stacking is even a possibility (especially if enquiring is slow and expensive). There are also potential equity issues because students who face barriers to education have less access to money, time and information about how the process works
- Flexible
  - The model would recognize learning from a wide variety of sources, not only the most common pathways followed by large numbers of learners.

Block transfers fulfil the first three of these, but by their nature they can only apply to a restricted set of courses. The process involves gathering considerable information which is only economically feasible if enough students are moving between that specific pair (dyad) of courses. They cannot be used to react to new and unfamiliar credentials, and the wide variety of micro-credentials available makes this a major problem for micro-credentials.

PLAR, on the other hand, is as flexible as the subject matter experts choose to make it but because it relies on expensive experts making individual judgments it is much weaker on the other criteria. PLAR gives control over the process to faculty, some of whom can be

conservative in their willingness to award credit. The identity of the subject matter expert evaluating may make the process hard to predict, so students seeking a micro-credential as a step towards a degree or diploma cannot know in advance how much credit they will receive. Costs are often borne by the student making PLAR an expensive proposition if they cannot be sure the savings in tuition will outweigh the up-front cost.

While institutions can assess individual courses for transfer by examining syllabi, it was clear from interviews that this would not be a viable basis for a model of micro-credential stacking that would meet the criteria.

> *"Think about the overhead that would cost [if an applicant were to say] 'I've got 10 different micro-credentials from 10 different institutions and I want to show you that's congruent to Biology 1000.' [swears] 80% of that material has to be congruent and that has to be assessed by an academic. That would be a nightmare, we would never get into that business." – University Registrar*

The underlying problem is that under the current model micro-credentials need to be independently evaluated for course credit in order to be stacked into degrees or diplomas and processing the information needed to do that is expensive. It is too expensive for an individual institution to learn enough about each credential when each micro-credential probably has very limited credit value (because it is so short compared to the larger credential) and they may see few students presenting the micro-credential.

In principle, centralisation of assessment could help. But the examples of stackability and portability in other countries (Section 1) have shown how important consistency of data presentation is in central coordination.

Exploring meta-data

In order to examine the "state of stackability" for this project, we therefore examined the data of over 1700 micro-credentials listed on the eCampusOntario's Micro-credential Portal as of the summer of 2022.

Using the Portal as a guide, we used the institutional links affiliated with each micro-credential to record the following fields of information:

- course title
- host institution,
- credential start/end dates,
- presence of multiple credential sections,
- contact hours,
- credits assigned,
- delivery method
- required prerequisites,
- field of study,
- industry partners,
- professional recognition,
- price,
- stacking,

- credential type,
- OSAP eligibility,
- course description,
- learning outcomes,
- skills/core competencies developed
- the affiliated link to the institutional website.

Most of this information required no interpretation, but in some fields – notably, learning outcomes and skill/core competencies – some interpretation by HESA researchers were required. For example, if a micro-credential posted a list of topics to be covered without providing any information on what the learner would take away with respect to these topics, it was marked as “no learning outcomes provided”.

One very significant challenge early on in the project was the use of the eCampusOntario Micro-credential Portal itself. Apart from being difficult to navigate and challenging to filter, the data provided by the portal is sub-par. The most prominent issue of all is the lack of a time filter. Something on the order of 30% of the micro-credentials listed in the portal are either not currently being delivered or have no start or end date associated with them (i.e., it is unclear if they are currently being offered). In addition, the Portal seems to be a far-from-complete database, in that there are a number of micro-credentials listed on institutional sites which are not listed on the Portal. To take but one simple example: the Portal lists OCADU as offering 7 micro-credentials. A quick check of the OCADU website shows in fact that there are 13 current micro-credentials, of which only 6 are listed on the eCampusOntario portal. It was not possible to cross-check all listings on institutional websites, because these sites often make it extremely difficult to locate micro-credentials amongst other course offerings; however, our estimate is that there are at least 300 courses offered by public institutions which are not listed on the Portal, suggesting that the toral number of courses – as of late 2022 – is probably in excess of 2100.

It should be noted that these numbers are by their very nature approximate because the constantly changing nature of micro-credentials on offer makes absolute certainty about numbers difficult. Between the start (June 2022) and end (November 2022) of this project, the number of credentials listed on the Portal rose from 1742 to 1796, though as noted above this includes several hundred courses with no data on run dates and so may not be currently offered. For this reason, this report uses rough percentages to report data rather than absolute numbers.

Key Data on Ontario Micro-credentials

As of summer 2022, roughly two-thirds of the roughly 1750 current micro-credentials offered by public institutions in Ontario are delivered by universities with the remainder delivered by community colleges and Indigenous institutes. This roughly corresponds to the distribution of full-time students between the two sectors, which suggests that what micro-credential learners are seeking from providers is not that different from what the overall post-secondary market seeks.

