



CEDEFOP INSIGHTS

Digital tools for the **portability** of learning outcomes

Insights from a ReferNet survey



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The **European Centre for the Development of Vocational Training** (Cedefop) is the European Union's reference centre for vocational education and training, skills and qualifications. We provide information, research, analyses and evidence on vocational education and training, skills and qualifications for policymaking in the EU Member States.

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CHAPTER 1.

Introduction

Qualifications databases and digital credentials for learning are becoming important digital tools that foster transparency and portability of learning outcomes. They build on longstanding European cooperation in the field of qualifications and skills transparency, including initiatives such as the European Qualifications Framework (EQF) and Europass (Cedefop, 2024a). While these transparency tools have improved the visibility and portability of learning outcomes, differences in approaches remain and qualifications from less familiar providers can still be difficult to interpret, compare and trust (Cedefop, 2025).

Digitalisation can help address some of these barriers by supporting common formats for describing, sharing and verifying skills and qualifications. This can make skills and qualifications more accessible, comparable and verifiable, while linking them to related data such as skills taxonomies, occupations, or job advertisements. Over time, EU transparency tools have increasingly integrated digital aspects. The [2017 EQF](#) revision introduced structured data fields for qualifications, while [Europass](#), relaunched in 2020, boosted interoperability and cross-border visibility of national qualifications and programmes databases. More recently, the [Union of skills](#) proposed to develop a [Skills portability initiative](#) building on existing transparency tools and promoting European formats for digital credentials (European Commission, 2025).

At European level, digital credentials are promoted, as part of the Europass implementation, through the [European Digital Credentials for learning \(EDC\) infrastructure](#). Although no official definition exists, at EU level digital credentials are described as verifiable digital claims from an issuer to an individual proving his/her learning achievements, which can include descriptions of learning outcomes. They may relate to learning acquired in all contexts, including outside formal education such as learning at work or through personal experiences. Examples include diplomas, certificates, microcredentials, certificates of participation or employer recommendations (Europass, n.d. a; b). Unlike traditional paper-based certificates, digital credentials are digital by design, meaning that they contain structured data that can be automatically processed by machines and whose authenticity can be verified through cryptographic solutions.

The [European learning model](#) is the data model behind digital credentials in Europass and, as part of the effort to move towards interoperability, it is also used to share information on qualifications, learning opportunities and accreditation. It is also planned to be used in other EU developments, such as in the [Once Only Technical System \(OOTS\)](#) which aims at streamlining data retrieval and exchange,

including data on qualifications, between public administrations across borders. In parallel, broader EU developments such as digital identity wallets aim to allow individuals to store and share qualifications alongside other forms of personal data.

To explore national developments in this area, Cedefop distributed an online survey on digital tools promoting the portability of learning outcomes to its ReferNet ⁽¹⁾ partners in the first quarter of 2026. The survey explored digital tools providing information on qualifications and programmes, as well as adoption and use of digital credentials. Responses were received from 27 countries ⁽²⁾, with 28 submissions (two from Belgium). Respondents were predominantly national public authorities and agencies responsible for education, qualifications, and vocational education and training (VET), including ministries, national agencies, and research institutes.

This paper is based on selected findings from the ReferNet survey and provides insights into whether and how countries are investing in digital tools to support the transparency and portability of learning outcomes. It focuses on two distinct but potentially interconnected developments: qualifications databases and digital credentials. For qualifications databases, the paper explores developments related to single access points, coverage and target users. For digital credentials, it examines countries' understanding of the concept, reasons for introducing them, level of maturity and use, the tools available for issuing, storing and verifying credentials, and the main challenges countries face in implementation.

(1) ReferNet is a Cedefop network of institutions which provides information on national vocational education and training (VET) systems and policies in the EU Member States, Iceland and Norway. Each national partner is a key organisation involved in VET in the country it represents.

