



Micro-credentials for Lifelong Learning and Employability: Uses and Possibilities

The Council of the European Union (EU) adopted a proposal for a Council Recommendation on a European Approach to Micro-credentials for Lifelong Learning and Employability in June 2022 (Council of the European Union, 2022^[1]). It recommends a list of measures that EU Member States could consider implementing to support the development of a micro-credential ecosystem and deliver on their potential to support lifelong learning and employability. EU Member States are invited to implement the Council Recommendation and inform the Commission of planned national measures by December 2023. Governments in other regions, particularly Asia-Pacific and North America, are taking similar steps to develop a policy infrastructure for micro-credentials.

The OECD launched a Micro-credential Implementation Project in August 2022 to assist countries in their efforts to develop national measures. With financial support from the EU, it aims to i) strengthen the evidence base on the current and near-term potential of micro-credentials and related challenges and ii) outline practical approaches and steps that countries can take to deliver on that potential and address challenges.

This paper is the first of two planned project publications, aiming to strengthen the evidence base on the potential of micro-credentials. Taking into account the evidence already developed by different bodies with respect to micro-credential innovation (including OECD's recent papers "Micro-credential Innovations in Higher Education (OECD, 2021^[2])" and "Quality and Value of Micro-credentials in Higher Education (OECD, 2021^[3])"), it principally focuses on the areas where evidence is still limited, namely whether micro-credentials can contribute to:

- a) enhancing employability, labour market participation and outcomes among completers;
- b) widening pathways from upper secondary, including vocational education and training (VET), to higher education and improving completion of higher education; and
- c) promoting social inclusion among disadvantaged learners and workers.

This paper will be followed by a second paper that outlines practical approaches and steps that countries can take to deliver on the potential of micro-credentials. The second paper is envisioned to be published towards the end of 2023 and will include a set of implementation and monitoring indicators that countries can use to facilitate national discussions and case studies from the four EU Member States that participate in the project, namely Finland, the Slovak Republic, Slovenia and Spain.



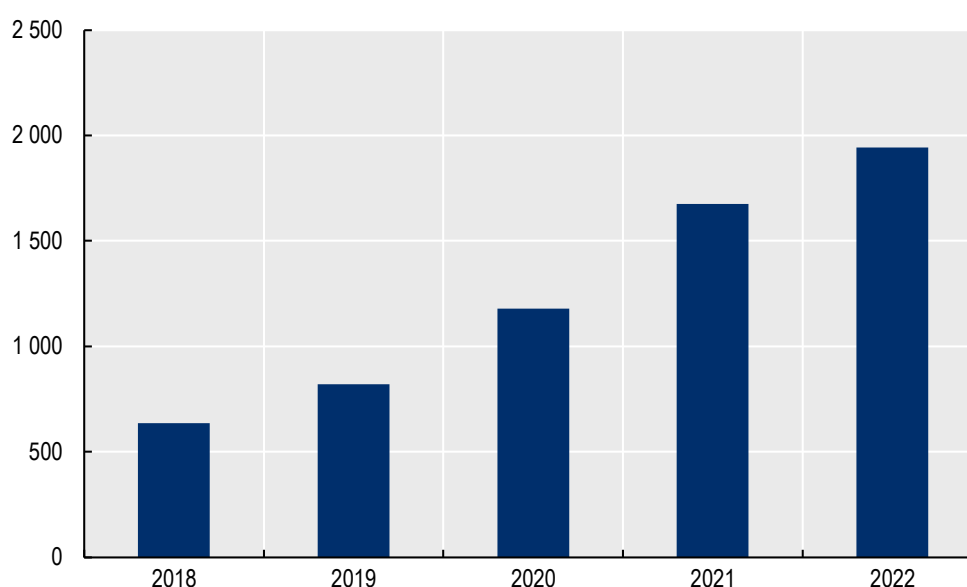
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Micro-credentials have become a global trend - but have they proved their potential?

The term “micro-credentials” has swiftly spread across the world, and its burgeoning prominence owes much to higher education institutions and education technology firms. Education and training institutions are increasingly offering micro-credentials by rebranding and restructuring their existing programmes and by creating new programmes, often through partnerships with other institutions, industries and learning platforms. A growing number of large technology companies, other private companies and non-profit organisations are also offering micro-credentials (OECD, 2021^[2]; OECD, 2021^[3]). There is no comprehensive data on the number of micro-credentials offered in OECD countries. However, it is possible to track the growth of micro-credentials offered through major learning platforms, such as Coursera and FutureLearn, and this reveals a swift expansion of micro-credential offerings. According to Class Central, an aggregator of online courses, the number of micro-credentials offered on five major learning platforms increased from around 600 in 2018 to 1900 in 2022 (Figure 1).

Figure 1. The number of micro-credentials offered on six major learning platforms (2018-2022)



Note: The figure shows the number of micro-credentials offered on Coursera (MasterTracks, Professional Certificates, Specializations and University Certificates), edX (MicroBachelors, MicroMasters, Professional Certificates, Professional Education and XSeries), FutureLearn (Academic Certificates, ExpertTracks, Micro-credentials and Programs), Kadenze (Programs) and Udacity (Nanodegrees).

Source: (Shah, 2021^[4]; Shah, 2022^[5])

This proliferation of micro-credentials has also been supported by governments and intergovernmental organisations. In Europe, for instance, micro-credentials have been gaining momentum in policy discussions. The Council of the EU adopted the Council Recommendation on a European Approach to Micro-credentials for Lifelong Learning and Employability in June 2022, and it recommends EU member states develop measures to create a micro-credential ecosystem by the end of 2023 (Council of the European Union, 2022^[11]). Many EU member states are moving forward with piloting micro-credential programmes and discussing adapting national legislations and quality assurance systems. Similarly, in the Asia-Pacific region, the UNESCO Asia and Pacific Regional Bureau of Education is researching national use cases of micro-credentials to assist policymakers to have an overview of approaches taken in the region (INQAAHE, 2023^[6]). The Council of Ministers of Education, Canada, also established a working group dedicated to micro-credentials to share directions taken in each province and territory and explore possible collective actions to be taken at the pan-Canadian level.

Proponents of micro-credentials envision them as an innovation with a multitude of potential uses and benefits – a sort of all-purpose solution for the problems confronting education, training and labour market systems. The growing interest of governments, technology firms, and education and training institutions in micro-credentials has been fuelled, in part, by demand for the upskilling and reskilling of the labour force. Micro-credentials, it is hoped, can aid laid-off workers and workers whose skills are obsolete and whose jobs are at risk of automation to gain new skills demanded in labour markets, thereby efficiently reducing the mismatch between skills sought and available. In some countries, they are also expected to support enrolled students to increase their employability in the labour market.

In addition, higher education and VET institutions in many OECD countries have been challenged by policymakers to become more flexible and learner-centred to accommodate diverse individual needs. Micro-credentials, which are smaller, more targeted, and more flexible than traditional qualifications, are seen as one answer to this call. They enable modularisation and offer different learning options to learners in initial education, while also supporting lifelong learning, which is seen as important in the context of ageing populations.

Moreover, micro-credentials are believed to be a useful means by which to promote social inclusion by facilitating a wide range of learners, including disadvantaged and vulnerable ones, to access higher education and VET. Through this, learners can acquire skills relevant to the labour market, as well as strengthen their well-being and ability to exercise their rights and obligations as citizens of democratic knowledge societies. Some countries also discuss micro-credentials in the context of promoting internationalisation and student mobility, as the widespread use of micro-credentials could improve cross-border academic recognition. Other countries pilot micro-credentials to connect the VET and higher education sectors by using them as an alternative pathway to higher education. Several countries also seek to use micro-credentials to improve completion rates of degree programmes by permitting enrolment in modules and subsequent stacking (Figure 2).

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Considering the relative novelty and growing use of micro-credentials, evidence of their value and impact is still scarce. In some systems, uncertainty about their impact has limited the commitment of education and training institutions in their offer, while in many countries, policy support is still only offered on an ad-hoc basis. Building upon existing research on micro-credentials, this paper will focus on the three areas where evidence on the potential of micro-credentials is currently limited:

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- Can micro-credentials enhance employability, labour market participation and outcomes among completers?
- Can micro-credentials widen pathways from upper secondary to higher education and improve completion of higher education?
- Can micro-credentials promote social inclusion among disadvantaged learners and workers?

The following sections will examine each of the three questions based on desk research and interviews with innovators in the design and use of micro-credentials.

Figure 2. Examples of context in which micro-credentials are expected to play a role



Can micro-credentials enhance employability, labour market participation and outcomes among completers?

The potential for improving labour market participation and addressing skills shortages in growing industries is one of the main reasons for the increased interest in micro-credentials (OECD, 2021^[2]; CEDEFOP, 2022^[7]). Despite this, evidence, statistical data in particular, on labour market outcomes for completers, remains relatively limited. Existing evidence, however limited, suggests that the efficacy of micro-credentials depends on finding the right programme for the right learning profile. They can increase the probability of employment, at least in the short-term. There is also evidence suggesting that, in some cases, micro-credentials can lead to higher wages or higher-quality employment. However, these depend greatly upon the programme, the course provider, and the characteristics of the learner (Valentine and Clay, 2019^[8]; Ntwari and Fecteau, 2020^[9]; OECD, 2021^[2]). This section examines the existing evidence base for the efficacy of micro-credentials as of December 2022. In doing so, it will present i) the main trends emerging from existing evidence on the labour market impacts of micro-credentials and ii) key features that seem to have the potential to make short programmes more successful in enhancing labour market participation and outcomes among completers.

Existing evidence is limited but key patterns can be observed

While the potential of micro-credentials to improve employability and labour market participation has been widely discussed in recent years, evidence of their impact remains scarce. Below we briefly note four factors hampering the development of reliable evidence.

Micro-credentials, like other forms of so-called “alternative credentials” are not included in national graduate tracking programmes, nor are they featured in population censuses or surveys on households, labour force, or adult education – in contrast to conventional educational qualifications, such as the completion of upper secondary education or bachelor degrees (Kato, Galán-Muros and Weko, 2020^[10]; OECD, 2021^[3]). This has begun to change in the United States. For example, the scope of the US Adult Training and Education Survey (ATES) was extended to include non-degree credentials, such as post-secondary certificates, occupational licences and industrial certifications in 2016 (Cronen et al., 2018^[11]). In 2022, building upon the ATES questionnaire, the US Census Bureau also administered its first National Training, Education, and Workforce Survey to continue collecting data on non-degree credentials (US Census Bureau, 2023^[12]). In Europe, changes to national surveys have not yet been implemented. Neither the EU’s Labour Force Survey nor the Adult Education Survey collects information on non-degree credential attainment (Eurostat, 2023^[13]).

A second related concern is that data about employment and wage outcomes may often be proprietary information held by education and training organisations and is either inaccessible or insufficiently documented to evaluate the impact of completed credentials. Google, for example, indicates that 75% of those who completed a Google Career Certificate report a positive career outcome within six months, and that non-STEM (Science, Technology, Engineering and Mathematics) graduates who obtain a career certificate achieve entry-level wage gains of 32-38% (Brophy, 2022^[14]). However, without understanding attrition rates in certificate programmes or differences in completer/non-completer earnings, it is difficult to fully assess the payoff to certificate acquisition.

Thirdly, micro-credentials themselves are not a standardised education or training offer; rather, they vary substantially in duration and the International Standard Classification of Education (ISCED) level at which they are offered. For example, short learning programmes at the Catalan University Quality Assurance Agency (AQU Catalunya) conform to ISCED level 6 and 7, while Ireland’s Springboard+ programmes can include programmes at ISCED level 5 and New Zealand Qualifications Authority (NZQA)-recognised micro-credentials can be as low as ISCED level 3 (OECD, 2021^[3]). This variation hampers generalisations about their impact and comparisons to other credentials, such as academic degrees.

