

From Informal Learning to Formal Recognition: Policy Perspectives on Integrating Micro-Credentials into EQF-Aligned Vocational Education

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Abstract

As the European workforce navigates a rapidly changing skills landscape, the need to recognize learning beyond traditional education structures has become increasingly urgent. This paper explores the strategic role of micro-credentials in bridging informal and non-formal learning with formal vocational education and training (VET) systems, particularly in alignment with the European Qualifications Framework (EQF). Drawing on current EU policy developments, institutional practices, and emerging quality assurance mechanisms, the study outlines how micro-credentials can be embedded into national qualification systems, mapped to learning outcomes, and validated with trust and transparency. Special attention is given to stakeholder engagement, system readiness, and policy innovation, offering actionable recommendations for establishing a coherent and scalable micro-credential ecosystem. The findings underscore the potential of micro-credentials to support lifelong learning, enhance employability, and promote inclusive education systems across Europe.

Keywords: micro-credentials, informal learning, vocational education and training (VET), European Qualifications Framework (EQF), non-formal education

1. Introduction

In today's rapidly evolving labor market, informal learning has emerged as a vital dimension of vocational competence development. Unlike structured, institutionalized education, informal learning occurs outside traditional classrooms—through work experience, self-study, community engagement, and increasingly, digital platforms. Its relevance is underscored by the growing demand for adaptable, job-ready skills that cannot always be acquired through formal education alone.

The World Economic Forum estimates that by 2025, 50% of all employees will need reskilling due to the rise of automation and digital transformation, yet many of these skills are acquired informally or non-formally through on-the-job learning or online modules (World Economic Forum, 2020). For vocational education systems, this shift highlights a pressing need to integrate and recognize these alternative learning pathways.

Moreover, the European Centre for the Development of Vocational Training (Cedefop) emphasizes that informal learning plays a key role in upskilling low-qualified adults, especially in sectors with high levels of experiential knowledge like construction, caregiving, and hospitality (Cedefop, 2022). Without mechanisms to validate this learning, such individuals often face barriers to mobility and career advancement despite substantial skill mastery.

The growing mismatch between formal credentials and real-world capabilities has prompted policy-makers to consider how informal learning can be better mapped, validated, and integrated into structured frameworks like the European Qualifications Framework (EQF). In doing so, vocational education systems can enhance

inclusivity, promote lifelong learning, and respond more effectively to labor market needs.

2. Framing Micro-Credentials within European Education Policy

2.1 Clarifying Definitions and Functional Characteristics

As the digital and green transitions accelerate, European policy has increasingly emphasized the need for flexible, inclusive, and learner-centered education systems. Micro-credentials have been positioned as a core mechanism to support this shift, offering an alternative to traditional long-cycle qualifications. However, their successful deployment requires a shared understanding of what micro-credentials are—and what they are not.

The European Commission's Council Recommendation on micro-credentials (2022) proposes a working definition that is both inclusive and policy-ready: micro-credentials are short, focused learning experiences that lead to assessed and validated learning outcomes, which are then documented and shareable through trusted systems such as Europass. This definition underlines the importance of:

- Structured learning outcomes, aligned with qualification frameworks or industry-defined skill sets;
- Formalized assessment, ensuring that the credential represents more than just participation;
- Clear metadata, including information on issuer, workload, level, and validation method, fostering comparability and trust.

Crucially, micro-credentials are intended to be purposeful and demand-driven, designed in response to skills shortages, technological shifts, or learner mobility needs. The OECD (2021) noted that well-designed micro-credentials could help governments respond rapidly to emerging labor market needs, particularly in areas where full degrees are unnecessary or inefficient.

Micro-credentials also align well with European lifelong learning policy, serving workers, job seekers, and marginalized learners who may not otherwise engage with traditional education systems. As of 2023, over 30 pilot projects across EU Member States have explored their application in continuing vocational education and training (CVET), including digital literacy, sustainable construction, and advanced manufacturing (ETF, 2023).