While nearly all institutions now offer micro-credentials, some institutions are much more active in the market than others. Our scan of micro-credentials on the portal suggests that

just four institutions (York University, the University of Windsor, Conestoga College and the University of Waterloo) are responsible for the delivery of about half of all micro-credentials in the province: adding the University of Toronto, Lambton College and Queen's University brings it up to about two-thirds.

Figure 2 shows the distribution of micro-credentials by field. In terms of field of study, micro-credentials are clearly available across the spectrum, but they cluster very differently from those in regular post-secondary education. The most common field in which micro-credentials are offered is Business and Management, which is perhaps unsurprising as this is also true of continuing education programs. What is perhaps a surprise is the extent to which micro-credentials are being used in the Education: to a considerable degree, what used to be simple professional development courses are now being given out as micro-credentials.

Figure 2: Distribution of Micro-credentials by Subject

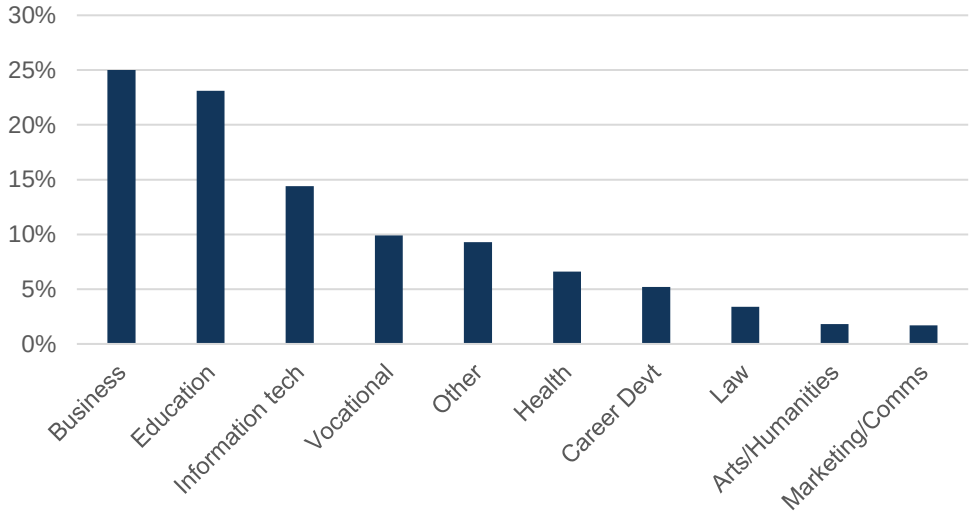
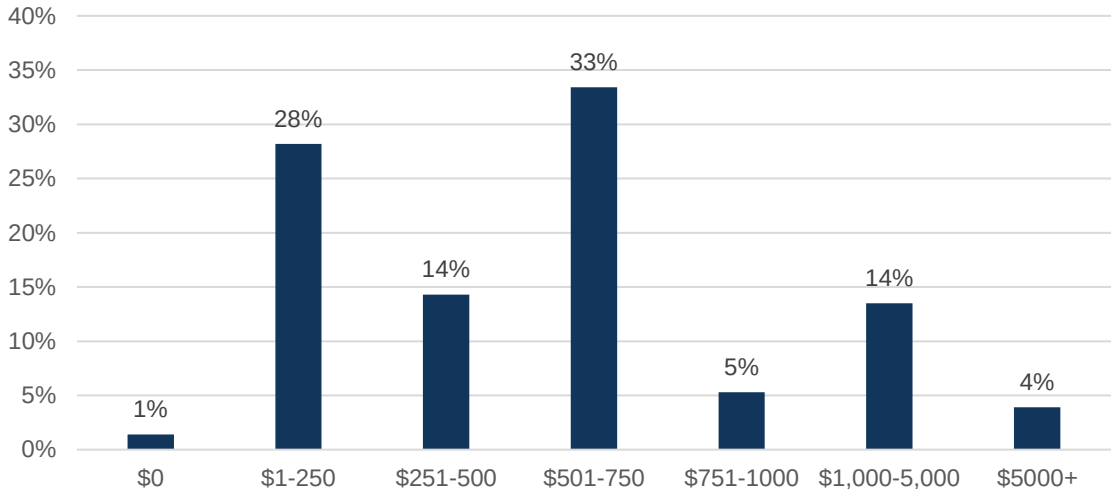


Figure 3 shows the distribution of micro-credentials by price. Most micro-credentials are very reasonably priced, with a few of them offered free of charge and three-quarters of all micro-credentials costing under $750. Since a year of studies at the undergraduate level in Ontario average about $7500 with ancillary fees included. This suggests that many institutions are pricing micro-credentials as if they were an individual undergraduate course, or treating the undergraduate course price as a reference or ceiling. For the most part, the micro-credentials offered at $1,000 or above are comprised of multiple courses or modules.