Additionally, flexible, short-term learning programmes vary widely in the profile of learners they serve. Short learning programmes at the pre-bachelor level have a much higher proportion of socio-economically disadvantaged learners than micro-credential programmes offered by learning platforms such as Coursera or edX, whose learners are typically experienced workers holding academic degrees (Zhenghao et al., 2015^[15]; Chuang and Ho, 2016^[16]; Hollands and Kazi, 2019^[17]; Kato, Galán-Muros and Weko, 2020^[10]).

Notwithstanding these limitations, some patterns can be discerned. While much of the data admittedly comes from North America, many of the key trends observed appear to have been reflected in smaller studies from other regions, including Europe. Much evidence is based upon “short-cycle programmes” that may be somewhat longer and less flexible than micro-credential programmes emerging in Europe. Moreover, economic returns to education and training vary across education and training systems. While researchers must be wary of assuming that all North American trends are entirely applicable to other regions, findings from these systems provide useful indications and considerations to the extent to which micro-credentials can be used to “enhance employability, labour market participation and outcomes among completers” in the rest of the world.

Targeted and short-term credentials have labour market value, but this depends on programme and learner profiles, and on how labour market impact is defined and measured

Altogether, the available evidence suggests that the impact of a targeted short-term credential on labour market outcomes depends on course features and learners' demographic characteristics (Carnevale, Rose and Hanson, 2012^[18]; Tesfai, Dancy and McCarthy, 2018^[19]; HEA, 2019^[20]; Teo and Ying, 2019^[21]; Valentine and Clay, 2019^[8]; Baum, Holzer and Luetmer, 2020^[22]; Ositelu, McCann and Laitinen, 2021^[23]).

On the one hand, acquiring certain targeted short-term credentials does appear to have a positive impact on the chances of being employed (Carnevale, Rose and Hanson, 2012^[18]; HEA, 2019^[20]; Valentine and Clay, 2019^[8]; Baum, Holzer and Luetmer, 2020^[22]). For example, previously unemployed workers who completed one of the “bite-sized” learning courses offered through the Singapore’s Workforce Skills Qualification credential system between 2011 and 2014 were 3.5 percentage points more likely to be employed in the year after completion than the control group (Teo and Ying, 2019^[21]). Still larger micro-credentialled learning can be effective in improving learners’ employment quality, i.e., they can allow learners to access better-paid, higher-skill roles. For example, research by Statistics Canada found that among learners with bachelor’s degrees, the proportion employed in “low value-added service industries” decreased from 22.1% to 9.9% in the two years after they completed a short-duration credential, while their unionisation rate and participation in a pension plan increased by 4.6 and 16.3 percentage points respectively (Ntwari and Fecteau, 2020^[9]).

On the other hand, existing evidence strongly suggests that only some targeted short-term credentials result in a significant increase in employment or wages (Bailey and Belfield, 2017^[24]; Baum, Holzer and Luetmer, 2020^[22]; Ositelu, 2021^[25]; Lovenheim and Smith, 2022^[26]). For example, a study of 346 Massive Open Online Course (MOOC) students conducted as part of the EU Joint Research Centre’s “MOOCKnowledge” project concluded that completers were more likely to remain in employment, specifically to retain their existing employment, but were unlikely to experience an increase in wages (Castaño-Muñoz and Rodrigues, 2021^[27]). The extent to which micro-credentials have a positive impact on learners’ employability and labour market outcomes also appears to vary based on learner characteristics (Jepsen, Troske and Coomes, 2014^[28]; Bahr, 2016^[29]; Tesfai, Dancy and McCarthy, 2018^[19]; Strada; Gallup; Lumina Foundation, 2019^[30]; HEA, 2019^[20]; Baum, Holzer and Luetmer, 2020^[22]; Ositelu, McCann and Laitinen, 2021^[23]). These differences can be divided into two categories: firstly, the impact of the programmes itself, including length, area of focus and provider, and secondly, the impact of different learner characteristics, such as previous education, age, and gender.

Differences in labour market impact by programme

The longer the programme, the better the outcomes

Research evidence suggests a positive correlation between time spent in education and training and positive labour market outcomes, and this holds true for targeted and short-term qualifications: the longer the course, the greater the resulting employment and wage benefits appear to be (World Bank, 2014^[31]; Schnepf, 2014^[32]; Jaggars and Xu, 2016^[33]; Belfield and Bailey, 2017^[34]; Tumen, Dixon and Crichton, 2018^[35]; OECD, 2021^[2]; Ositelu, McCann and Laitinen, 2021^[23]). This has been observed in multiple state-level studies in the United States (Dadgar and Trimble, 2015^[36]; Xu and Trimble, 2016^[37]; Jaggars and Xu, 2016^[33]; Belfield and Bailey, 2017^[34]; Baum, Holzer and Luetmer, 2020^[22]). For example, an analysis of administrative records from 49 post-secondary institutions in eight US States (for students with no or very limited previous tertiary education experience) matched with unit-quarterly earnings data showing larger and more consistent earnings gains for non-degree credentials that took over six months to complete than those of shorter duration (Valentine and Clay, 2019^[8]). Similarly, the Singaporean government’s evaluation of its Workforce Skills Qualification credential system found that participants who earned a much-longer,

full qualification enjoyed a more substantial, 5.8% increase in real wages compared to those who only received a Statement of Attainment for individual modules, the latter of whom only saw a real wage increase of 0.8% (Teo and Ying, 2019^[21]).

There is some evidence that the value of shorter or smaller alternative credentials diminishes more swiftly than the value of longer courses, perhaps due to the skill specificity and faster obsolescence of skills rapidly acquired (Ositelu, McCann and Laitinen, 2021^[23]). This was observed in a handful of US states (Bailey and Belfield, 2017^[24]). For example, a study of 1 115 386 students who first enrolled in the California Community College system between the autumn of 2002 and the summer of 2008 found that the returns to low-credit awards and certificates flattened and began to decline after seven years of completion, while the returns to associate degrees remained more durable (Bahr, 2016^[29]). Similarly, a study of 830 000 students who enrolled into certificate or diploma courses in the North Carolina Community College System from 2001/02 through 2009/10 indicated that the positive impacts of these awards on wages diminished and fell to zero within nine years of initial enrolment (Liu, Belfield and Trimble, 2015^[38]; Bailey and Belfield, 2017^[24]).

Existing evidence suggests that stacking can lead to economic benefits, but these benefits appear to be uneven based on programme direction and among fields of study. In the case of programme direction, existing evidence implies that combining micro-credentials with longer qualifications, chiefly bachelor's degrees and associate degrees, appears to lead to substantial economic benefits (OECD, 2021^[2]). For example, an already mentioned Statistic Canada study of 5 370 students who completed one additional short-duration credential between 2010 and 2016 after finishing a bachelor's degree in 2010 found a significant improvement in employment quality (measured as a decrease in the likelihood of working in "low value-added service industries" and an increase in unionisation and pension plan participation-rates) (Ntwari and Fecteau, 2020^[9]). Such "supplemental stacks" (attempting a shorter subsequent credential, such as a certificate after a degree) were also found to have strongly positive returns by Bailey and Belfield (2017^[24]). In contrast, while Bailey and Belfield found no earnings gains for "progressive stacks" (attempting a second credential that is longer than the first), a recent study using an administrative panel dataset of enrolment and employment records from the Virginia Community College System, the Virginia Employment Commission, and the National Student Clearinghouse, found that progressive stacks, specifically learners returning to complete associate degrees after earning a certification in the previous three academic years, had stronger returns than supplemental stacks (Meyer, Bird and Castleman, 2022^[39]). In the case of study fields, some fields, such as healthcare, appear to have better outcomes after stacking. For example, the Meyer, Bird and Castleman study found a much higher, USD 950 quarterly earnings increase compared to non-stackers for healthcare qualification stacks. This is much higher than the average of USD 380 quarterly wage increase for stackers in other fields. However, given the small size of the sample in this study, researchers should not consider this observation more as a starting point for discussion than a conclusion.

Programmes that are specifically linked to in-demand or growing industries show better outcomes

The extent to which employers understand, trust, and value the skills signalled by credentialled short-term learning varies widely. In general, across all employers and industries, there is substantial uncertainty or ignorance among employers about short-term, targeted learning. However, in certain industries or occupations, where the content of credentialled learning is closely linked to job skill demands – or credentials have been developed by industries or firms themselves – one can find substantial pay-offs. This, coupled with worker shortages, is a major reason for the success of these credentials. There is a correlation of sorts – that employer associations may be spurred to develop new credentials in response to chronic shortages of qualified candidates.

By some accounts, employer trust in traditional degree credentials is reported to be declining. However, a lack of understanding and awareness of alternative credentials means that employers continue to default

to using degree credentials during their hiring processes, which acts to the disadvantage of learners with alternative credentials, or skills that are uncredentialed (Gallagher, 2018^[40]). This is well-illustrated, amongst others, in a recent study of 600 US employers commissioned by American Student Assistance (ASA) and Jobs for the Future (JFF). This found that 72% of employers considered bachelor's degrees to be an unreliable indicator for assessing applicants' skills, but the majority of employers (52%) continued to see hiring from degree programmes as less risky (ASA; JFF, 2022^[41]).

Targeted and short-term credentials appear to be most recognised in industries where firms or professions are active in the development and management of credentials and/or which are characterised by acute labour shortages, such as IT, healthcare, or manufacturing (Wiershem, Zhang and Johnston, 2010^[42]; Lester, Fertig and Dwyer, 2011^[43]; CompTIA, 2015^[44]; Inter-American Development Bank, 2022^[45]). In these industries, employers, industry bodies and trade unions are active promoters, and often providers of targeted and short-term credentials. For example, in Europe, the Danish Society of Engineers – a professional association and trade union representing workers in science, technology and engineering – offers a wide range of short learning programmes that focus on in-demand skills such as UX-design or data science (Leth, 2021^[46]). In the IT sector, an increasing number of technology companies, such as Google or IBM, have started to offer their own non-degree certificates. This, combined with the fact that many of the same companies have also established 'non-degree entry routes' for IT roles, implies a decreased emphasis on academic degrees in their talent strategies (Inter-American Development Bank, 2022^[45]).

Targeted and short-term credentials with a vocational orientation have markedly better labour market outcomes than those in more generic or academic fields. Mechanical and technical areas, law enforcement and healthcare show high rates of employment, and in most, but not all cases, higher wage returns (Belfield and Bailey, 2017^[34]; Baum, Holzer and Luetmer, 2020^[22]; Lovenheim and Smith, 2022^[26]). Concurrently, using programme-level earnings data from the US Department of Education to estimate the Price-to-Earnings Premium for different certificate programmes, Itzkowitz (2021^[47]) estimated that more than 90% of certificate programmes in transportation, heavy industrial technologies and nursing allowed learners to recover the costs of their course within five years. On the other end of the spectrum, the same study found that more than 75% of programmes offered in fields such as cosmetology and English language and literature provided no statistically significant return on investment at all. A similar picture emerges from South America and the Caribbean (Inter-American Development Bank, 2022^[45]). For example, in Chile, it was found that returns for short-cycle programmes were the highest in clearly vocationally oriented fields such as 'engineering and technology' or 'business and administration', and the lowest in academic fields such as 'humanities', 'education' and 'arts' (Ferreyra et al., 2021^[48]).

Completion rates and outcomes vary between different types of providers

There are some limited indications that the outcomes of targeted short-term credentials also appear to vary between providers. However, the existing evidence base in this area is particularly limited, coming from aggregated studies that include vocational and industry certificates lasting longer than a year, and is sometimes contradictory, meaning that researchers should consider the following observations as a starting point for wider discussion and not a conclusion.