In practice, their modularity enables stacking or bundling into larger qualification pathways, allowing for personalization and progressive learning. For example, an individual might earn micro-credentials in data analysis, cloud computing, and cybersecurity—each with a distinct outcome—before combining them into a more comprehensive ICT certification pathway.

2.2 Distinctions from Other Digital Certifications

To ensure policy effectiveness, it is critical to distinguish micro-credentials from other forms of digital certification that have proliferated in online learning ecosystems. While digital badges, MOOCs, and certificates of attendance contribute to recognizing participation, they typically lack assessment rigor, alignment with formal qualifications, or standardized metadata that support recognition and portability.

Digital badges, for instance, are often used to signal soft skills, achievements, or participation in informal activities (e.g., attending a workshop or volunteering). However, these badges vary widely in credibility and are not always based on measurable learning outcomes. Open badges, created by platforms such as Mozilla, aim to promote transparency, but their uptake in formal education remains limited due to the absence of quality assurance or regulatory alignment.

MOOC certificates (from platforms like Coursera, edX, or FutureLearn) may involve peer-graded assignments or automated quizzes, but generally fall short of the formal validation required for qualification recognition. A 2020 study by the Joint Research Centre (JRC) observed that less than 10% of MOOC learners completed courses with formally assessed outputs that could be considered for academic credit (JRC Science for Policy Report, 2020).

In contrast, micro-credentials are explicitly designed for formal or semi-formal recognition, often linked to National Qualifications Frameworks (NQFs) and referenced to the EQF. This ensures that learners can use them to access further education, gain credits toward full qualifications, or demonstrate job-relevant competencies to employers across borders.

Furthermore, the European Commission's support for a micro-credential metadata standard (via Europass) provides a crucial digital infrastructure for interoperability. This allows institutions and employers to read and verify credentials issued in different countries and sectors—an essential feature for cross-border learning and labor mobility in the EU.

In sum, the fundamental distinction lies in purpose, structure, and recognition: while digital badges and MOOC certificates signal informal learning, micro-credentials are policy-integrated, learner-verifiable, and qualification-aligned instruments of skills recognition. This clarity is essential for advancing their legitimacy and

fostering trust among VET providers, employers, and learners.

3. Strategic Alignment with EQF and National Frameworks

3.1 Embedding Micro-Credentials into Existing Structures

Integrating micro-credentials into the European Qualifications Framework (EQF) and national qualification systems requires thoughtful adaptation of existing educational and vocational structures. Rather than replacing traditional qualifications, micro-credentials are intended to complement them—offering short, stackable modules that address specific competency needs while maintaining structural coherence with established frameworks.

The EQF, with its eight reference levels based on learning outcomes in terms of knowledge, skills, and responsibility/autonomy, provides a strong foundation for integrating micro-credentials. However, mapping micro-credentials onto these levels requires explicit descriptors, workload estimations (typically in ECTS or hours), and quality assurance alignment.

Several countries have initiated integration strategies. For example, Ireland's National Framework of Qualifications (NFQ) allows micro-credentials to be formally referenced to existing award levels via Quality and Qualifications Ireland (QQI). Similarly, France is experimenting with incorporating *blocs de compétences* (blocks of competences) into national certifications, serving a similar function to micro-credentials and supporting partial recognition of learning outcomes (CEDEFOP, 2023).

This integration requires not only technical alignment but also capacity-building within awarding bodies, sectoral skills councils, and VET providers, who must understand how to evaluate and structure micro-credentials in ways that are EQF-compatible and industry-relevant.

3.2 Ensuring Policy Coherence and Interoperability

A major challenge in embedding micro-credentials lies in avoiding fragmentation across education systems, sectors, and borders. Without coordinated policy guidance, the risk is a proliferation of disconnected credentials that lack comparability, trust, or transferability.

To address this, the European Commission's 2022 Council Recommendation on Micro-Credentials encourages Member States to develop national strategies that are consistent with a European-wide approach, based on shared principles of quality assurance, learner agency, and transparency.