Figure 3: Distribution of Ontario Micro-credentials by Price



Evaluating the Meta-data in Ontario Micro-credentials

As noted in the Section II, one of the emerging areas of consensus globally with respect to micro-credentials, and the one which has the greatest potential to improve stackability and portability of is the quality of meta-data associated with micro-credentials. Unfortunately, the state of this meta-data is not good. Quite apart from the fact that the meta-data for individual courses can show different things depending on whether it is on the institutional website or that of eCampusOntario, in too many cases there is simply no data available for things which in other countries are considered key required fields.

Content Descriptions:

Roughly 98% of active micro-credentials have content descriptions. However, the quality and descriptiveness vary. Roughly a quarter of all micro-credentials possess no description. Of the remainder, roughly two-thirds (50% in total) have what might be called "limited" information, while one-third (25% in total) have high-quality descriptive information.

An example of a "limited" course content description is the University of Windsor's micro-credential in Additional Basic Training in Green Studies has the following description "*This course focuses on the skills and theory underpinning the study of Green Industries. This course addresses student development, program planning and delivery issues in the school environment."* While this technically qualifies as description, in truth it does little to enlighten the potential learner about the learning activities involved in the class.

At the other extreme, there is the Osgoode Hall (York) description for its Certificate in ESG, Climate Risk, and the Law from Osgoode Hall at York University described below in Box 1:

Box 1

Course description: Certificate in ESG, Climate Risk and the Law

"Environmental, social and governance (ESG) risk, once optional, is now a critical business priority. Global financial markets, scientific data, government policy and public opinion are converging to drive rapid legal, business and cultural changes in the area of ESG-related risk management. At the same time, ESG and climate-related risks are leading to greater legal and regulatory claims, shareholder activism, investor class-actions, and public "naming and shaming" in cases where an organization is not adequately prioritizing ESG and climate issues.

In order to effectively navigate and advise on legal and operational ESG and climate-related risks and issues in the context of governance matters, commercial transactions and investments, and to avoid legal liability and reputational risk, you must have a solid grasp of the complex and evolving laws and expectations in this area.

Designed by governance, climate-risk and policy experts for board directors and legal and business professionals whose work involves governance, commercial transactions or investments, this unique new Osgoode PD Certificate is the only program of its kind for Canadian organizations, boards and legal advisors to upskill in this important area.

Over five engaging days featuring discussion and case studies, you will learn how to evaluate, navigate and disclose common ESG and climate-related risks and opportunities, establish and develop an ESG framework within the corporate culture and decision-making process, and set suitable ESG-related legal risk management and operational goals.

Completing this program will enhance your knowledge and refine your repertoire of risk management strategies and techniques for navigating ESG and climate-related issues, potential liability exposure and opportunities and provide you with valuable resources.

Online Primers – Foundations in ESG, Climate Risk and the Law.

Included with the Certificate, these online primers are available on demand, and they cover core concepts to set the stage for the program modules (primer content will not be covered in class). It is strongly recommended that you view all five (5) primers before attending the program. To obtain your Certificate, all five (5) primers must be viewed: ESG, Law and Policy Primer (75 mins, 2021), Climate Science, Risk and Carbon Neutrality/ Net Zero Primer (90 mins, 2021), Governance Framework for ESG Primer (50 mins, 2021), Indigenous Rights, Consent and the Duty to Consult in Canada Primer (100 mins, 2021), Indigenous-Led Projects and Partnerships Primer (80 mins, 2021), and

Registration includes 120-day unlimited, online access to the recorded program.

The difference here between the York and Windsor examples is enormous, and most descriptions lie somewhere between these two extremes. However, for the most part institutions choose descriptions which lean towards the briefer end of the spectrum.

Learning Outcomes:

For the purpose of this analysis, this section is divided into “learning outcomes” and “core competencies”. The former describe the *topics* over which learners should have some degree of mastery at the end of the course while the latter are the skills to be developed develop during the course. If a course included a list of topics (e.g. business planning) but did not describe what a learner may take away from the course (e.g. at the end of the course, learners will be able to develop a business plan that encompasses financial strategy, marketing and communications, and project management) it was not counted as a learning outcome.

The University of Toronto is one of few institutions that consistently and clearly includes both the learning outcomes and course competencies in its meta-data. For example, the outcomes and competencies for its “Managing People: Essentials” micro-credential reads like the one in Box 2.