Fully online courses on MOOC platforms tend to have low completion rates, between 3% and 15% (Jordan, 2015^[49]; Jung and Lee, 2018^[50]; Oliver, 2019^[51]). However, researchers have also found evidence of differences between higher education institutions based on whether they were public, private non-profit or for-profit. For example, data on Ireland's Springboard programmes in 2011-12 shows an average completion rate of 29% for courses run by universities. This is markedly lower than the same figure for Ireland's Institutes of Technology and private (not-for-profit) colleges, which stood at 47% and 56% respectively for the same period (HEA, 2014^[52]).

There is also a link between providers and employment outcomes. Research from the United States points to weaker employment outcomes for learners who obtain qualifications from for-profit private institutions than certificates issued by public institutions (Deming et al., 2016^[53]; Cellini and Turner, 2019^[54]). While much of the difference in employment outcomes may be attributable to the characteristics of the learners that an institution serves – and findings must be treated with caution – there is evidence that firms attend closely to institutional reputation when hiring, and this has an important bearing on the labour market impact of short-term, targeted credentials. For example, one survey by Northeastern University’s Center for the Future of Higher Education & Talent found that 58% of hiring managers in the United States placed great emphasis on the reputation of the issuing institution when considering applicants with alternative credentials obtained through MOOC courses (Gallagher, 2018^[40]).

The outcomes of targeted and short-term credentials reflect existing socio-economic inequalities

Available evidence suggests that targeted and short-term credentials do very little to mitigate existing socio-economic disparities. Some researchers go as far as to argue that they do the opposite, resulting in augmented disparities in educational and labour market outcomes (Bailey and Belfield, 2017^[55]; Ositelu, McCann and Laitinen, 2021^[23]). Learners’ socio-economic differences can be separated into two sub-categories: the first are differences caused by life events, and work or educational history; the second are learners’ demographic attributes, notably age, gender, and ethnicity.

Targeted and short-term credentials appear to work well when ‘topping-up’ existing higher education but have a mixed impact on those without a bachelor’s degree

Those with prior education attainment to the bachelor (or higher) level appear more likely to seek out short-term, targeted learning, are more likely to persist in learning to completion, and experience greater benefits (in terms of employment outcomes) than those without. Existing data on participation patterns shows a substantial degree of self-selectivity. In other words, targeted and short-term credentials, especially in IT, have high proportions of students who have either previous higher education experience or other relevant subject experience. For example, 78% of learners who completed a programme with the University of Helsinki’s Elements of AI (Artificial Intelligence) initiative already had a bachelor’s degree or higher, and over one-third had previous educational experience in the IT, engineering or manufacturing-related subjects (University of Helsinki, 2019^[56]). A similar picture emerges in the evaluations of Ireland’s Springboard and Germany’s *Aufstieg durch Bildung* (Advancement through Education) programmes, as well as data on participation patterns in MOOC courses (Zhenghao et al., 2015^[15]; HEA, 2019^[20]; Thiele, Nickel and Schrand, 2019^[57]; Kato, Galán-Muros and Weko, 2020^[10]).

There are some indications that learners with previous tertiary education, especially those with a completed bachelor’s degree or above have better overall outcomes, such as higher employment rates. For example, the Irish Higher Education Authority found that prior qualification correlated positively with the chances of employment 3-6 months after completion. Among those who completed Springboard programmes between 2012 and 2016, 59% of those with a previous National Framework of Qualifications (NFQ) level 7 (ordinary bachelor), and 61% of those with an NFQ 8 (honours bachelor) qualification were employed, compared to 55% learners whose highest education was at the secondary level (HEA, 2019^[20]).

In contrast, labour market outcomes, particularly wage returns, appear to be mixed for learners without previous higher education attainment. On the one hand, available evidence indicates that completing short courses correlates with an increase in employment rates in specific industries or sub-baccalaureate occupations (Baird, Bozick and Zaber, 2021^[58]). On the other hand, this increase in employment rates, especially outside of typically well-paid industries such as IT, does not automatically result in substantial increases in incomes. For example, a New Zealand study found that tertiary certificates led to improved employment prospects for young people who left senior secondary school without the National Certificates

of Educational Achievement level 2 qualification, however, these improved employment rates did not result in substantial improvements in earnings (Tumen, Dixon and Crichton, 2018^[35]).

While stronger labour market outcomes are observed for those with prior educational attainment at the bachelor's or postgraduate level than those without, there are nonetheless employment and wage benefits for those who complete short-term credentials. In some cases, completing the right targeted, short-term credential can make a positive difference for learners with no previous higher education. For example, in the United States, the median certificate holder earned more than 20% above the median earnings of a worker with a high school diploma (Carnevale, Rose and Hanson, 2012^[18]). Similarly, Baird, Bozick and Zaber at the RAND Corporation found that occupational certificates and licences in the United States acted as a key means for workers without bachelor's degrees to differentiate themselves in the eyes of employers (Baird, Bozick and Zaber, 2021^[58]). The same can be seen in multiple studies on South America, where the returns of short-cycle programmes are particularly notable for male students with poor academic preparation who come from disadvantaged families in small or medium-size municipalities, as well as for female students from large, disadvantaged families. The reason for this appears to be that the fall-back options for such learners are either dropping out of a degree course or not completing any kind of post-secondary qualification, both of which result in a higher likelihood of lower wages and higher levels of unemployment (Ferreira et al., 2021^[48]; Inter-American Development Bank, 2022^[45]).

Those with no previous work experience or a long history of unemployment are less likely to earn targeted, short-time credentials and appear to benefit less from them, needing additional targeted support

Those with long periods of unemployment typically have some of the lowest rates of participation in micro-credentials outside of targeted unemployment mitigating programmes such as Ireland's Springboard (HEA, 2014^[52]; HEA, 2019^[20]; Thiele, Nickel and Schrand, 2019^[57]). What evidence does exist implies better outcomes for learners with recent work experience. Specifically, studying transaction-level data of freelance workers on one of the largest online-learning platforms showed that micro-credentials in the form of digital "badges" were primarily beneficial for workers with existing but shorter work experience. In contrast, workers with no previous work experience or workers with long, well-established track records saw no improvement (Kässi and Lehdonvirta, 2022^[59]).

European project teams developing publicly funded micro-credential initiatives have observed that there is a need to pay attention to diverse needs of different learning groups, and for educators and trainers to offer targeted additional support, such as modules on employment skills. This is especially important for heavily disadvantaged learners such as refugees or the long-term unemployed (Thiele, Nickel and Schrand, 2019^[57]). This is consistent with studies on the weak employment and earnings impact of training programmes for the long-term unemployed that lack significant accompanying career support services (Mathematica Policy Research, 2017^[60]).

Workers over 45 might experience comparatively weaker outcomes

There is very little evidence on the outcomes of micro-credentials between different age groups. What evidence does exist implies that labour market outcomes are stronger for learners under 45. For example, in the United States, one study showed higher wage premia for learners between the ages of 25 and 44 (Baum, Holzer and Luetmer, 2020^[22]). The evaluation of Ireland's Springboard and ICT (Information and Communications Technology) Skills Conversion courses, and Singapore's 'SkillsFuture' initiative presented similar results. For instance, for Springboard courses, employment 3-6 months after completion was on average 10% higher among learners in their twenties compared to learners in their fifties. The gap in employment rates was even greater for the higher-level ICT Skills Conversion courses, where on average, employment rates 3-6 months after completion was 80% for learners in their twenties and 59% for learners in their fifties (HEA, 2019^[20]).

The evidence regarding the link between gender and labour market outcomes is contradictory

Although some researchers point to an “extreme case of variation [in labour market outcomes] by gender”, the overall picture is mixed and contradictory (Dadgar and Trimble, 2015^[36]; Bahr, 2016^[29]). There are three main trends that appear to emerge from the existing evidence base. Firstly, most studies appear to point towards substantially higher wage returns for men. Secondly, in the case of employment rates, the evidence is contradictory, with some studies observing no significant employment rate gender gaps, while others showing considerably better outcomes for men. Thirdly, there is evidence suggesting that while women’s wages are lower, the added value of micro-credentials can be more substantial for women than for men.

Research evidence appears to confirm the presence of a clear gender-pay gap among non-degree credential completers. For example, in the United States, an analysis of the 2016 ATES showed that among the workers who had a non-degree credential as their highest qualification, only 25% of men earned less than USD 30 000 per annum and 17% earned more than USD 75 000. In contrast, among women who had a non-degree credential as their highest qualification, 46% had annual earnings under USD 30 000, and only 5% earned more than USD 75 000 (Tesfai, Dancy and McCarthy, 2018^[19]).

These differences in wages are partially rooted in the subject choices of women micro-credential learners. Women are more likely to take courses in fields that lead to less-well-paid employment, such as healthcare, and they are under-represented in technical or STEM programmes that lead to higher levels of pay, such as IT, mechanics, or aviation (Carnevale, Rose and Hanson, 2012^[18]; Tesfai, Dancy and McCarthy, 2018^[19]; Baum, Holzer and Luetmer, 2020^[22]; Ositelu, McCann and Laitinen, 2021^[23]). This pattern also appears to be present in Europe (HEA, 2014^[52]; HEA, 2019^[20]; Thiele, Nickel and Schrand, 2019^[57]; University of Helsinki, 2019^[56]). However, the proportion of women in the total population of learners in the Elements of AI and ICT Skills Conversions courses was substantially higher than in longer STEM-related courses. For example, in Ireland, the proportion of women in the ICT Skills Conversion courses was around 25%. This is substantially higher than the national average of 15% of women in ICT-related undergraduate programmes (HEA, 2014^[52]). Similarly, at the University of Helsinki’s Elements of AI courses, many of which were conceived as introductory courses for the wider population, the proportion of women among completers was as high as 40%, well above the share of women among graduates of ICT degree programmes of 25% (Stoet and Geary, 2018^[61]; OECD, 2020^[62]; OECD, n.d.^[63]). This points to the possibility that shorter, introductory courses might be more effective at attracting women to STEM fields.

Subject choice cannot fully explain the differences in wages between males and females. Several studies concluded that men tended to earn more even after completing an identical qualification to a woman (Bailey and Belfield, 2017^[24]; Tesfai, Dancy and McCarthy, 2018^[19]). For example, in one especially striking example, it was concluded that in the United States, men with certificates in cosmetology – a particularly low-paying field – still earned more than women with certificates in business and office management – the highest-paying subject for women (Carnevale, Rose and Hanson, 2012^[18]). These discrepancies in outcomes were the strongest in the case of short programmes and appeared to decrease with the length of programmes. Indeed, some studies found evidence suggesting that longer-term certificates were associated with stronger wage increases for women, in some cases even vis-à-vis men (Dadgar and Trimble, 2015^[36]; Bahr, 2016^[29]).

In addition, the evidence base with respect to employment rates is more mixed than - and often contradictory to - that concerning the impact of short and targeted learning on earnings. Evaluation of Ireland’s Springboard and ICT Skills Conversion courses found no significant differences in employment rates by gender (HEA, 2019^[20]). Conversely, other studies have found consistently higher overall employment rates among male micro-credential holders. For example, a study analysing the results of the 2016 ATES in the United States showed higher employment rates among men across all types of surveyed

non-degree credentials (certificates, industry certifications and licences) (Tesfai, Dancy and McCarthy, 2018^[19]).