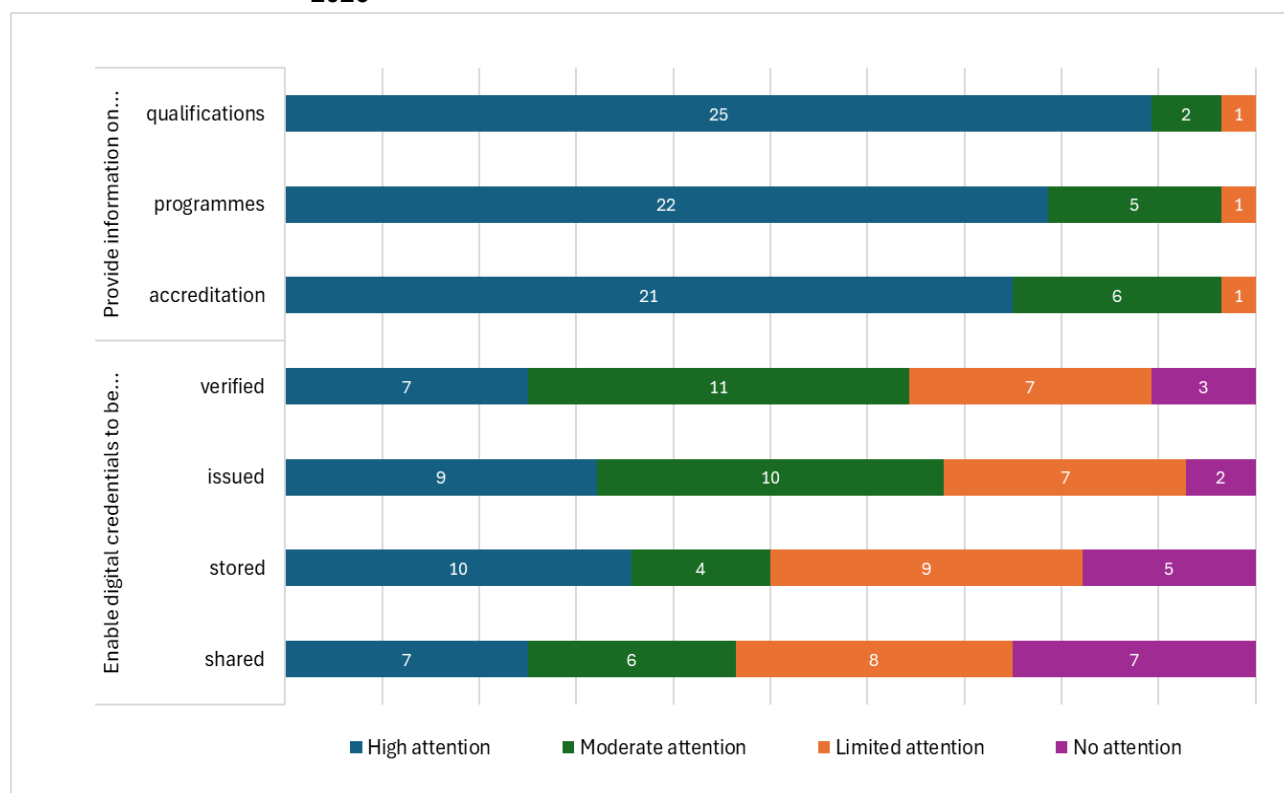
(2) This includes all EU Member States, except France and Malta and with contributions from Norway and Iceland.

CHAPTER 2.

Policy attention to digital tools promoting transparency and portability of learning outcomes

Digital tools supporting the transparency and portability of learning outcomes are on the policy agenda in all countries examined. Of the 28 responses received, 22 systems report that policy developments are already in place while the remaining six indicate that discussions are ongoing (Austria, Belgium-French Community, Iceland, Netherlands, Slovakia, Slovenia, Sweden). Figure 1 shows that national public authorities devote the greatest policy attention to digital tools that provide information on qualifications, programmes and awarding bodies. Countries reporting high attention to qualifications information tools also tend to report high attention to tools covering programmes and awarding bodies, suggesting a tendency for areas to develop together. By contrast, attention to digital credentials used to issue, verify, store or share learning achievements appears more limited and uneven across countries. This may reflect the long-standing policy focus on qualifications transparency, while digital credentials are only beginning to gain policy traction. Broader factors like the existence of national digitalisation strategies and digital infrastructure capacity may also shape developments.

Figure 1. Policy attention across digital tools for different purposes, 28 systems, 2026



NB: The survey asked to rate the level of attention given by national public authorities to digital tools for each listed purpose.

Source: Authors' elaboration based on ReferNet data.

Least policy attention is reported for sharing digital credentials with third parties, such as employers and education and training providers. Countries reporting limited or no attention to credential sharing also tend to report lower levels of attention to other functions related to digital credentials, including verification, storage and issuance. Within the set of responses on digital credentials, issuing and storing credentials attract the greatest levels of policy attention.