Box 2

Learning Outcomes – Managing People: the Essentials

“WHAT YOU'LL LEARN:

By the end of this micro course, you'll be able to:

- *Describe the role of a manager.*
- *Use a human-performance model to diagnose performance problems.*
- *Identify performance gaps.*
- *Troubleshoot problems to determine why they occur and how to fix them.*

Competencies/skills developed in this micro course include:

- *Performance Management*
- *Performance Planning*
- *Performance Monitoring*
- *Problem Solving”*

In total, fewer than 25% of micro-credentials had both clearly outlined learning outcomes and core competencies listed. Intriguingly, a very high proportion of these came from a single institution (the University of Toronto). Roughly have 50% had learning outcomes listed but not core competencies. The final 25% did not list any learning outcomes or core competencies.

Contact Hours:

Every course in the eCampusOntario Micro-credential Portal has a number of contact hours assigned to it, ranging from 2 to 480 hours. This is because listing contact hours is a requirement to be listed on the site: in many cases parallel information is not available on the host institution’s website. This is at the very least a good sign that eCampusOntario can affect micro-credential meta-data through its listing policies.

Credit:

Very few micro-credentials (roughly 4% of the total) in the province of Ontario are listed as bearing academic credit and they are situated almost exclusively in five institutions: Conestoga College, Cambrian College, Mohawk College, St. Clair College and Lakehead University. The rest are assumed to be non-credit courses, though it is possible that there are a few where credit is given but not mentioned in the meta-data.

In a select few cases, there are courses that have non-academic, professional credit hours associated with them. These are courses that have an industry partner affiliation and completing the micro-credential counts towards experience hour for a professional designation. For example, completing “Managing Complex Projects” at the University of Waterloo earns a learner 14 credit hours towards a Project Management Professional designation from the Project Management Institute. Only two institutions, York University and the University of Waterloo, seem to offer/promote these credit hours as a main feature of their completing their micro-credential. It does not appear that these courses have any credit-value within the institution.

Level of course:

Because so few courses bear credit towards a credential, there is really little need to associate learning with a specific level, and thus there are few courses that do so. The only relative distinction comes from the course being offered by a university or a college. There are some courses that contain an institutional course code within the title (e.g. University of Toronto’s 3197B - Presentations with Visual Impact or Georgian College’s “TATA0032: Coaching”). However, these codes have limited meaning beyond an individual institution and given little to no information to the learner or the employer about the level of learning.

Assessment method:

Understanding how learning is assessed is a key piece of meta-data transparency: just as learning outcomes tells one *what* was learned, a description of assessment methods tells one how the issuing body knows whether or not such learning was actually achieved.

The most complete examples will tell one two things. First, it will describe how students are evaluated, and second, it will describe the meaning of the grading scale used to denote the degree to which the learner has met the objectives of each evaluation. So, for example, the assessment criteria for Western University’s micro-credential “Teaching Online” is shown below in Box 3.

Box 3

Assignment criteria: Teaching online

Evaluation:
Assignment #1 – 10%
Assignment #2 – 10%
Assignment #3 – 15%
Assignment #4 – 15%
Assignment #5 – 50%
Total – 100%

Notes on assignments (papers and reports):

- *Must follow general APA style in format, references, and citations*
- *Must be academic in style and content*
- *Must include title page and references, where required*
- *Must include data that is based on clearly identified research and sources, where required*

Grading:
A+ 90-100: One could scarcely expect better from a student at this level
A 80-89: Superior work which is clearly above average
B 70-79: Good work, meeting all requirements, and eminently satisfactory
C 60-69: Competent work, meeting requirements
D 50-59: Fair work, minimally acceptable
F below 50: Fail"

The kind of description shown in Box 3 is an example of what be called fulsome assessment criteria. Under 20% of all micro-credentials listed on the eCampusOntario Portal meet this description. A more common situation (roughly 40% of cases) is when the micro-credential description provides a list of types of assessment but lacks either weights or a grading scale or both. For example, Ontario College of Art and Design University's "Becoming a Content Creator: Advanced Social Media Marketing for Creative Entrepreneurs Micro-Credential" falls into the second category with their assessment description: *"As part of the modules in each micro-credential, you will complete assignments and exercises outlined in each micro-credential. These build towards the required evidence for each micro-credential that is submitted at the end of the micro-credential modules."*

Finally, there are many micro-credentials where no assessment data is to be found. These also constitute roughly 40% of all micro-credentials.