Although employment levels among men who have completed alternative credentials are higher than for women, some researchers suggest that the added value of alternative credentials such as micro-credentials is greater for women. They propose that micro-credentials act as a signal that decreases employer uncertainty, which is much more likely to negatively impact women (and ethnic minorities), thereby providing a more significant added advantage for women, than for men (Blau and Kahn, 2017^[64]; Baird, Bozick and Zaber, 2021^[58]; Kässi and Lehdonvirta, 2022^[59]) This view is well exemplified by Baird, Bozick and Zaber (2021^[58]), who in their study at the RAND Corporation interpreted the considerable decrease in the employment gap between the genders following the completion of an occupational credential or licence as decreased negative impact of employer prejudices on women. While it cannot be considered definitive evidence, these results are consistent with studies on the impact of degree credentials and occupational licences on women's labour market outcomes (Diprete and Buchmann, 2006^[65]; Law and Marks, 2009^[66]; Blair and Chung, 2017^[67]; Coffman, Exley and Niederle, 2021^[68]).

US evidence shows a link between labour market outcomes and the race and ethnicity of certificate holders, and although based on a different context, it is worth the consideration of European policymakers

US data show that labour market outcomes vary among ethnic groups, with certificate-holders from Hispanic backgrounds obtaining lower wage increases than learners classified as “white” but higher than learners classified as “African-American” (Carnevale, Rose and Hanson, 2012^[18]; Dadgar and Trimble, 2015^[36]; Bahr, 2016^[29]). These findings are not directly relevant to European contexts for several reasons. Firstly, the racial and ethnic categories used in these studies are specific to the United States and therefore cannot be used to make comparisons or assumptions about European countries, most of which have their own practice of categorising ethnic groups and their own hierarchical structures of race and ethnicity. Secondly, the certificate programmes examined by these studies do not fully align with the European definition of micro-credentials. Thirdly, the studies reflect American labour market conditions, which are often different from those of European states. Nonetheless, they are worth mentioning as a reminder for European policymakers that ethnic background is likely to be a relevant consideration when evaluating the impact of micro-credentials, especially if micro-credentials are to be aimed at promoting social inclusion among disadvantaged sections of the population.

Key features of short programmes that enhance employability, labour market participation and outcomes among completers

Given the limited evidence available on the efficacy of micro-credentials, researchers and policymakers should be very cautious in drawing conclusions on what makes micro-credentials work and what does not. At the same time, the existing evidence does present seemingly more successful or efficient programmes. Based on this, as well as on discussions with project groups working on pilots or micro-credential programmes, the following section will present a number of features that policymakers should reflect upon, and perhaps consider incorporating into their next generation of micro-credential initiatives in some shape or form. Some of these features could be introduced relatively quickly, while other changes, such as adapting data collection practices, would take several years. This list is not exhaustive or strongly prescriptive. Rather, these are questions that policymakers should address as they design national micro-credential ecosystems.

Closer involvement of employers/industry actors

If the aim is to improve employability and provide a better supply of skilled workers to meet skills demands, close and continuous collaboration with potential employers is key to ensure that micro-credential

programmes reflect industry needs and equip learners with the skills employers need. Ideally, this collaboration should cover all aspects of micro-credential provision. In other words, industry partners can drive the development of micro-credentials and should be involved from the concept and design to delivery and learner employability support. Examples of this could include embedding industry collaboration into the development and accreditation, including work experience placements in programme design and seeking employer commitments on interviewing programme completers.

Embed industry collaboration into the development and accreditation

Engagement by industry and labour market actors is essential to establishing the uptake and trust of micro-credential as a tool for employability. The value and currency of micro-credentials can only be established by employers and industry taking an active role in the design and delivery of micro-credentials so that they can become an established tool to support workplace development. There are many open questions about how to adjust or design aspects of micro-credentials such as their quality assurance and accreditation. Answers to these questions will only emerge through meaningful engagement and clarification of expectations from industry. One potential model for this is the way MBO (middelbaar beroepsonderwijs, vocational upper secondary education) short courses are designed in the Dutch education system, in which course providers and industry partners collaborate in developing proposals for new short courses (MBO Raad, 2021^[69]; MBO Raad, 2022^[70]). Other examples include the participation or occasional intervention of industry practitioners in the teaching of micro-credential programmes, and the development of professional mentoring systems, in which learners could be linked with workers already employed in their target industry.

Work experience placements

Work placements which are incorporated as a compulsory element of a credential, are highly valued, both by learners and potential employers, as they allow learners to gain practical experience in their chosen field. They should be long enough that they provide meaningful exposure to the industry, but short enough that they do not result in prolonged periods of work for low or no pay. In some cases, work placements can also act as a direct gateway into employment, as it is not uncommon for learners to find subsequent employment with the company where they completed their training (HEA, 2014^[52]; HEA, 2019^[20]). However, work placements should be carefully designed to be practical, appropriate, and equitable for learners. Providers should actively support learners in finding a work placement, such as by organising work fairs, or even aiming to secure work placement commitments from industry partners. Learners should also receive stipends or salaries to ensure that they can cover the costs associated with the placements.

Interview commitments

A handful of micro-credentials initiatives have negotiated an arrangement in which industry partners agree to allow completers of the partner micro-credential programme to bypass the first stage of their hiring process when applying to a role with them. An example of this can be seen in the agreements between the University of Helsinki's Full Stack project team and about a dozen Finnish and international companies (Full Stack, n.d.^[71]). Another example is the 16-week Advanced Automotive Service Technology – Tesla Technician Career Technical Certificate which was co-developed between Tesla and Miami Dade College, and aims to directly prepare learners to work as service technicians at Tesla (Miami Dade College, n.d.^[72]). Such agreements allow completers to start the hiring process in the practical exercise or even interview phase, thereby lessening the chances of being rejected due to external reasons, such as gaps in their CVs. Concurrently, such agreements can provide companies with a source of potential employees with skills validated by a well-understood and trusted certification or provider.

Accessible information on labour market outcomes

It is considerably harder to find information about the labour market outcomes of micro-credentials compared to degree qualifications, for which the destinations of previous cohorts are often available for prospective learners (OECD, 2021^[3]). Even when there is some information that is available to the public, this can be insufficiently informative and often difficult to compare with programmes by other providers. This is a particular concern for more vulnerable populations who might lack sufficient industry knowledge to decide whether a programme will meet their needs. Having a centralised ‘one-stop’ information point could ensure that learners can view offers by multiple providers before making a choice. However, just listing the available programmes might be insufficient, especially if the catalogue is not updated and monitored regularly. Best practice involves the provision of information on outcomes; for example, Singapore’s SkillsFuture programme website publishes learners’ feedback from previous cohorts (Government of Singapore, 2023^[73]). In addition, an early effort is underway in the United States to increase the transparency of the value of industry certifications by linking different data sets, namely data from certification bodies, educational attainment and enrolment data from post-secondary education institutions, and aggregate wage data from the Census Bureau (Workcred, 2023^[74]).

Tailored programme design and support measures

Different types of learners have different support needs. For example, an immigrant or refugee with multiple higher education credentials is likely to benefit from targeted language courses but might gain little from training on basic employability skills such as writing CVs. Incorrect or insufficient course targeting, and student support are among the leading causes of drop-out for learners in micro-credential programmes (HEA, 2014^[52]). The content and expectations of micro-credentials should be clearly linked to the needs and capacities of the target learners. For example, as in the case of the Finnish Elements of AI initiative, if the course is aimed as an introduction to artificial intelligence, the learners should be able to follow the course without previous coding experience (OECD, 2020^[62]).

Social and financial support

Financial and personal difficulties, including the cost of travel, childcare, equipment, and lost earnings are some of the leading reasons for drop-out or non-entry, not only for micro-credentials but any kind of training or education programme in general (HEA, 2014^[52]; HEA, 2019^[20]; OECD, n.d.^[75]; Ferreyra et al., 2021^[48]). Micro-credential programmes, especially if offered through a publicly-funded initiative with the aim of integrating socio-economically valuable people into the labour market should be affordable and practicable for the target audience. For example, participants on welfare support should not see their allowance decrease while undertaking a micro-credential or a work placement.

The labour market value of micro-credentials depends on offering the right, targeted programmes for specific learner groups.

Can micro-credentials widen pathways from upper secondary to higher education and improve completion of higher education?

Governments across the world aim to ensure that learning pathways are flexible, with a view to widening access to, and success in, higher education. Micro-credentials are increasingly at the centre of this discussion and are expected to play a role in improving articulation between programmes, providing alternative pathways to higher education, and modularising formal education programmes. This section will examine what is known about the capacity of micro-credentials to facilitate access to higher education and improve completion.

Using micro-credentials to facilitate access to higher education

Higher education systems in many OECD countries offer learning opportunities that are more targeted and rapid than full degree programmes. Often, though not always, these are micro-credentials. In some cases, they are used to promote access to higher education by i) improving articulation between upper secondary and higher education and ii) providing alternative pathways to higher education.

Improving articulation between upper secondary and higher education

Some micro-credentials support learners' access to higher education by letting them try out higher education. Opportunities for testing are believed to be particularly helpful to school leavers who are unsure about continuing to higher education, including first-generation students, as they can experience higher education without a large commitment of time or money – while providing an incentive for learning that is recognised, stackable, and portable, rather than solely informal. Similarly, permitting students to explore fields of study before committing to a degree programme could improve the match between learning ability and interest and programme characteristics, and thereby contribute to lower drop-out rates in degree programmes.

In Norway, for example, most higher education institutions offer a one-year study programme, *årsstudium*, that introduces students to higher education and a selected field of study, and it can be built up to a bachelor's or master's degree upon completion (Studentum, 2023^[76]). Micro-credentials have also been playing a similar “testing and building” role in the Flemish Community of Belgium. The Karel de Grote University College in Antwerp, for instance, offers a microdegree in supply chain management, which targets learners who are interested in studying the subject but not ready to commit to enrol in a bachelor's degree. The microdegree is a set of courses that are part of a bachelor's degree in supply chain management and count for around 20 ECTS (European Credit Transfer and Accumulation System) (Karel de Grote Hogeschool, 2023^[77]).

In addition, in the United States, dual enrolment allows high school students to try out post-secondary education. Dual enrolment programmes – which permit high school students to take a college course and earn college credits (also high school credits in some cases) – traditionally tend to serve students from advantageous backgrounds (Taylor et al., 2022^[78]). However, there are a few cases where dual enrolment programmes successfully engage learners from disadvantaged backgrounds and increase their access to post-secondary education. The North Carolina Career and College Promise Dual Enrolment Programme, for example, reported that the programme had a larger impact on college enrolment among students from economically disadvantaged backgrounds than their peers (11 and 9 percentage-point increases, respectively) (Career and Technical Education Research Network, 2022^[79]).

Providing alternative pathways to higher education

Micro-credentials can also be seen as alternative pathways to higher education by permitting individuals who may not meet traditional entry requirements to enrol in a degree programme. In this way, individuals

with VET backgrounds will have better access to higher education. Those with work and family responsibilities can also engage in higher education without committing a few years of their time.

Many higher education systems, in which admission to certain institutions or programmes could be competitive, permit learners an alternative entry to higher education by allowing them to enrol in modules of degree programmes. In Finland, for instance, higher education institutions offer modules of degree programmes as open studies. While entry to degree programmes is competitive in Finland, open studies are available to anyone and do not ask for entrance exams. Students can earn ECTS through open studies, and if they complete a certain volume of open studies (often around 60 ECTS), they have the possibility to enrol in a degree programme. The number of individuals enrolled in a degree programme through the open study pathway doubled from around 900 in 2016 to 2 000 in 2019. However, the growth has been concentrated in universities of applied sciences and in study fields in which competition for study places is limited, such as humanities (OECD, 2022^[80]).

Some countries also adopt a stackable qualification system in continuing higher education, offering mature learners alternative pathways to higher education. In Switzerland, for example, adult learners have the option to build smaller units of learning towards a degree. They can enrol in a Certificate of Advanced Studies (CAS) (10 ECTS and more), which can be built towards a Diploma of Advanced Studies (DAS) (30 ECTS and more). DAS can then be built towards a Master of Advanced Studies (MAS) (60 ECTS and more). These continuing education courses target individuals with a few years of working experience and focus on practical matters. While, in principle, higher education institutions can decide to take on learners with a higher VET qualification, most programmes remain only open to higher education degree holders (swissuniversities, 2023^[81]).