Interoperability is being actively pursued through the Europass Digital Credentials Infrastructure (EDCI), which allows issuers to create credentials in a standardized, machine-readable format. By embedding metadata such as EQF level, learning outcomes, and issuing institution, the EDCI aims to create a single European space for recognition and mobility.

Additionally, micro-credentials must interact seamlessly with other instruments, such as:

- The European Credit System for Vocational Education and Training (ECVET),
- The European Skills, Competences, Qualifications and Occupations (ESCO) classification, and
- National Qualifications Frameworks (NQFs) that align with EQF.

By ensuring that micro-credentials can be decoded, trusted, and transferred across systems, the EU promotes learner mobility and employer confidence, avoiding duplication or undervaluation of learning achievements.

3.3 Supporting the Shift Through Regulatory Innovation

Realizing the full potential of micro-credentials requires not only alignment with existing frameworks but also regulatory innovation to accommodate new learning pathways. Traditional qualifications frameworks are typically rigid, built for long-form degrees and vocational diplomas, and may not be well-suited to short-form, modular learning.

To address this, some countries have introduced legislative or regulatory reforms to legitimize micro-credentials as recognized learning units. In Finland, for instance, the national digital skills strategy incorporates micro-credentials as part of official upskilling programs, with public funding attached. In Italy, pilot programs have integrated micro-credentials into adult learning and employment requalification schemes under national recovery and resilience plans.

Regulatory innovation may also involve adjusting accreditation rules, revising institutional mandates to include micro-credential design and delivery, and updating funding formulas to recognize modular learning. For example, some European funding instruments such as ERASMUS+ and the European Social Fund Plus (ESF+) now explicitly support the development of micro-credentials within recognized frameworks.

Furthermore, policymakers are exploring legal recognition pathways, allowing learners to convert validated micro-credentials into credits that count toward formal qualifications or professional licensing. This legal

backing is essential to avoid micro-credentials becoming a parallel, but ultimately peripheral, learning track.

In sum, aligning micro-credentials with EQF and national frameworks is both a technical and political undertaking, requiring harmonized policy approaches, cross-sector coordination, and institutional innovation. The success of this alignment will largely determine whether micro-credentials can genuinely bridge the gap between informal learning and formal recognition within vocational education systems.

4. Mechanisms for Quality Assurance and Recognition

4.1 Validation Tools for Informal and Non-Formal Learning

A critical enabler for the integration of micro-credentials into formal education and vocational systems is the validation of informal and non-formal learning (VNFIL). Across the EU, significant progress has been made in establishing national validation systems, guided by the Council Recommendation on the Validation of Non-formal and Informal Learning (2012).

Validation typically includes four stages: identification, documentation, assessment, and certification of competences. This process ensures that learning acquired through work experience, self-directed study, or short courses is recognized in the same way as learning obtained through formal settings. In 2020, 85% of EU Member States reported having national frameworks for validation, though implementation varies in scope and accessibility (Cedefop, 2020).

Micro-credentials can act as validated outputs of non-formal or informal learning if tied to transparent learning outcomes and accompanied by quality-assured assessments. Key validation tools include:

- Recognition of Prior Learning (RPL) systems, allowing learners to gain credit or exemptions based on prior experience;
- Digital portfolios documenting evidence of competencies;
- Standardized skill assessments, aligned with sectoral standards.

For instance, the Netherlands operates a robust RPL framework where micro-credentials may be used as documented proof during validation interviews or assessment centers. Similarly, Austria's *Weiterbildungsakademie* system links validated adult learning to national certification, providing a model for integrating micro-credentials into broader qualification structures.

4.2 Mapping to Learning Outcomes and EQF Levels

The credibility of micro-credentials largely depends on their alignment with established learning outcomes frameworks, particularly the European Qualifications Framework (EQF). Mapping ensures that micro-credentials are level-referenced, outcome-based, and comparable across institutions and borders.