Delivery mode:

Roughly 70% of all Ontario micro-credentials are delivered fully online. However, it is not always clear from the meta-data whether the course is synchronous or asynchronous. Among those that do offer this information, and where the class is synchronous, the most typical delivery model is a single weekly session lasting for one to three hours. However, it

is seldom the case that these “class times” sum to the contact hour count given on the eCampusOntario portal. Our interpretation therefore is that most institutions are not equating “contact hours” with the traditional “learner-instructor-interaction” but rather providing an estimate of the time learners will need to spend with the materials and participating in assessment activities (that is, something more akin to the European model of describing credits in terms of estimated hours of work)

The next most common delivery method (~14%) is “in-person only”. For the most part, these courses are vocational micro-credentials: that is, college-based non-credit courses in welding, truck driving, plumbing, and food services. For example, Confederation College’s “*AZ Truck Driver MELT (Mandatory Entry Level Training)*” or Lambton College’s “*Performing Plasma ARC Cutting*” both fall within this category. There are fewer examples of universities offering fully in-person micro-credentials, but these do exist: example, Trent University offers a micro-credential certificate for English, Leadership, and Community where students spend four weeks completing the credential on Trent’s campus. Finally, there are also a few university-level micro-credentials that are delivered in dual mode: with some sections delivered online and others delivered in person. These are mainly in information technology and computer sciences.

The least common (>0.5%) are courses that are hybrid in nature, with both an online and in-person component. These tend to be concentrated in science/life-science based micro-credentials in rurally-located schools. It is likely the catchment area for these courses is anticipated to be within the community so learners can participate in both the online and in-person sections.

Just over 16% of micro-credentials did not list a delivery method.

Quality Assurance:

None of the micro-credential we examined listed any form of quality assurance processes. Presumably this reflects the overall lesser role of external quality assurance in Canadian post-secondary education than in the other systems described in Section 2.

Stackability:

There are no examples in Ontario of being able to obtain a diploma or degree *exclusively* though stacking micro-credentials, as is sometimes the case in the United States (e.g. Northeastern). There are however some examples of micro-credentials stacking towards a certificate: for example, at Conestoga College, completion of five individual micro-credential courses stacks into the “Certificate of Academic Integrity in Post-Secondary Teaching.”

Industry Partners:

Fewer than 6% of micro-credentials are listed as having industry partners attached to their delivery. This may perhaps understate the degree of industry involvement in micro-credentials: companies may have been involved in delivery and not listed, or they may

have been involved in the conceptualization and design of the programs without having been credited as such in the meta-data. Where such participation is noted, it tends to occur in the fields of information technology and computer sciences, business, and within vocational fields.

Industry Recognition:

Industry "recognition" – that is, providing courses which are recognized by industry certification bodies – is a much more common type of industry affiliation that a straight delivery partnership. Roughly one in six credentials contains some meta-data to this effect. This is particularly true in fields like business, where for example the University of Waterloo's "*Advanced Project Monitoring and Control*" micro-credential is "recognized" by the Project Management Institute to count towards a Project Management Professional designation, even if it is not directly partnered with the Project Management Institute itself. It seems likely that this is actually a significant undercount, as most of the Education micro-credentials appear to be designed (or perhaps converted) to meet ongoing professional development and thus are likely recognized by the Ontario College of Teachers, though few courses actually make note of this.

Final Observations on Ontario Micro-credentials

Beyond the simply descriptive nature of the data presented here, there are a couple of observations to be made about the data on micro-credentials in Ontario.

The first is that while micro-credentials are still an emerging field, they are finding footholds in in nearly all public institutions across the province and indeed across a wide variety of fields of study. While there are a few clear institutional pioneers (York, Windsor, Conestoga) and a few field-of-study clusters (Business and Education), there is every reason to believe that this will be a wide-ranging phenomenon for years to come.

Second, there seems to be a significant reluctance to offer micro-credentials for credit, particularly in universities. There may be a number of reasons for this, but the most obvious barrier is structural: micro-credentials are often treated as a subset of Continuing Education, which not only tends to focus on clients who already have some kind of diploma or degree but also are structurally unable to give credit towards degrees which are approved by university Senates.

There are several implications of these observations. The first is that institutions are not really designing credentials with individuals who might have an interest in stackability in mind. In fact, for the most part, what appears to be the case is that these are being designed and driven for largely the same kinds of markets that institutions have been serving for decades through Continuing Education units. It is not possible to say that micro-credentials in Ontario are simply old Continuing Education products in new clothing, but this might be the case for a significant percentage of them.

A second implication follows from the first: although stackability/portability is possible through better use of credits/levels and other meta-data, little attention has been given to meta-data or assigning credit values.