Inspired by the Swiss continuing education system, the German Association for University Continuing and Distance Education introduced new certificates and diplomas to its continuing higher education system in 2018, which are designed to be widely accessible to individuals who do not hold a higher education entrance qualification. They developed a Certificate of Basic Studies (CBS) and a Diploma of Basic Studies (DBS), which can be applied toward a bachelor's degree, and a Certificate of Advanced Studies (CAS) and a Diploma of Advanced Studies (DAS), which can be stacked to a master's degree. CBS and CAS are minimum 10 ECTS and DBS and DAS are minimum 30 ECTS. While individuals from VET backgrounds do not have direct access to higher education degree programmes, they can take certificates and diplomas without a higher education entrance qualification (*hochschulzugangsberechtigung*). To receive a degree by stacking certificates and diplomas, they must take a university entrance assessment exam (*feststellungsprüfung*). According to the evaluation of several continuing higher education programmes funded by the Federal Ministry of Education and Research, one-fifth of the programme participants with available data did not have a higher education entrance qualification, showing the potential of these programmes to reach a wider group of learners (Freitag et al., 2020^[82]).

Challenges associated with the use of micro-credentials to promote access to higher education

While these initiatives may hold the promise of widening pathways to higher education, particularly for non-traditional learners, governments face two challenges in realising their ambition. Firstly, micro-credentials do not create pathways to higher education unless they are designed to do so. Many micro-credentials set a higher education degree as an entry requirement, closing the door to non-degree holders. In addition, in several systems, the primary purpose of micro-credentials is to respond to labour market demands, and they are not designed to provide pathways to degree programmes. In New Zealand, for instance, while micro-credentials are offered by registered tertiary education providers, more than half of the NZQA-approved programmes are offered at the New Zealand Qualifications Framework level 2-4 (equivalent to ISCED level 3-4) and cannot be built towards degree programmes. If policymakers wish to

use micro-credentials to promote access to higher education, pathways that lead to degree programmes need to be built in as part of programme design.

Secondly, promising micro-credential initiatives that support access to higher education share the challenge of not being widely known and used in practice. For micro-credentials to play a substantial role in promoting alternative access to higher education, learners, as well as teachers and counsellors, need to be more fully informed of the benefits of these programmes and the subsequent learning pathways. Governments across OECD countries have been tackling this challenge by making information more accessible to learners. The German Rectors' Conference, for instance, launched an information portal dedicated to continuing education offers at the higher education level in 2022, with funding from the Federal Ministry of Education and Research. The portal is called “*hoch&weit*” (higher and further) and aims to make university continuing education more visible to potential learners – both higher education graduates and those with VET backgrounds – as well as employers. It gives an overview of the newly-introduced certificate, diploma and degree system and lists all programmes, as well as information on available financial support and advice tailored to adult learners (hoch & weit, n.d.^[83]).

Some governments also attempt to increase the use of alternative pathways by providing financial incentives to higher education institutions. The Finnish Ministry of Education and Culture, for example, considers learners' take-up of continuous learning offers, including open studies, when allocating public funding to higher education institutions. They increased the share of funding allocated on the basis of the continuous learning offers to 5% for universities and 9% for universities of applied sciences in the public funding model for 2021-24, with the aim of placing more importance on open studies and other continuous learning offers (OECD, 2022^[80]; UNESCO, 2022^[84]).

Promising micro-credential initiatives that support access to higher education share the challenge of not being widely known and used in practice.

Improving completion by modularisation and stacking

In addition to promoting access to higher education, micro-credential learning has been championed as a means by which to support the completion of conventional academic degree programmes. Its success in doing so depends upon two conditions: first, that the unbundling of lengthy programmes into smaller units, each with milestones that recognise and reward progress, generates incentives that outweigh the burdens of added decision making; and second, that credit articulation and prior learning policies permit learners to effectively stack or “re-bundle” small units of learning into recognised credentials and, potentially, academic degrees.

While the idea of using micro-credentials to improve higher education completion comes up in policy discussions, there are limited examples of using micro-credentials for this purpose. Several higher education institutions in the United States, for instance, have sought to capitalise on the completion-enhancing potential of modularisation and stacking, joining forces in 2021 to implement 90 incremental credentials, such as short-term certificates, micro-credentials and badges, at the post-secondary level (Suny Empire State College, 2021^[85]). This effort is part of the “Credential As You Go” initiative, which sees the growing number of the “some college, no degree” population as a major national issue, and promotes the transformation from a degree-centric post-secondary system to an incremental credentialing system. The purpose of incremental credentials is to “ensure that learners are recognised for what they know and can do as they acquire the learning and not leave learners without formal documentation of that learning” (Credential As You Go, 2023^[86]). This initiative, however, is an ongoing effort, and the impact of incremental credentials on student access to, persistence in, and

completion of, post-secondary credentials is yet unknown. There are similar open questions and evidence to gather on the use of micro-credentials to support completion of VET programmes and engage with other types of learning.

At the primary and secondary levels, certified modular training has been offered in Portugal to help adults who left compulsory education halfway through obtaining a qualification. Learners receive a certificate upon the completion of the modular training and can apply it towards a certificate of basic education, which is given at the end of primary education, and a secondary school diploma (InnoVal, 2018^[87]). To facilitate the award of formal qualifications through this scheme, the government plans to make it more flexible by not requiring learners to strictly follow the requirement of the primary and secondary education curriculum and allowing them to take courses that are in line with labour market demand to apply for a formal qualification. While this certified modular training is offered at the school education level, similar initiatives at the higher education level are envisioned to provide greater flexibility to learners who left education without qualification.

It is also relevant to note Estonia's earlier efforts to encourage the "some college, no degree" population to return to higher education, which suggests that there is a substantial interest on the learner side to come back to higher education. As part of the TULE programme, which ran between 2010 and 2015, the government encouraged former students who left higher education without a degree during the economic boom of 2000-07 to come back to higher education. Tuition fees were waived for those who previously achieved 50% of the total credits required as part of the qualification, and they were permitted to build upon these earned credits. The programme attracted around 800 former students by 2013, which was equal to around 5% of all entrants in Estonia in 2013. Around one-third of the returnee students earned a degree (OECD, 2019^[88]).

Benefits and burdens of unbundled choice

Research evidence concerning academic degree programmes indicates that, on average, more tightly regulated programme formats and higher intensity programmes are associated with better rates of progress and degree acquisition than programmes that confer wide discretion upon learners to take decisions about how to advance through a modularised curriculum. This is most especially the case for initial or younger learners who are inexperienced or unfamiliar with making autonomous study decisions. Several studies show that study intensity at an earlier stage of learning affects the likelihood of degree completion. The number of credits attempted in the first semester correlates with the chances of completing a degree, and part-time attendance is associated with lower degree completion (Attewell, Heil and Reisel, 2012^[89]; Belfield, Jenkins and Lahr, 2016^[90]; Ann Clovis and Chang, 2019^[91]).

Ensuring sufficient academic momentum is reflected in policies in some countries. For example, in the Netherlands, binding study advice (BSA) given in the first year of higher education programmes only allows students who earn a certain number of ECTS (ranging from 15 to 60 ECTS) to progress to the second year of their programmes. This policy is based on a study suggesting the completion of the 30 ECTS in the first year of a study is a good predictor of study success (van de Watering, Gijbels and van der Rijt, 2004^[92]). Another study also reported that the introduction of BSA increased student graduation rates, while also increasing drop-out rates in the first year. The same study also reported that students' overall satisfaction decreased following the BSA introduction, while their satisfaction with programme feasibility increased (Sneyers and De Witte, 2015^[93]). De Koning et al. (2013^[94]) also noted that BSA influenced student study behaviour, and students became more prepared and active in group discussions that were part of courses.

While modularisation and bundling learning may not support completion among all, it is likely to work best for mature learners who have left higher education and seek to resume their studies, and whose capacity for autonomous study choices is further developed than younger learners. The Flemish Community of Belgium, for instance, appears to be moving towards encouraging young learners to follow learning as a package and directing flexible learning pathways to more autonomous learners. Higher education has been

granting a high level of flexibility to learners for the past two decades in the Flemish Community. All degree programmes are offered as an aggregate of modules, and tuition fees are set based on the number of credits that students are enrolled in (OECD, 2019^[88]). However, the government has been increasingly concerned that flexibility increased complexity and resulted in longer study duration and lower completion rates (Government of Flanders, 2014^[95]). Responding to this government's concern, some micro-credentials are explicit about their targeted learners. A micro-credential in sustainability coaching offered by the University College Ghent, for example, requires learners to have a higher education degree, at least 100 ECTS obtained in higher education, or a diploma of secondary education combined with at least five years of work experience. Enrolment in a subsequent programme – a micro-credential in ecological sustainability – is only possible if learners have a higher education degree, at least 100 ECTS in higher education or a certificate from the micro-credential in sustainability coaching. These two micro-credentials can then be built towards a bachelor's programme in business management (Hogent, 2023^[96]; Hogent, 2023^[97]).

Recognition of micro-credentials

Regardless of the capabilities of mature or highly motivated learners, aggregating micro-credentials (or other learning increments) into larger credentials, e.g. academic degrees, requires advances in the capacity of education and training systems to adopt efficient arrangements for the recognition of prior and subsequent learning. In Europe, the recently adopted Council Recommendation on a European Approach to Micro-credentials for Lifelong Learning and Employability sets out a set of standard elements to describe micro-credentials which, if adopted across countries and providers, can support consistent understanding and easier recognition of micro-credentials (Council of the European Union, 2022^[11]). In addition, the Stacking Credits and the Future of the Qualification project proposes two major approaches to recognising micro-credentials – a procedure that is in line with the Lisbon Recognition Convention and the Recognition of Prior Learning system. The project lists seven evaluation criteria for micro-credentials: quality of the course, verification of the certificate, level of the course, learning outcomes, workload, the way study results are tested, and identification of the participant. If micro-credentials present robust information in relation to these criteria, they may be recognised based on the Lisbon Recognition Convention principle. This means that learning will be recognised unless a substantial difference can be observed between the course for which recognition is sought and the corresponding course. In other cases, the project advised using Recognition of Prior Learning systems to recognise micro-credentials (Nuffic, 2022^[98]).

Countries outside of Europe are also moving forward to facilitate the recognition of micro-credentials. Australia, for instance, developed a National Micro-credentials Framework in 2022, which sets out information micro-credential providers are required to make available on the National Micro-credentials Marketplace, known as Microcred Seeker. Providers must publish title, provider, content/description, learning outcomes, language, delivery mode, date of delivery, learner effort, inherent requirements, price and financial assistance, assessment, certification, credit/other recognition, quality assurance and prerequisite(s). Where possible, providers are also recommended to present other information, i.e. expiration of the micro-credential, depth of learning, jurisdiction, industry support, recommended prior experience, stackability, industry/occupation and industry alignment (Australian Government, 2021^[99]).

Aggregating micro-credentials (or other learning increments) into larger credentials, e.g. academic degrees, requires advances in the capacity of education and training systems to adopt efficient arrangements for the recognition of prior and subsequent learning.

Can micro-credentials promote social inclusion among disadvantaged learners and workers?

To assess whether micro-credentials can promote social inclusion among disadvantaged learners and workers, three questions must be addressed. Are disadvantaged learners and workers taking up micro-credentials? Are they completing micro-credentials? Are they receiving favourable economic outcomes upon completion? This section will first look at each of these questions and then attempt to identify features that micro-credentials successfully contributing to social inclusion have in common.