When asked about future relevance, a clear majority of systems (23) consider qualifications databases as highly important in the future. Respondents emphasise their role in providing structured and easily accessible information on qualifications, including qualification levels, learning outcomes and quality assurance arrangements, for learners, employers, and providers. Qualifications databases are considered important tools for improving the transparency and comparability of qualifications. They help employers, learners and others to be confident that the qualifications and providers can be trusted and meet standards. They can provide an overview of all learning and career opportunities.

Although to a slightly lesser extent, most respondents (19) also expect the importance of digital credentials to grow. Emphasis is on enabling fast and reliable verification of qualifications by employers and educational and training providers. As learning pathways become more flexible and diverse, digital credentials are considered key for documenting and certifying a broader range of learning experiences, thereby supporting more personalised and lifelong learning trajectories.

Overall, most countries expect efforts on digital tools to intensify over the next five years, with no country anticipating a decline. However, several respondents stressed that future progress will depend on continued political commitment and investment. Only Norway and Portugal anticipate limited further change, noting that substantial investments have already been made.

These findings may indicate that policy efforts currently focus primarily on developing the technical infrastructures required to create and manage digital credentials. As countries build information infrastructures around qualifications, programmes and accreditation, the issuing and storage of credentials can be easier to implement since it can link directly to this existing information. Deploying user-oriented services that enable individuals to share digital credentials and third parties to interpret and verify them require more advanced level of maturity, trust and interoperability. In addition, this may reflect a relatively typical development pattern in which back-end systems are prioritised before broader deployment of user-oriented services.

CHAPTER 3.

Digital tools for information on qualifications and programmes

3.1. Towards a single access point

Across systems, a considerable number of digital tools offer information on qualifications and programmes, reflecting policy activity but also creating risks of dispersed and fragmented information. Respondents could report up to 10 tools serving this purpose, resulting in the identification of 160 different digital tools. Around two thirds focus on information about programmes and courses, either exclusively (39 %) or combined with information on qualifications (25 %), while 30 % provide information only on qualifications. In several cases, databases also include information on accredited training providers or career opportunities.

Qualifications databases, programme registries and tools providing information on skills and occupational standards frequently co-exist with different degrees of connection between them. These tools often differ in terms of objectives, scope, coverage and administrative responsibility. As a result, users may face difficulties navigating the existing landscape, while fragmented or incomplete information may reduce transparency and usability.

Only a limited number of countries report to have a clearly established single access point for information on qualifications and programmes. Nevertheless, most systems indicate ongoing efforts to move towards more integrated and centralised systems. In the Netherlands, for example, [Leeroverzicht.nl](https://leeroverzicht.nl) was launched in 2022 following a nationwide survey and brings together information from three distinctive databases into a single platform covering all possible existing certifications in the country.

In several systems, the move towards single access points is closely linked to broader digitalisation efforts and the development of more user-centred services. Spain is developing a federated digital architecture connecting vocational education and training registries and competency standards through a unified citizen interface ([Mi Carpeta Ciudadana](#)). Similarly, Finland is developing integrated digital services for lifelong learning that combine information on learning opportunities, guidance and skills development. These developments illustrate a gradual shift from static qualifications registers towards more integrated, user-oriented and lifelong learning services.

Efforts to consolidate qualifications data are also increasingly linked to labour market intelligence and skills needs anticipation. Several countries are connecting

qualifications databases and learning opportunities with information on labour market needs, skills demand and job vacancies. Romania's ongoing Reconnect project, for example, aims to integrate education and labour market data to support skills needs anticipation and VET policy evaluation. In Estonia, separate central access points for qualifications and programmes ([education portal/EHIS](#) and [Juhan](#)) and skills and occupations ([skills compass/OsKuS](#)), are being interconnected to verified credential and learning opportunity data that can be reused in more integrated, user-centred services (e.g. skills profiles, self-assessment and guidance/recommendation features). In countries such as the Netherlands, Norway and Slovakia, qualifications databases are already linked to job vacancies, while similar developments are planned in other systems.

At the same time, not all countries are moving towards a single central access point. Austria, Slovenia, and Sweden, for example, report maintaining multiple interconnected registries and databases that provide broad information across sectors without full integration into one platform.