Finally, it is worth noting that in general, the state of meta-data on Ontario credentials is a long way from global best-practice. The meta-data taken for granted elsewhere is frequently missing or unreliable.

eCampusOntario could impose standards as a condition of listing on its Micro-credential Portal. However, the issue of comparability runs through whole Ontario system, with most individual instructors able to organize their syllabi as they choose and no requirements to record meta-data or describe learning outcomes in any prescribed format. The costs to institutions of co-ordinating all their instructors to present meta-data consistently would be considerable and it is not clear that the benefits of being listed on the portal are a powerful enough incentive to make them bear those costs. Individual institutions would probably need quite a significant incentive to ensure consistency in meta-data.

Section IV. Possible paths to stackability

Ontario's current model is not the only possibility for stacking micro-credentials into macro-credentials. The barriers to portability between institutions and stackability into hierarchical credentials identified by experts in the Ontario system have been partially addressed in the other countries studied. There are also more radical options which have occasionally been tried.

Mandating comparable meta-data

Currently, each unfamiliar credential presented to a college or university for transfer or PLAR must be examined at the level of the syllabus and syllabi are not mandated to follow a single consistent format. Instructors can often freestyle their learning outcomes and the concepts taught, which makes comparing the syllabi into highly-skilled work requiring subject matter expertise. As shown above, even the meta-data provided to eCampusOntario is frustratingly inconsistent.

Encouraging credential developers to create meta-data which is more easily understood by other institutions in the process of creating micro-credentials would reduce the information processing costs. Essentially, this would involve creating a list of options for content, level and credit value. Providers could choose from this fixed list of options and attest to them.

Standardising meta-data about the level, credit value and content of a course would convert what is currently an artisan process requiring highly-skilled subject matter experts into a general skill which could potentially even be partially automated.

Institutions offering micro-credentials could be incentivized to publish meta-data about them in a more standardized format in various ways. Meta-data could be required for

- Listing on public catalogues e.g. eCampusOntario's portal
- Eligibility for public funding
- Acceptance for stacking by public colleges (which MCU can direct using Binding Policy Directives) and universities

The simplest way to provide meta-data may be to parallel diploma and degree courses as closely as possible, so that level and value would be expressed in hours of study and the pre-requisites needed. It would equally be possible to develop a competency-based model in which the skills developed through a particular credential are defined in a pre-determined grid (with developers able to apply to add new skills to the grid where necessary) similar to current practice in Singapore.

The limitation of this model is that, without central oversight of what level, content and credit values are being claimed for a micro-credential, it essentially relies on an honour system. Providing misleading information might become self-penalising if it harmed the reputation of the institution or the individual staff involved. However, academic credit has a very real economic value in the labour market and, if a micro-credential could be used to avoid the tuition and time costs of completing a diploma or degree course, its value to learners would increase.

Assigning guidance on credit value at source

One obvious solution is some kind of centralization in which the issuer of each micro-credential seeks to have a credit value and level within a qualifications framework (e.g. one credit-hour towards the second year of an undergraduate degree) assigned by a trusted third party. This would reduce the overall information cost to the system, since the labour-intensive process of evaluation would take place only once rather than needing to be replicated for each possible combination (dyad) of sending and receiving institutions. Institutions asked to stack micro-credentials into their diplomas or degrees would not need to make individual judgments about the credibility of each individual provider.

In New Zealand this role is filled by the New Zealand Qualifications Authority (NZQA). In New Zealand this is largely a paper exercise in which the provider has to convince NZQA of its capacity to manage the training and that they can realistically expect to achieve their learning outcomes. However, the need to submit to a central authority opens the possibility of an application being challenged.

It is also possible to imagine a central body taking on a more active role than in New Zealand, for example by policing the correspondence between learning outcomes and level or credit value (perhaps by comparison with the content of conventional for-credit courses) or by tracing the progress of learners who have stacked a micro-credential to verify whether they are adequately prepared and eventually graduated with a degree or diploma.

In an Ontario context a similar function could potentially be performed by the Province or a Provincial agency. This would mean the cost of the work appearing on government's administration budget or fees needing to be levied on micro-credential providers, but the total cost to the sector would be much lower than having micro-credentials evaluated by receiving colleges and universities. In the current system, the cost of evaluating credentials is repeatedly duplicated and either absorbed by colleges and universities or charged to students through PLAR fees.

If the Province does not take on the role, universities and colleges could contract with a private agency which will handle the considerable information costs for them in exchange for payment. Many institutions already allow private companies to have input into their admissions decision-making (also a fairly crucial dimension of a university or college's reputation) when they have to decide what foreign credentials to recognize. Private providers such as World Education Services (WES) employ staff with specialist knowledge of college and university entrance credentials around the world, relieving admissions staff of the need to remain up-to-date on such a huge volume of information, for a fee. Effectively, WES is trusted to establish an exchange rate between grades on an exotic credential and the more familiar Ontario Secondary School Diploma which enables a student to be admitted. Receiving institutions can challenge WES's judgment or reject the exchange rate, but in practice this is rare and many thousands of foreign credentials are accepted each year on WES's recommendation.