Marginalised population's experience with micro-credentials

Disadvantaged learners and workers are often not engaged in lifelong learning

There is extensive evidence from large-scale surveys that participation in further education and training among adults is highly correlated with learners' socio-economic backgrounds. Data from the OECD Survey of Adult Skills, for example, show that adults who have a higher education degree and higher information processing skills, are of prime working age (25-54) and are employed in a larger firm with a higher income are more likely to participate in non-formal education and training than their peers with opposite profiles (Kato, Galán-Muros and Weko, 2020^[10]). Other national and international data, such as the EU Labour Force Survey and Adult Education Survey, also present similar trends in learner profiles (OECD, 2022^[100]).

It is not yet feasible to directly assess the take-up of micro-credentials with large-scale survey data since these surveys currently do not collect fine-grained information on the characteristics of the education and training being acquired by respondents. However, other existing data – including proprietary data from learning platforms, such as Coursera – prove that learners enrolled in micro-credential programmes also tend to have a higher education degree, come from more privileged socio-demographic groups, and have some prior knowledge related to the course topic (OECD, 2021^[2]).

There appear to be different factors that hinder adults from participating in education and training. Amongst adults who do not participate in education and training, some do have the will to learn but do not manage to participate in organised learning activities for different reasons, including responsibilities at work and in family life, financial constraints and inflexibility in programme offering. According to the OECD Survey of Adult Skills, a quarter of adults across OECD countries reported that there were learning activities in which they were interested in participating in the last twelve months prior to the survey but did not participate. More than one-third of these individuals report work-related constraints as reasons for non-participation, namely a shortage of time due to work (28%) and a lack of employer support (7%). Around one-sixth refer to a lack of financial resources (16%) and a shortage of time due to family reasons (15%), respectively. One in ten reports that education and training are offered at inconvenient times or places (12%) (OECD, 2019^[101]). Anecdotal evidence also suggests that disadvantaged learners and workers hesitate to participate in job training programmes as they fear that a resulting wage gain will make them lose access to a range of social security benefits while not being enough to put them on a solid financial footing (Fain, 2022^[102]).

The majority of adults who do not participate in education and training, on the other hand, do not show interest in engaging in learning activities. This may be because they are unaware of the need for upskilling and reskilling and the learning opportunities available to them. Qualitative interviews with less-qualified workers suggest that they are less likely to be aware of the risks of skill obsolescence and the importance and relevance of professional development. Many interview participants also report that the lack of knowledge of providers, programmes and available financial support hinders them from considering engaging in learning activities (OECD, 2022^[103]).

Disadvantaged learners and workers seem less likely to complete learning than their peers

It is widely recognised that the completion of academic degree programmes is linked to learners' socio-economic backgrounds. In the majority of OECD countries with available data, the shares of full-time bachelor's students who complete their programmes within the theoretical duration plus three years were lower among those whose parents did not have a higher education degree and those from immigrant backgrounds than their corresponding peers (OECD, 2019^[104]). Similarly, the US National Center for Education Statistics (NCES) reported that, in the academic year 2020-21, the share of full-time, first-time degree/certificate-seeking undergraduate students who completed their studies within 150% of normal completion time was nine percentage points lower among the recipients of a Pell Grant, which assists undergraduates of low-income families, than the overall completion rate of 55% (NCES, 2022^[105]). Data from the US National Student Clearinghouse also suggest that higher education students who are older than 24, male, black and Latino and enrolled part-time have lower completion rates than their peers (NSC Research Center, 2022^[106]).

While limited evidence is available on micro-credential completion by different groups of learners, data on MOOCs offer some insights about learners' experience and suggest the link between completion rates and learners' socio-economic backgrounds appears to extend to micro-credential learning. Among those who complete short online learning programmes, van de Oudeweetering and Agirdag (2018^[107]) argue that learners from more privileged backgrounds enjoy a higher chance of completing a MOOC. Based on a systematic review of studies on MOOCs, they concluded that cultural capital, such as prior skills and knowledge, could be one of the factors contributing to completion, while the impact of learners' education attainment on completion remained unclear.

It is also relevant to note that completion rates are generally lower for short online learning programmes than for degree programmes, suggesting a general need for completion support. A study on MOOCs provided by Harvard University and Massachusetts Institute of Technology via edX shows that course completion rates were 3% among all registrants, 15% among registrants who indicated their intention to complete a course in a survey, and 46% among learners who paid to enter the verified certificate track in the academic year 2017-18. It also reported that the low completion rates did not improve through the period of 2013-14 to 2017-18 (Reich and Ruipérez-Valiente, 2019^[108]).

Among those who complete micro-credentials, learners who are disadvantaged and those who are not appear to receive similar economic outcomes

Data on academic degree programmes show that under-represented students tend to have less favourable economic outcomes than their peers, while the lower returns to higher education are largely explained by the tendency of these students to pursue fields of study and occupations where subsequent employment and earning opportunities are comparatively poor. The fact that learners from disadvantaged backgrounds are less likely to enrol in selective institutions that provide graduates with higher returns also contributes to the difference in outcomes by different learner groups (OECD, 2020^[109]; Adamecz-Volgyi, Henderson and Shure, 2021^[110]).

Similarly, as discussed in the earlier section, since the economic outcomes of micro-credentials depend on the length and content of programmes, it is difficult to draw a conclusion on the difference in outcomes by learners' characteristics, particularly in light of the limited data availability. However, it is worth noting that data from Ireland and the United States suggest that non-degree credentials bring economic benefits to learners from a range of educational backgrounds. Graduate surveys implemented as part of the Irish Springboard+ programme report that the average employment rates were 55% among adults whose highest education was at the secondary level and 59% among a bachelor's degree holder 3–6 months after graduation for the programmes offered in 2012-16 (HEA, 2019^[20]). Findings from the Current Population Survey in the United States also show that weekly wage premia for certifications were around

USD 150-200 among adults whose highest education was high school education and USD 170-230 among adults who had at least a bachelor's degree in 2021 (Cardenas-Navia, 2022^[111]).

Nonetheless, existing evidence on the economic outcomes of education and training activities suggests that bachelor's and more advanced degrees hold stronger value in the labour market and highlights the importance of micro-credentials leading to these larger credentials. According to the US Current Population Survey data, while wage returns of certificates are similar for high school graduates and graduates with bachelor's and advanced degrees, median weekly earnings are around 40% and 70% higher among adults with bachelor's and advanced degrees compared to those with high school diplomas. This suggests that micro-credentials targeting learners from disadvantaged backgrounds can best help them advance by being stackable towards degree programmes.

Delivering micro-credentials for disadvantaged learners

Governments and educational institutions across OECD countries have developed micro-credentials that target different groups of learners who are under-represented in education and training. While many of these initiatives struggle to attract target learners, help them complete studies or lead them to favourable economic outcomes, there are several examples that successfully support disadvantaged learners and workers to benefit from micro-credentials.

The analysis of micro-credentials successfully contributing to support social inclusion points out six features policymakers and micro-credential providers may wish to note. These features are grants and loans; information, guidance, partnership, and marketing; student engagement in an online setting; cohort creation and near-peer mentor involvement; support to balance work, life, and study; and employer engagement and career support.

Facilitating access to microlearning through financial support, information, guidance, and marketing

Micro-credential grants and loans

Removing financial burdens appears to be a prerequisite to engaging disadvantaged learners in lifelong learning. While there is a range of financial support offered for the education and training of unemployed individuals, a limited number of opportunities are available to low-income and marginalised workers. In addition, financial support is often provided in the form of reimbursement upon completion of learning, making access to micro-credentials more challenging.

To attract learners to education and training who are under-represented or who might benefit from further credentialled learning but not otherwise obtain it, governments and education and training providers are developing funding schemes that remove financial burdens to learners at the point of enrolment. The Google Career Certificate programme, for example, reports to have awarded a certificate to more than 200 000 individuals since its launch in 2018, and more than half of these individuals did not have a bachelor's degree at the time of certificate completion. One of the reasons for their success in engaging a diverse group of learners may be their strong commitment to financial support for disadvantaged learners. In 2022 Google launched a USD 100 million Google Career Certificates Fund to support 20 000 learners from underserved communities, building upon its earlier funding of 10 000 scholarships for veterans, refugees, and students from low-income backgrounds. The new fund works in a similar way to income-contingent loans for academic degree programmes: learners are not asked to repay study fees until they earn USD 40 000 a year. The new fund is managed by non-profit organisations that offer study and career support and, for some, living stipends in addition to learner loans (Google, 2022^[112]).

Similarly, in recent years, many governments announced funding support for micro-credentials, permitting learners to engage in learning at a low cost. Some governments have established ongoing and dedicated

public funding to provide grants to learners, employers and/or providers. In Singapore, for example, costs of courses offered by government-approved providers are covered up to 70% for all Singaporean citizens and permanent residents, up to 90% for individuals older than 40 years of age and small and medium-sized enterprise employees, and up to 95% for persons with disabilities (SkillsFuture Singapore, 2020^[113]). Other governments are also moving forward with developing a public loan scheme for micro-credentials. The UK Department for Education, for instance, plans to extend its income-contingent loan scheme for degree programmes to smaller units of learning, such as modules, from 2025. The new loan scheme is called the Lifelong Loan Entitlement, and learners will be able to use their loan entitlement for four years of post-18-year-old education at their own pace over their lifetime (UK Department for Education, 2022^[114]).

Information, guidance, partnership, and marketing

Providing comprehensive information on micro-credentials helps to make under-represented learners aware of learning opportunities and to make effective study choices. The majority of OECD countries have had an online information portal that summarises learning opportunities leading to a traditional academic degree (Hofer, Zhivkovikj and Smyth, 2020^[115]). Countries are now moving towards also developing online platforms dedicated to lifelong learning and micro-credentials. The German Rectors' Conference, for example, started developing a nationwide portal for continuing education in 2020 with funding from the Federal Ministry of Education and Research. The portal “hoch&weit” (higher and further) was launched in 2022, and public and government-recognised German higher education institutions publish information about their further education offerings there. It also includes information on grants and loans available to learners and learning options available to learners without the Abitur (certification of successful completion of a university preparatory curriculum) (hoch & weit, n.d.^[83]). The Australian Government also announced the development of a one-stop-shop for micro-credentials in 2020 to assist learners in making informed learning decisions and launched an online portal called “Microcred Seeker” in 2022. The portal allows users to search micro-credentials by industry, level (five scales - novice, advanced beginner, competent, proficient and expert), the award of academic credits, start date, duration, delivery mode, price, provider and region (Australian Government, n.d.^[116]).

Supplementing information provided through online platforms with more personalised guidance further assists learners in their decision making. Singapore, for instance, has an online information portal, “MySkillsFuture”, which aims to support Singaporeans’ learning throughout life, and pupils learn how to use the portal as part of career guidance offered at schools. In addition, later in life, the Skills and Training Advisory Services – one-to-one education, training and career guidance – are available to all Singaporean citizens and permanent residents who wish to seek advice on career and skill development. Service beneficiaries can ask questions about skills required for their career transition and progression, suitable training courses (both degree and non-degree programmes) and assistance schemes available to them, and around 7 200 individuals used the services in 2021 (Government of Singapore, 2022^[117]).

Some providers believe that they need to go beyond traditional information and guidance provision to reach under-represented learners and establish a partnership with different stakeholders. For example, the Institute of Coding, which was launched in 2018 with funding from the UK Office for Students, partners with several outreach organisations, such as Code First Girls, the Age Diversity Forum and the Business Disability Forum, and engages them in programme development and information dissemination through the Diversity and Inclusion Advisory Board. They also partner with key stakeholders in targeted regions to increase local engagement and trust and deliver courses in partnership with the learning platform FutureLearn (Institute of Coding, n.d.^[118]). According to voluntary learner survey data, their courses were taken by a diverse set of learners, with ages ranging from 18 to over 65 and women representing 45% of learners (FutureLearn, 2020^[119]).