3.2. Coverage and users of qualifications databases

Most countries examined have a database on qualifications linked to the National Qualifications Framework (NQF) that cover several educational sectors (Cedefop, 2025b). Some systems provide comprehensive coverage across general education, VET, higher education, adult learning and qualifications awarded outside formal education and training. Examples include [Poland's integrated qualifications register \(IQR\)](#), [Ireland's register of qualifications](#) and national portals in Belgium (French Community), Denmark and Norway.

Other databases have a smaller scope. In Greece, the Greek Qualifications Register ([GQR-PROSON](#)) focuses mainly on formal education qualifications, while in Germany the [BIBB database](#) concentrates on regulated VET occupations. [Sweden's qualifications database](#) includes both formal VET qualifications and qualifications from outside the formal system linked to the NQF.

When it comes to information on users, significant gaps exist. Of the 44 tools for which respondents were asked to provide information on users, fewer than half (16) collect user data, while several systems report plans to introduce monitoring mechanisms in the future. This suggests a need to improve monitoring outreach, use and impact of qualifications databases. In some countries, such as Estonia and Finland, databases are integrated into application and registration systems, allowing for more systematic user data collection. In most other cases, however, monitoring is limited to basic web analytics and visitor statistics.

CHAPTER 4.

Digital credentials

4.1. National understanding

As digitalisation accelerates, digital credentials are attracting policy interest as a way to certify skills, knowledge and competence. Official national definitions anchored in legislation are not reported in any of the analysed systems, suggesting that the concept of digital credentials is still taking shape. In some systems, such as Slovakia, the term ‘credential’ is not commonly used, while in others, including Finland, national terminology varies depending on the context. In Croatia and Hungary, the concept is defined in specific education and training sectors, while in Italy it is operationalised through several legislative instruments. Other countries, including Greece, Estonia, Lithuania and Austria explicitly refer to EU developments, particularly the [European digital credentials for learning](#) infrastructure, as influencing national understanding. Specific legislation on digital credentials remains rare, although existing frameworks on electronic identification, authentication and digital signatures (often linked to the [eIDAS regulation](#)) commonly provide the legal basis for their use, as reported in countries such as Greece, Hungary, and Luxembourg.

Despite the absence of formal definitions, systems are overall aligned in identifying the main characteristics associated with digital credentials, although interpretations are not always fully coherent or consistent. Some systems report that understanding of the concept has evolved over time. Initially, digital credentials were often associated with electronic versions of paper documents, such as PDFs with digital signatures. Increasingly, however, countries associate digital credentials with structured, machine-readable and verifiable data. In Germany, for example, the [Federal Office for Information Security describes digital credentials](#) as ‘electronic documents’ containing ‘metadata’ such as date of issue and scope. The emphasis on metadata signals a move towards rich, structured and interoperable data structures that can be automatically processed and secured through cryptographic verification. These characteristics – structured data, machine readability, interoperability and verifiability – were identified by most respondents as core features of digital credentials.

At the same time, some systems still associate digital credentials with PDFs or other static, non-interoperable formats. In other cases, existing qualifications (or more rarely programmes) databases and registries are considered the starting

point for implementing digital credentials, with their functionalities gradually extended to include credential issuance, storage and/or verification.

The findings also reveal a degree of conceptual overlap between digital credentials and microcredentials. Some respondents appear to associate, or even confuse, the two concepts. In the European context, however, microcredentials refer to the size and scope of learning achievements (Council of the European Union, 2022), whereas digital credentials refer to the format through which learning achievements are represented, shared and verified. While microcredentials can be issued as digital credentials, not all digital credentials are microcredentials.

This ambiguity may partly stem from the fact that digital credentials are often discussed in relation to microcredentials in European policy developments, particularly regarding authentication and portability. In addition, microcredentials frequently constitute one of the first use cases for digital credentials at national level. Lithuania reports experimentation by universities and colleges with digital credentials mainly in the context of microcredentials, while Slovakia expects the development of microcredentials to be accompanied by the introduction of digital credentials. Similarly, Poland's initial experimentation with digital credentials was linked to microcredentials initiatives.

The association between the two concepts might also be due to shared features. Microcredentials can be 'stackable', and digital credentials can facilitate this process by enabling the secure accumulation and transfer of learning outcomes. Finally, both concepts are frequently associated with non-formal learning and flexible learning pathways, although both concepts can apply equally to formal, non-formal, and informal learning contexts.