Effective mapping involves:

- Defining explicit learning outcomes (knowledge, skills, and autonomy/responsibility);
- Estimating learning volume, typically in ECTS credits or hours;
- Clarifying assessment methods and criteria;
- Specifying EQF level equivalence and referencing to NQFs.

To facilitate consistent mapping, the European Commission has supported the development of a metadata standard for micro-credentials within the Europass Digital Credentials Infrastructure (EDCI). This standard includes fields for EQF level, workload, issuing body, and quality assurance reference—ensuring that each micro-credential carries structured, verifiable information.

One notable example is Ireland's National Micro-credentials Framework, which requires all micro-credentials to be level-referenced to the Irish NFQ, use validated learning outcomes, and be approved through the QQI's quality assurance procedures. This ensures interoperability within the wider qualifications system and enables stackability toward full awards.

Without such mapping mechanisms, micro-credentials risk being perceived as fragmented or informal—undermining their potential to serve as bridges between different learning contexts and between education and labor markets.

4.3 Addressing Trust, Transparency, and Stakeholder Buy-in

Establishing trust among learners, employers, and education providers is essential for the widespread adoption of micro-credentials. Without shared confidence in their quality and utility, micro-credentials risk being seen as lesser credentials rather than meaningful indicators of learning and competence.

Transparency is the foundation of this trust. Each micro-credential should include clear metadata, disclose

learning outcomes and assessment processes, and be linked to a recognized quality assurance framework. The European Commission's guidance emphasizes the need for public registers or repositories of validated micro-credentials, similar to credential transparency systems in the U.S. or New Zealand.

Equally important is the involvement of social partners, particularly employers and sectoral bodies, in the design and endorsement of micro-credentials. A 2021 survey by BusinessEurope found that while 72% of employers support the idea of micro-credentials, only 34% were actively using them in hiring or internal upskilling decisions—largely due to uncertainty over quality and relevance.

To bridge this gap, several countries have created multi-stakeholder governance models for micro-credential validation. In Finland, national pilots involve collaboration between universities, employers, and unions to co-design micro-credentials that meet both academic standards and occupational profiles. Similarly, Lithuania's Skills Council plays a key role in vetting and endorsing credential content for industry recognition.

Ultimately, stakeholder buy-in requires a cultural shift toward valuing modular, lifelong learning pathways. This shift must be supported by clear legal frameworks, funding mechanisms, and communication strategies, ensuring that micro-credentials are not just technically valid, but socially and economically recognized across sectors.

5. Stakeholder Engagement and System Readiness

5.1 Perspectives from Employers, Learners, and Institutions

The successful adoption and sustainability of micro-credentials within EQF-aligned vocational systems hinges on broad stakeholder engagement. Each group—employers, learners, and education institutions—plays a distinct yet interdependent role in shaping the credibility, demand, and usability of micro-credentials.

Employers are central to ensuring relevance and uptake. Many industries, especially those undergoing digital transformation, view micro-credentials as tools for targeted skills validation. A 2022 Cedefop survey revealed that 61% of employers in the EU consider micro-credentials useful for upskilling and hiring, but only 28% reported direct involvement in their design or recognition (Cedefop, 2022). Their limited engagement is often due to uncertainty around quality assurance, EQF alignment, and lack of standardization across sectors.

Learners, particularly adult learners and those in career transition, tend to value micro-credentials for their flexibility and short duration. In the context of the green and digital transition, they are increasingly seeking just-in-time learning to remain competitive in the labor market. However, learners also face concerns around the recognition and transferability of micro-credentials. Without clear assurances that credentials will be acknowledged by employers or lead to formal qualifications, motivation to invest time and resources may diminish.

Education and training institutions are simultaneously embracing and adapting to micro-credential frameworks. Higher education institutions, in particular, are exploring how micro-credentials fit within modular degree pathways. According to the European University Association (EUA), over 70% of surveyed universities in 2021 were developing or piloting micro-credential offerings, though many raised challenges related to internal quality procedures and workload crediting (EUA, 2021).