Other providers are investing in marketing to boost their reach. The Pima Community College in the United States, for instance, has worked with a marketing consultant to identify where their targeted learners are located in the local community and what messages may be effective in attracting these learners to micro-

credentials. Using the Community College Growth Engine Fund offered by the Education Design Lab, the college has developed micro-credentials that target eight occupations that are in high demand in the region and high-paying, including automotive service technicians and emergency medical technicians. They have launched a website dedicated to these micro-credentials called “FastTrackPima” and attempted to make programme content and outcomes transparent by publishing information on occupations available upon completion, average salaries, available support, and flexibility. They received over 1 000 applications within the first five weeks of targeted marketing, concluding that strategic marketing was successful (Johnson, 2022_[120]; Education Design Lab, 2023_[121]).

Supporting completion through the use of digital analytical technologies, near-peer involvement and support for work and life concerns

Micro-credentials that are successful in engaging a diverse group of learners also implement several mechanisms that ensure learners complete their programmes. Indeed, many under-represented learners tend to face more challenges during their studies than their peers with more advantageous backgrounds, and extra support is essential to support their study success.

Student engagement in online learning

While many micro-credentials are offered online to ensure flexibility, learners’ drop-out rates are higher in an online setting. Therefore, several providers offer support to make online learning more engaging by using learning analytics. The Google Career Certificate programme, for instance, includes hundreds of assessments throughout lessons to continue engaging learners, and assists them with advice based on behavioural science in their assessment preparation. When learners do not successfully pass their assessment, the learning system advises them, “Need help? 70% of your peers reviewed this lecture before retaking the assignment” (Brophy, 2022_[14]). Similarly, a group of researchers at the Open University UK report that proactive student support via text, phone and email improves student course retention and completion rates. They used predictive learning analytics to identify students at risk of failing their studies, and student support teams contacted these learners outside of office hours before the start of the course and after enrolment. Contact was used to introduce student support teams and discuss motivation, preparation, workload, module choice and employability, and improved student retention rate by 7% and course completion by 3% (Herodotou et al., 2020_[122]).

Cohort creation and near-peer mentor involvement

As in other education and training settings, the creation of cohorts appears to be effective in engaging micro-credential learners. A learning platform, Emeritus, for example, designs their online courses as cohort-based with a group of around 50-100 students, and reports completion rates of 85% across all courses (Fain, 2021_[123]). In addition, programmes successfully engaging non-traditional learners involve their “near-peers” in the delivery of the programmes. COOP, a non-profit organisation offering ICT-career-focused programmes to underemployed, low-income, first-generation college graduates in the United States, for example, establishes a cohort made of 10-16 students, and each cohort is led and supported by a team of four cohort captains, who are alumni working full-time in the ICT sector. These near-peer coaches assist learners throughout the programmes by passing on their knowledge and networks. COOP participants on average report tripling their annual earnings 12 months upon completion (COOP Careers, n.d._[124]).

Support to balance work, life, and study

Governments and micro-credential providers support learners by addressing their concerns around work and life during their studies. In some cases, they do so by offering basic income, living stipends and child-care support to learners. LaunchCode, a non-profit organisation, for instance, offers free online

coding programmes for individuals at different skill levels and paid apprenticeships to support individuals with non-traditional backgrounds to launch tech careers. They report a combination of free off-the-job learning and paid on-the-job training as a key to leading non-traditional learners to success. They also provide access to laptops as needed and funding for individuals who may need an emergency payment to cover living costs. The majority of their apprentices are reported to be previously low-income, women and unemployed (LaunchCode, 2023^[125]). Similarly, in Germany, employment agencies and job centres offer an education voucher to cover the costs of further VET, as well as travel expenses, costs for childcare and contributions to health insurance and pension. The unemployed are the main beneficiaries of the voucher, while some employed individuals also benefit from the support under certain conditions (Bundesagentur für Arbeit, 2022^[126]).

In other cases, governments provide employers with grants to cover part of learners' payroll during studies. The Government of Singapore, for example, offers absentee payroll funding to employers whose employees participate in government-approved training. The absentee payroll funding is offered under the condition that employers cover the cost of training fees, and its hourly rate is SGD 4.5 as of 1 January 2022. Each enterprise can receive up to SGD 100 000 to support their employers' participation in education and training (GoBusiness Singapore, 2023^[127]).

Facilitating a job landing through employer engagement and career support

Employer engagement and career support

In addition to supporting access to and completion of micro-credentials, the majority of successful initiatives offer extensive career support. Employers are often engaged through learners' entry to exit, and learners receive technical support to prepare CVs, practice interviews and make career decisions. Google, for example, has established an employer consortium of over 150 companies to ensure the labour market relevance of the Google Career Certificate programmes and help learners establish networks with potential employers. It also partners with a staffing firm, CareerCircle, to assist programme graduates with their CV and interview preparation and job search. Google reports that three in four programme graduates report a positive career outcome within six months (Brophy, 2022^[14]). The UK Institute of Coding also forms the Industry Advisory Board to reflect their views on programme development and delivery. All of their boot camp programmes and the majority of the remaining programmes offer employment support, such as assistance with job applications, interviews and networking with potential employers, and soft skill development opportunities, including increasing learners' confidence with success in tech careers (Institute of Coding, n.d.^[118]). They also report that support beyond employment is important for graduates from non-traditional backgrounds to avoid them leaving a job within the first few months, and they are exploring ways to do so.

Way forward for governments

The previous sections have shown that micro-credentials do not deliver on their potential automatically. For micro-credentials to play a role in enhancing learners' employability, facilitating access to higher education, improving degree completion, and promoting social inclusion, policymakers need to make interventions to steer and support learners and providers. This section presents five points that governments across EU and OECD countries may consider in their national discussions.

Figure 3. Five key points for policy discussions

1	Micro-credential initiatives need clarity about their purpose and target population if they are to be effective in achieving their goals
2	Funding support for micro-credential learners and providers should be sustainable and ensure micro-credentials remain accessible to all
3	Achieving the full potential of micro-credentials will require changes to quality assurance and academic recognition policies
4	Information provision for learners needs to go beyond the development of an online information portal to reach a wider population
5	Public policies can encourage collaborations between education and training providers and industries in micro-credential development and delivery

Micro-credential initiatives need clarity about their purpose and target population if they are to be effective in achieving their goals

While micro-credentials are expected to solve a wide range of educational and labour market needs among learners with very different skill levels, it is important that they each clarify expected learning outcomes and target learner populations. Learning design should be precisely linked to learning objectives. For example, if the main objective of micro-credentials is to increase learners' employability, employer engagement and the inclusion of practical components, including work placement, are key to achieving the purpose. However, when micro-credentials are to widen access to higher education and improve completion, designing micro-credentials with a view towards academic recognition – workload denominated in credits, level specified using the National Qualifications Frameworks, the trusted assessment, and quality-assured provider – will be essential.

In addition, learners with different skill levels have diverse needs, and this diversity should be reflected in the development of micro-credential offerings. Even among higher education graduates, some, on the one hand, may wish to top up knowledge and skills in their fields of specialisation (e.g. within the field of ICT); while others may wish to change their fields of expertise (e.g. from a humanities background to a business background). In this case, while micro-credentials for the former group need to be at an intermediate to advanced level, those for the latter group could be at an introductory level. The difference in learner needs becomes more evident with learners from disadvantaged backgrounds. Learners without a higher education entrance qualification may wish to enrol in a programme that is open to all and can be built up towards a degree. Learners without basic language and digital skills may need to take courses that prepare them to take more specialised courses, while learners with a disability require additional support, such as the use of sign language. Learner engagement in the development of micro-credentials and related policies will help policymakers and providers understand the needs of different learner populations (European Students' Union, 2021^[128]).

Research and practice point to the essential importance of agreeing on key objectives and the main target population before taking any policy actions and supporting different types of micro-credentials. The Institute of Coding, which is supported by the UK Office for Students, for instance, has a clear objective to support learners with careers in the field of ICT and therefore is committed to employer engagement (Institute of

Coding, n.d.^[118]). Kiron in Germany also sets refugees as their target population and offers programmes that respond to their needs. Language programmes are offered in addition to more field-specific training, and training is designed to develop skills required in less regulated occupations in receiving countries, in which refugees can be hired once they develop adequate skills (Kiron, 2023^[129]).

Funding support for micro-credential learners and providers should be sustainable, and ensure micro-credentials remain accessible to all

In recent years, substantial public funding has been invested in micro-credential initiatives across OECD countries. Many countries have launched government-funded micro-credential initiatives in response to the COVID-19 pandemic, including Australia, Canada, Costa Rica, Denmark, Hungary, Japan, Portugal, and the United Kingdom (OECD, 2021^[3]). In addition, with the adoption of the EU Council Recommendation on a European Approach to Micro-credentials in 2022, several European countries are currently piloting micro-credentials to see how they fit in their national education systems, such as Hungary, the Netherlands, Slovenia, and Spain.

The majority of these recent initiatives are implemented using temporary funds and lack a dedicated and continuous source of funding, suggesting the need for exploring a sustainable way of financing micro-credentials. Prior to the pandemic, non-degree programmes were often outside of the scope of public funding, and the costs of learning were largely borne by learners or their employers. Therefore, learners from more privileged backgrounds have been the major beneficiary of these fee-based learning opportunities, while the situation started changing with the launch of government-funded micro-credential initiatives (OECD, 2021^[2]; OECD, 2021^[3]). To ensure that micro-credentials remain accessible to all learners beyond the end of temporary funds, governments may consider their next step in making micro-credential financing more sustainable.

Different approaches to ensure continuity in micro-credential funding are taken across the world. Some countries have established continuous funding dedicated to lifelong learning. In Singapore, for example, everyone aged 25 and above is entitled to an individual learning account (called “SkillsFuture Credit”) and receives SGD 500 as initial credits, which can be used to take a wide range of skill development programmes. Funding support for education and training providers and absentee payroll funding for employers are also offered as part of a continuing national lifelong learning initiative, “SkillsFuture” (Government of Singapore, 2023^[73]). Other countries consider lifelong learning offerings in annual public funding agreements with higher education institutions. Finland, for instance, includes learners’ take-up of continuous learning offers in funding models for universities (5%) and universities of applied sciences (9%) (OECD, 2022^[80]). And others integrate micro-credentials into existing education loan systems. The United Kingdom, for example, will start extending the existing income-contingent loan scheme for degree programmes to smaller units of learning, such as modules, from 2025. Loan entitlement equivalent to four years of post-secondary education can be used at a learner’s pace over their lifetime (UK Department for Education, 2022^[114]).

It is also worth noting that several governments opt to charge small fees to either learners or their employers in order to ensure their commitment. In New Zealand, tertiary education organisations can apply for public funding to support the development and delivery of micro-credentials, while they can also charge fees of up to NZD 60 per credit (Tertiary Education Commission, 2022^[130]). In Spain, the Ministry of Universities plans to invest EUR 50 million in micro-credential development and offerings at public higher education institutions between 2023 and 2026 and is considering asking for small learners/employers’ contributions, as they see cost-sharing could be a way to ensure the quality and relevance of micro-credential offerings. Other ministries, such as the Ministry of Transport, Mobility and Urban Agenda and the Ministry of Culture, have also recently launched calls for upskilling and reskilling activities at higher education institutions, offering to subsidise the fees of learning programmes (15 ECTS and more) to learners or providers.