4.2. Policy rationale for introducing digital credentials

The use, or planned use, of digital credentials emerges as grounded in a series of national strategic priorities. These include the digitalisation of public services, the enhanced visibility and portability of learning outcomes across education, training and labour market, supporting flexible learning pathways and better alignment between learning opportunities and labour market needs.

Some countries, like Ireland, Luxembourg, Poland and Spain, have introduced explicit policy commitment to move from paper-based qualifications to digital formats. In others, digital credentials form part of wider efforts to develop comprehensive national digital education as in Estonia and Finland.

Portability and recognition of learning outcomes is a recurrent reason for moving towards digital credentials. They are perceived as making the

understanding and recognition of skills and competences more efficient, simpler, faster, and more reliable compared to traditional paper-based approaches.

The granularity and traceability that digital credentials offer are viewed as enabling access to detailed information, including information related to quality assurance or labour market opportunities. This is considered helpful to facilitate the accumulation of units of learning outcomes towards full qualifications but also facilitates professional development and labour market integration. At the same time, respondents noted that portability is conditioned on the use of common data, which are considered a precondition for improving portability and overcoming siloed approaches.

Digital credentials are seen as offering opportunities for increasing the visibility and transparency of learning outcomes, especially when acquired in non-formal and informal contexts. Making skills acquired on the job more visible and portable is considered particularly important for individuals lacking formal qualifications. In this context, they also facilitate the validation of prior learning.

The digitalisation and structuring of credential data are also considered to create opportunities for data reuse and skills matching. Respondents note that digital credentials could better support matching between individuals' skills profiles and labour market needs, while also enabling analysis of skills gaps, learner tracking and other policy-relevant uses of data.

Security and trust are frequently mentioned as key elements of digital credentials. This is linked to the ease of verifying their authenticity and reducing the risks of frauds. Automatic verification is seen as a way to transcend linguistic and administrative barriers that have historically complicated recognition across borders.

Efficiency gains are highlighted in relation to certification procedures, document management, reporting and administrative procedures. Reduced bureaucracy and resource savings are considered beneficial for institutions responsible for issuing and managing credentials and for learners, who may otherwise need to engage in complex administrative procedures or physical document handling. Several respondents also underline that digital credentials strengthen learner ownership and control over personal data, contributing to a more user-centred approach that shifts the focus from institutions towards individuals.

4.3. Implementation maturity and patterns of use

Among the analysed countries, none has a fully coherent national system for digital credentials covering all types of qualifications. Moreover, the use of digital

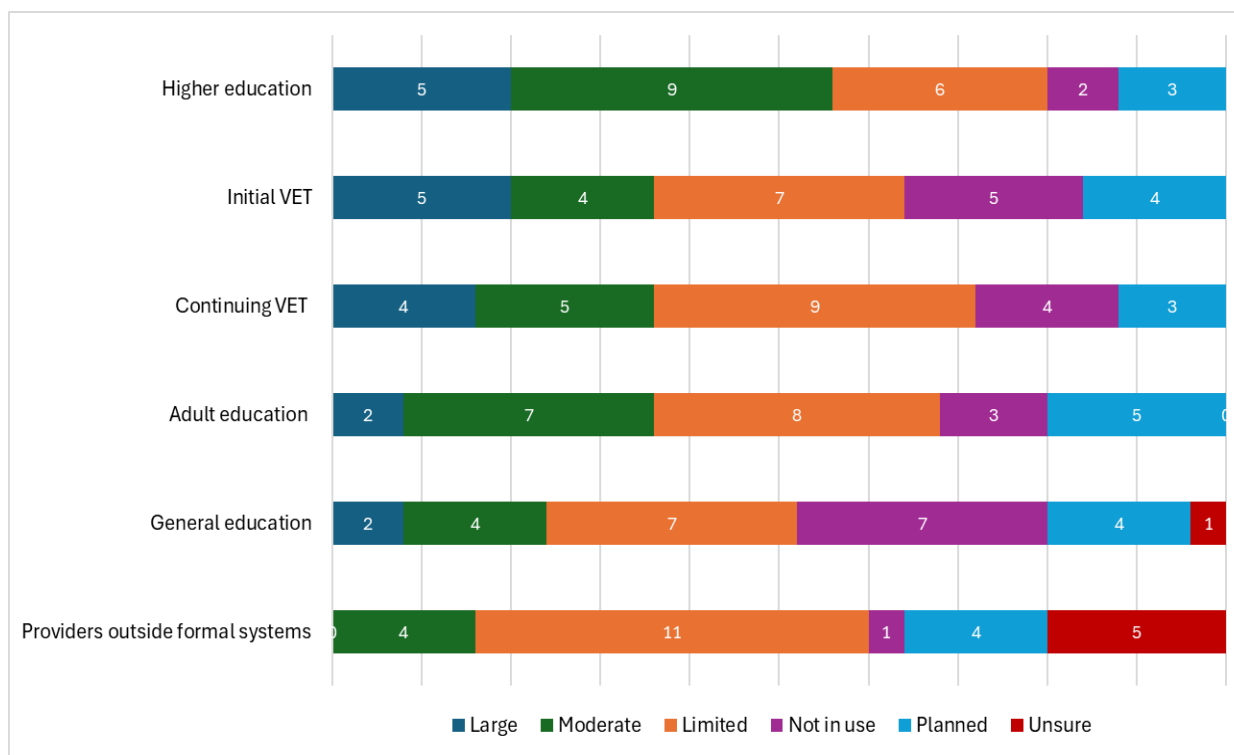
credentials remains limited, with considerable variation in the levels of maturity across countries. The survey reveals a spectrum ranging from systems with no use and no plans for implementation to systems with more advanced, though still incomplete, uptake.