Decoupling examination and teaching

An alternative approach would be to make micro-credentials into pre-qualifying mechanisms allowing learners to access tests comparable to those taken by regular degree and diploma students.

Stacking micro-credentials obtained elsewhere into diplomas and degrees will inevitably decouple teaching from examination. If there are concerns about how far micro-credentials offered by diverse providers will prepare learners for degrees and diplomas, models based on separate examination could also facilitate stacking. In essence, micro-credentials could pre-qualify learners to challenge exams taken by regular students, without the need to complete coursework[10]. This could allow an entrepreneurial college or university to position itself as a specialist in serving students who have many unconventional credentials to stack into a degree or diploma.

This is far from unprecedented, and in fact many of the older English universities are collegiate institutions where the university once had no role in teaching and instead provided examinations to students who were taught in colleges. For much of the 19th Century England had only two universities, both of which were open only to Anglicans, and growing demand for higher education in its cities. The University of London was established to provide common exams to, initially, two colleges in the city which did the actual teaching. The university was initially controlled by the government, which opened its examinations to other colleges approved by the government. Eventually University of London exams were opened to anyone who could show preparation. A number of institutions developed as effectively tutoring services for students who would ultimately take University of London exams. It is still possible to take University of London exams by correspondence from abroad without attending any classes in London, and the university allows independent colleges around the world to become Recognised Teaching Centres where students can prepare for University of London exams in a classroom environment.

Awarding credentials (and credentials in which quality control is crucial) to candidates who can show alternative forms of preparation by examination alone is also not unheard-of in modern Canada. Apprentices who have enough work experience are able to challenge qualifying exams, avoiding completion of all the normal classroom training, provided they meet certain requirements. Their on-the-job training is a necessary pre-qualification for being able to take the exam, preventing spurious applications by potentially-dangerous unprepared candidates, but anyone who passes is allowed to become a journeyperson as if they had the complete program of training. Other forms of preparation, including micro-credentials, could potentially fill this role.

A decentralized challenge model could allow the universities and colleges which award degrees and diplomas to retain quality control of examinable material, although not the wider student experience. They could still impose some residency requirements and use micro-credentials as evidence that the candidate had appropriate preparation.

Alternatively, one body could offer exams for all of Ontario and set pre-qualification standards independently of colleges and universities. In South Korea the government

[10] While colleges and universities tend to require that students register for courses as cohorts and are then tested, this is not necessary. Western Governor's University, for example, largely decouples progress though its degrees from the academic calendar by allowing progress once a student can demonstrate competence (https://www.wgu.edu/student-experience/learning/scheduling.html).

provides a bank of exams which students can challenge without attending university and receive a ('no-name') Self-Study Bachelor's Degree from the government if they are successful. Although most challengers have some formal preparation, the government does not teach or require any teaching and is agnostic about the form of preparation. Similarly, the Higher Education Law of the People's Republic of China commits the government to offer examinations for self-taught students and there are many agencies which do not have their own degree-awarding powers preparing learners for these exams.

Having a centralised bank of exams would clearly be more efficient than a decentralized system, but in a higher education system in which prestige is seen as important the degrees awarded can be seen as inferior to those of selective universities. Further, institutions which prepare students for exams set by others will sacrifice some degree of autonomy in the content of their courses, leading to greater difficulty in developing an independent reputation for developing programs.

That said, some institutions might welcome such a system. Not all Ontario institutions necessarily value autonomy and strengthening their brand more than being able to access Ontario-wide exams. Importantly, once an institution offers a standardized exam students who have completed one have a very clear claim for advance standing at other institutions which also use that exam. Hence the value of passing a standard exam increases as more and more institutions use it.

Private career colleges (PCCs) are potential users of such exams. Because they operate as private businesses, the costs of assessing how prepared aspiring students are and assigning them an appropriate level (not to mention simply writing their own exams for every course) cuts into their budgets, so standardization could save them money as well as facilitating transfers between PCCs. Many PCCs are not brand-name institutions and being able to boast a high pass rate on exams set by a trusted third party could legitimize them in the eyes of potential applicants. From their point of view, having someone else write and administer exams to their students could be a valuable endorsement of the quality of their teaching. In fact, Ontario PCCs at one point shared exams across the sector, with their national body distributing the same exam across the country on the same day and arranging centralized grading.