Achieving the full potential of micro-credentials will require changes to quality assurance and academic recognition policies

Quality assurance

Public authorities across the world have started working to establish foundations for the quality assurance of micro-credentials or intend to do so (Huertas and García, 2022^[131]). There have followed two general approaches, as is the case for degree programmes, establishing either programme or institutional accreditation procedures. Some countries, on the one hand, opt for quality assurance at the programme level. For instance, in New Zealand, the NZQA reviews new micro-credential programmes offered by tertiary education providers (excluding universities) and publishes them on a micro-credential register. The NZQA also invites these providers to review each existing micro-credential programme every twelve months to reflect on demands from learners, employers and a wider community (NZQA, n.d.^[132]). Universities are, however, not included in this review process and are responsible for ensuring the quality of micro-credential offerings themselves, based on the guideline provided by the Committee on University Academic Programmes (Universities New Zealand, 2021^[133]). Similarly, the Malaysian Qualifications Agency (MQA) differentiates micro-credentials that are a component of accredited degree programmes and that are standalone, and they verify the quality of each standalone micro-credential programme before registering to a national register. Micro-credentials that are part of larger accredited programmes are exempted from this programme accreditation system (MQA, 2020^[134]). In New Zealand, micro-credentials are meant not to duplicate existing quality-assured learning programmes, and therefore, approaches taken in the two countries are similar in a way that they both review new programmes and list them in registries.

Other countries, on the other hand, have chosen to move ahead with the quality assurance of micro-credentials at the institutional level. AQU Catalunya in Spain, for instance, piloted the programme accreditation of 33 short learning programmes offered by nine Catalanian universities in 2020, and concluded that the institutional-level approach would be more appropriate for micro-credentials given the number of micro-credential programmes expected in the future and associated administrative burden posed to providers (Casadesus, Huertas and Edo, 2022^[135]). Most stakeholders in European quality assurance seem to support this view, and several projects, such as the MICROBOL project, suggest that the quality of micro-credentials might be assessed based on providers' ability to ensure and monitor the quality of their programmes (MICROBOL, 2022^[136]).

While the majority of current efforts focus on micro-credentials offered by traditional education and training providers, some countries are moving forward with integrating those offered by non-traditional providers into a national micro-credential quality assurance system. In Malaysia, the MQA plans to extend their scope of micro-credential quality assurance to non-traditional providers, including industries, in 2023. Under the new system, all short courses that assess learning outcomes and are credit-bearing will be able to apply for the MQA's review and be listed on the national register. They envision that this development will allow learners to combine and stack micro-credentials offered by different types of providers to obtain a formal qualification, thereby providing an alternative pathway into higher education (Chua, 2022^[137]).

The best approach to the quality assurance of micro-credentials depends on the context of national education and training systems and differs from one jurisdiction. Regardless of where the responsibility for quality assurance is located – at the programme or institutional level – and whether non-traditional providers are included in the scope, the development of quality criteria is the first step to be taken, and national criteria can offer an important foundation upon which providers and programmes build. In both Malaysia and New Zealand, where the programme accreditation approach is taken, criteria for quality assurance are clearly defined at a national level (NZQA, n.d.^[132]; MQA, 2020^[134]). In Europe, in contrast, 53 quality assurance agencies surveyed in 2022 reported that the largest challenges to the external quality assurance of micro-credentials were “the lack of supporting national legislation”, “the lack of full

understanding of micro-credentials by the sector” and “the lack of clear definitions/descriptors to allow for micro-credential quality assurance requirements to be relevantly captured” (Huertas and García, 2022^[131]).

It should also be noted that other policy levers can support the quality enhancement of micro-credentials (Staring et al., 2022^[138]). Policymakers may develop a national micro-credential strategy that can offer broad objectives against which providers can monitor progress. Governments can also offer financial assistance for providers to invest in the infrastructure and human resources necessary to implement the strategy. It is equally important to support staff professional development to ensure they have the skills and knowledge necessary to develop and deliver quality and relevant micro-credentials. Public authorities can also play a role in performance monitoring and benchmarking – for instance through administrative data collection and national surveys – to assist providers in making informed decisions about the possible improvement of the quality of their micro-credential offerings.

Academic recognition

Robust quality assurance of micro-credentials can establish a foundation of trust among higher education institutions that supports the academic recognition of micro-credentials – as it already aims to do for academic degrees. When this trust is complemented by the alignment of micro-credentials with qualifications frameworks and their incorporation into registers and credit policies, micro-credentials should be able to achieve recognition and portability comparable to that of conventional academic degrees.

Several governments and governmental agencies have already established guidelines about micro-credential descriptors that can provide a foundation for the quality assurance and recognition of micro-credentials. The American Association of Collegiate Registrars and Admissions Officers (AACRAO), for instance, has proposed the following information could be considered in reviewing, approving and verifying micro-credentials: programme title; programme description; issuing entity; type (credit or non-credit); level (if credit, graduate or undergraduate); requirements; criteria; evidence (demonstrations or examples of criteria met); assessment protocol; effective date; expiration date (if applicable); learning outcomes; alignment with external standards and competency frameworks; description of the timing of how the micro-credential can be earned and when a learner can begin and finish the credential (traditional semester/quarter model or on-demand); and clock or credit hours, if applicable (AACRAO, 2022^[139]). This AACRAO proposal is in line with the micro-credential descriptors that have emerged in Europe and in Australia, which are presented in the previous section on recognition (see page 19).

Information provision for learners needs to go beyond the development of an online information portal to reach a wider population

The importance of informing learners of microlearning opportunities and assisting them with decision making has been highlighted in the previous sections. Learners need to be aware of different types of learning opportunities available to them and have means to compare programmes to find one that suits their needs best. When their learning goal is to find a job or increase a wage, learners need to have information on labour market outcomes upon the completion of micro-credentials or participants' feedback on their relevance. Learners seeking to complete higher education need to know the stackability of micro-credentials, while those with financial difficulties benefit from information on grant and loan options.

Governments across OECD countries recognise this importance and are moving forward with the development of online information portals. As discussed in the previous section on information for learners (see page 23), Australia and Germany developed websites dedicated to micro-credential and continuing education provisions (Australian Government, n.d.^[116]; hoch & weit, n.d.^[83]). Ontario in Canada also recently launched an online portal that allows learners to compare nearly 1 800 micro-credentials offered in the province (eCampusOntario, 2023^[140]). In addition, in Singapore and the United States, online portals have long existed to support learners in making informed decisions about enrolling in degree and non-degree programmes (Government of Singapore, 2023^[141]; Credential Engine, n.d.^[142]).

The next steps for governments could be to increase the visibility and use of these portals to share microlearning opportunities with a wider population. Engaging outreach organisations and local stakeholders and investing in marketing could be ways to increase the visibility of online learning portals. In addition, offering study and career guidance is equally important in assisting learners in making the best use of available information, including an online information portal. This paper provides promising examples of these approaches from which other countries can learn (see page 23).

Public policies can encourage collaborations between education and training institutions and industries in micro-credential development and delivery

There needs to be an active exploration of the potential of micro-credentials as part of active labour market policies including through close involvement of employers, social partners and industry actors to deliver micro-credential programmes that enable employability and create favourable labour market outcomes for learners. Collaboration between education and training providers and enterprises or industries does not often happen automatically. A review of non-degree programmes in 84 European higher education institutions in 2021 showed that the majority of micro-credential programmes were developed as an extension of existing academic programmes, such as degree programmes, continuing education programmes and MOOCs (OECD, 2021^[2]). Interviews with the leaders of eight European institutions also showed that their plans for future micro-credential development were often to unbundle existing degree programmes into smaller pieces of learning or to combine several existing short courses into one product (OECD, 2021^[3]). Conversely, micro-credentials offered through the MicroCreds project, created by the Irish Universities Association partner universities, are specifically identified and designed in line with enterprise needs. Micro-credentials being piloted through the project do not necessarily have a link with larger credentials such as degrees, but this may evolve over time in line with learner needs. Micro-credentials must be linked to an identified skill need that goes beyond the mere convenience of flexibility to react to a clear skill-gap or an area where individuals, teams or sectors require upskilling or reskilling (IUA, 2023^[143]).

Collaboration between education and training providers and enterprises in the development and delivery of micro-credentials may be promoted through carefully targeted system-level policy levers, funding support, and reforms that enable the development of micro-credentials. For example, the Government of Ontario has invested CAD 15 million to fund 65 new micro-credential projects that were developed through the partnership of post-secondary institutions and local industry and employers (Government of Ontario, 2022^[144]). Similarly, the multi-sector micro-credential initiative, the Institute of Coding, in the United Kingdom, was launched with GBP 20 million funding from the Office for Students (Institute of Coding, n.d.^[118]). In addition, in New Zealand, the quality criteria essential for micro-credentials to be approved include the evidence of demand from employers, industry and the wider community (NZQA, n.d.^[132]).

Project next step

This paper is the first of two papers in the OECD Micro-credential Implementation Project, funded by the European Commission. A second paper, to be published towards the end of 2023, will outline practical approaches and steps that countries can take to deliver on the potential of micro-credentials and to address challenges to their successful implementation. More specifically, it will look at how the three key policy instruments discussed in this section – funding, quality assurance processes, and information and guidance – can be adapted and used to create an ecosystem supportive of micro-credential providers and users in countries, and more closely in the four participating states, namely Finland, the Slovak Republic, Slovenia, and Spain. It will also focus on using these instruments to expand opportunities for collaboration in the award of micro-credentials between traditional education and training institutions, industries, and new types of providers.

Supportive public policies are needed to fully unlock the potential of micro-credentials

Micro-credentials are increasingly prominent in discussions of education, training and labour market policy. Policymakers, educators and trainers across the world envision micro-credentials to be an innovation with a multitude of potential uses and benefits – a sort of all-purpose solution for the problems confronting education, training and labour market systems – and some have begun to integrate them into existing practice and policy frameworks. However, evidence on the value and impact of micro-credentials remains scarce, limiting commitment on the part of stakeholders.

This paper examines what is known about the potential and limitations of micro-credentials (and similar education and training offerings) with respect to enhancing learners' labour market participation and outcomes, widening pathways from upper secondary to higher education, improving completion of higher education and promoting social inclusion among disadvantaged learners.

Targeted, short-term credentials similar to micro-credentials can increase employability and raise wages; however, there is consistent and extensive evidence that their impact varies by programme characteristics (e.g. length, area of focus and provider) and learners' characteristics (including education background, work experience, age, and gender). Short-term credentials that hold labour market value appear to share a few design features, including the close involvement of employers and industry actors in the development and delivery of micro-credentials and in job landing.

Micro-credentials can, in principle, be used to facilitate access to higher education by improving articulation between upper secondary and higher education and providing alternative pathways to higher education. However, many micro-credentials on offer in EU and OECD jurisdictions are not designed to support this goal and are often only open to higher education students and graduates. When micro-credentials aim to promote access to higher education, these initiatives are not widely publicised or used and have had a limited impact.

Micro-credentials have been used, though infrequently, to improve completion of education and training among new entrants and non-completers, and to promote the social inclusion of disadvantaged learners. Effective use of micro-credentials appears to require special attention to the adoption of complementary supports, such as the provision of near-peer mentors for disadvantaged learners.

At present, mature and returning learners have been the principal beneficiaries of micro-credentials: they most strongly prefer the flexibility that micro-credentials can provide and most often possess the capacity for self-directed study needed to fully profit from flexible, unbundled and incremental learning. Nonetheless, for these learners and others, the aggregation of micro-credentials into larger credentials and their recognition will require advances in the capacity of education and training systems to assure the quality of micro-credentials, and to incorporate them into qualification and credit frameworks.

Practical approaches and steps that governments can take to deliver on the potential of micro-credentials will be further explored in the ongoing OECD Micro-credential Implementation Project, and key findings will be summarised in the consecutive paper to be published towards the end of 2023.

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