To align incentives, national governments and EU bodies must foster multi-stakeholder collaboration platforms, ensuring that employers, providers, and learners co-create credential formats that are relevant, recognized, and responsive to societal needs.

5.2 Capacity-Building for Implementation at Scale

Embedding micro-credentials within national systems and scaling their implementation across sectors and regions requires robust institutional capacity and infrastructure. While pilot initiatives across Europe have shown promise, large-scale integration demands systemic support in three key areas: governance, resources, and digital infrastructure.

Firstly, VET systems and quality assurance bodies need clear operational guidance on how to design, validate, and issue micro-credentials aligned with EQF and NQFs. This includes training staff in outcome-based curriculum development, digital credentialing tools, and assessment frameworks. The European Training Foundation (ETF) has highlighted the need for upskilling national agencies and providers to manage modular qualifications and transition toward learning-outcome cultures.

Secondly, capacity-building requires financial investment. EU instruments such as ESF+ and Erasmus+ can play a strategic role by funding pilot programs, cross-border credential recognition mechanisms, and public-private partnerships. However, in many countries, VET providers still lack stable funding streams to experiment with or sustain micro-credential offerings.

Thirdly, digital infrastructure is essential for secure, interoperable issuance and verification of micro-credentials. The Europass Digital Credentials Infrastructure (EDCI) offers a foundational tool, but it must be accompanied

by national-level digital literacy training, administrative system upgrades, and interoperability with existing education databases and HR systems.

Finally, political will is key. Without coordinated national strategies and policy roadmaps, micro-credential initiatives risk remaining fragmented and localized. Countries like Estonia, Finland, and Ireland have demonstrated how aligning national qualifications policy, labor market demand, and digital innovation can enable credible, scalable micro-credential systems.

6. Policy Futures and Recommendations for a Recognized Micro-Credential Ecosystem

The consolidation of micro-credentials into a recognized and functional component of EQF-aligned vocational education requires a shift from experimentation to structured system-building. This transformation must be guided by coherent policies that foster quality, inclusivity, transparency, and portability—while also remaining agile enough to respond to the evolving demands of learners and labor markets.

To move forward, five interconnected policy directions are recommended:

1) Establish Comprehensive National Frameworks for Micro-Credentials

Member States should develop dedicated micro-credential frameworks embedded within their national qualifications systems. These frameworks should define credential types, issuance conditions, referencing to EQF/NQF levels, and recognition mechanisms—ensuring compatibility with the EU-wide approach.

2) Mandate Quality Assurance and Transparent Credential Standards

Clear requirements for learning outcomes, assessment methods, metadata, and workload must be universally applied. National quality assurance agencies should be empowered to accredit micro-credential programs and audit providers using consistent criteria derived from EQAVET and Bologna Process tools.

3) Strengthen Stakeholder Co-Governance and Sectoral Relevance

Policymakers must institutionalize cooperation between educational institutions, employers, social partners, and civil society. National and regional platforms should be formalized to co-design credentials that are demand-driven and responsive to technological and sectoral changes.

4) Leverage EU Funding and Infrastructure to Support Scale-Up

Programs such as Erasmus+, Digital Europe, ESF+, and Horizon Europe should continue to support capacity-building, cross-border pilots, and credential interoperability. Countries should integrate the Europass Digital Credentials Infrastructure into their national education and employment systems to ensure secure, standardized recognition across Europe.

5) Promote Legal Recognition and Pathways to Formal Qualifications

Micro-credentials must not remain peripheral; their legitimacy depends on their integration into pathways that lead to full qualifications, career advancement, or professional licensing. National legislation should support conversion of validated micro-credentials into formal credits or qualifications, following procedures aligned with ECTS or national credit systems.

As the EU and Member States progress toward a more flexible, inclusive, and competency-based learning ecosystem, micro-credentials offer a unique opportunity to bridge the divide between informal learning and formal recognition. Realizing this potential will require vision, coordination, and sustained political and financial commitment—but the reward is a more agile, learner-centered vocational education system fit for the 21st century.

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