> *"With most prior learning models each school goes through an assessment of what the person's coming with … When I started teaching… many of the private career colleges used curriculum for courses, not programs but courses, which were given to us by [the national body of career colleges] but that program died in the 1990s. Talk about that portability for the student".*

Re-establishing such a system but allowing holders of micro-credentials to sit the same tests as PCC students could be a viable option for this sector.

Even for public institutions, developing assessments themselves is time-consuming and therefore expensive. Smaller institutions may favour the convenience of using someone else's assessments over autonomy. For example, some Indigenous Institutes choose to mainly offer programs developed by larger institutions, developing their academic identity from links to the community rather than distinctive programming.

A new institution

If the Ontario government is committed to allowing micro-credentials to be stacked into higher-level credentials, the most radical option would be to create a new institution with a mandate to award diplomas and degrees based on a wide range of prior education.

A new institution could be designed to avoid some of the barriers created by the current system. For example, almost all Ontario degrees and diplomas are awarded in specific subjects, so our discussion has assumed that we need information about the content of courses and micro-credentials, but when discussing the impact of the education they provide universities in particular often emphasise generic transferable skills their graduates develop. It is possible to develop degrees in which students demonstrate learning to a high level but not necessarily in any specific subject, taking the liberal arts tradition of choosing individual courses based on interest rather than a prescribed sequence to its logical conclusion. Some of the Scottish universities, by contrast, award 'general' degrees for which a graduate only needs a certain number of courses at various levels, with no specific subject requirements[11]. This philosophy would simplify stacking of micro-credentials, since institutions would only need to assign a credit-value equivalence and a level and could largely ignore the subject-specific details of the content.

It might seem that the government could simply order institutions to stack micro-credentials into their degrees and diplomas, but in practice this would probably not be very effective. In theory public universities and colleges are subject to government control, but the levers that the government can use to control their activities are somewhat limited. Universities are legally independent entities governed according to their own legislation (which gives considerable powers to Senates dominated by often-conservative academics). While public colleges can be guided by Minsters' Binding Policies (which, among other things, mandate that colleges have PLAR processes), colleges now obtain a relatively small proportion of their funding from the government. With most income coming from students, the value of control over their own credentials is quite considerable and the relative value of the funding they receive from government is much lower than it once was:

> *"On the college side I suppose the Minister can just, at a stroke of a pen [compel stacking]. I think the challenge is I think [my college] is about 22% government funded at this point […] the pushback would be 'what right do you, government have to regulate our business, essentially."*

Creating a new body to award diplomas and degrees, without an independent reputation to protect and faculty with influence over the process, would bypass these concerns.

Governments have created new institutions in the past to facilitate degree completion by students who hold unconventional mixes of past education. An example is the Korean Credit Bank. Briefly, the Korean Credit Bank was a response to large numbers of South Korean students being unable to complete degrees due to the difficulties of transferring credits between universities. The Bank is not a university as such but publishes standards for credentials which can stack into degrees. If a credential meets the criteria, the Bank can award credit towards one of its own degrees. The limitation, again, is that these are

[11] *https://www.st-andrews.ac.uk/students/academic/academic-advising/rules/degrees/*

effectively ‘no-name’ degrees in a graduate labour market dominated by brand-name credentials.

This radical option is probably unlikely in Ontario. There would be obvious economic and political barriers to creating a new institution to award credit for courses which existing institutions will not recognise at that level. However, it is a possible way for a government to ensure micro-credentials are stackable if institutions come to be seen as an insurmountable barrier.

Conclusion

The architecture of higher education in Ontario creates barriers to stackability and portability of micro-credentials. There are a range of options which could be pursued to destroy these barriers, ranging from the radical to the relatively gentle.

Comparing Ontario with other jurisdictions shows that considerable gains can be achieved through relatively modest changes in how data about micro-credentials is presented. Many of the problems of credit transfer and recognition of prior learning are informational and economic – it takes a lot of time and subject-matter expertise, and therefore costs too much, to evaluate the potential credit value of different micro-credentials within a highly fragmented system.

If there is a will to help students to stack micro-credentials into degrees and diplomas, a relatively gentle first move in that direction could be

- to develop a mechanism to co-ordinate how meta-data about micro-credentials is gathered and presented or
- to designate one agency to provide a centralised (probably advisory) assessment of a fair exchange rate between various micro-credentials and college or university credit.

Such ideas have been tested in other countries.

Given the difficulties of co-ordinating dozens of independent institutions, making meta-data consistent to the level of the European Union, Singapore or New Zealand would be an achievement in Ontario. However, if stacking of micro-credentials into degrees and diplomas becomes common in the future then *some* degree of co-ordination seems like it will be needed if the process is not to become infeasibly cumbersome for individual learners.

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