Three systems report no use and no plans to use digital credentials (Iceland, Romania and Slovenia), while another three report plans, but no implementation yet (Cyprus, Portugal, Slovakia). At the same time, both Romania and Slovakia, together with Bulgaria, are experimenting with digital credentials, particularly in initiatives focused on the certification of digital competences. Most systems (16) report partial use, with only a limited number (six) indicating more established uptake.

As shown in Figure 2, higher education is the sector where digital credentials are most widely implemented. Denmark, Estonia, Latvia, Norway, Spain and Sweden all report large higher education uptake. In Norway, only 8 % of higher education certificates remained paper-based in 2025. Initial VET also shows more advanced use in several countries, including Estonia, Greece, Lithuania, Luxembourg and Spain. By contrast, general education shows the lowest uptake, with digital credentials often not yet in use (e.g. in Austria, Poland, Sweden). Adult education and continuing VET show lower levels of use, though planning activity in adult education suggests increasing interest. Learning outside formal systems combines low uptake with high levels of uncertainty, likely due to limited oversight and visibility.

Figure 2. Use or planned use of digital credentials across education sectors in 25 systems, 2026

NB: The survey included a matrix asking to what extent digital credentials are used in the listed education



and training sectors

Source: Authors' elaboration based on ReferNet data.

As of early 2026 several systems are piloting digital credentials across education sectors while reflecting on future national approaches. In the Netherlands, [Edubadges](#) are being piloted in VET and higher education as part of a broader national approach. Germany reports multiple pilot initiatives, mainly in higher education but also in VET. Austria is experimenting with digital credentials in higher education, adult learning and continuing VET while simultaneously considering alignment with European solutions rather than developing a distinct national model. In Sweden, the government has assigned eight public authorities to collaborate and explore conditions for the use of the EU infrastructure for issuing digital credentials and explore how public authorities could move towards piloting and supporting full-scale implementation.

In Italy and Poland, implementation appears to be accelerating. In Italy, developments are supported by an established legislative and institutional framework, while in Poland experimentation with microcredentials has expanded from ICT related initiatives towards broader national pilots involving universities.

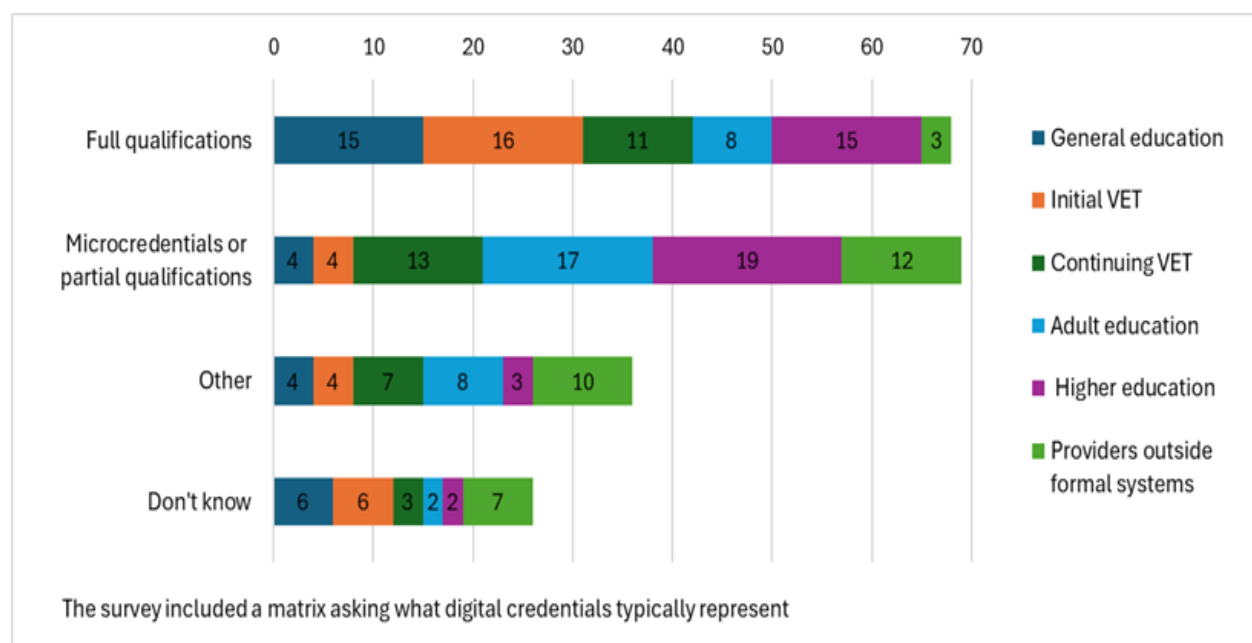
Other systems report broader but fragmented use of digital credentials across sectors. For example, in Czechia, Croatia and Lithuania, digital credentials are

increasingly used in higher education and VET but remain largely institution-specific, with limited interoperability and do not yet constitute a coherent or fully developed national service. The focus is more on administrative efficiency than on portability of skills and competences. Similarly, in Hungary, the use of digital credentials varies across subsystems with central registers supporting traceability and verification, with more advanced electronic solutions in higher education and parts of VET. In Estonia, digital credentials also follow a register-based approach, with national registers ensuring data quality, traceability and trust, while ongoing efforts focus on further integration and alignment with European infrastructures. In Belgium (Flemish community), a hybrid model is used, with paper certificates remaining the standard, complemented by optional digital versions. The central [*database of certificates of learning and experience \(LED\)*](#) acts as the core infrastructure, providing users with access to credentials and supporting qualification data exchange, while a future connection to the [European digital credentials for learning](#) is under consideration.

Regarding credential types, Figure 3 shows that full qualifications and microcredentials are the most common forms of digital credentials reported by countries. Full qualifications dominate in general education and initial VET, whereas higher education and continuing VET display a stronger mix including microcredentials, partial qualifications and other credential types. Adult learning and provision outside formal systems rely more heavily on microcredentials and alternative credential forms.

Overall, across sectors and types of qualifications, the large share of responses indicating 'not in use', 'unsure', or 'don't know' highlights gaps in awareness and governance.

Figure 3. Type of credentials represented or planned to be represented as digital credentials, 25 systems, 2026



NB: The survey included a matrix asking what digital credentials typically represent

Source: Authors' elaboration based on ReferNet data.

4.4. Actors using digital credentials

Responses suggest that public education institutions are the dominant actors issuing (or expected to issue) digital credentials, followed by private training providers. This indicates that the systems for digital credentials are still largely anchored in formal education structures. There is some openness to sectoral/professional bodies and employers, mentioned in nine and seven systems respectively (Czechia, Cyprus, Estonia, Finland, Luxembourg, Poland and Portugal, for both categories, with Spain and Italy additionally recognising sectoral/professional bodies). This suggests that non-formal and labour market actors are increasingly becoming part of the picture, although they are not yet central. Issuers can also be 'any trusted provider under the eIDAS regulation' ⁽³⁾ in Germany, Luxembourg, and Poland, while Luxembourg additionally allows issuance by any individual or organisation. This suggests that fully open or decentralised models are limited. There are also systems (Austria, Cyprus, Greece, Hungary, Iceland, Ireland, Romania, Slovakia and Slovenia) reporting 'no clear rules or practices', highlighting uncertainty or lack of regulatory clarity.

⁽³⁾ eIDAS stands for electronic Identification, Authentication and Trust Services.

4.5. Existence of digital credentials infrastructure

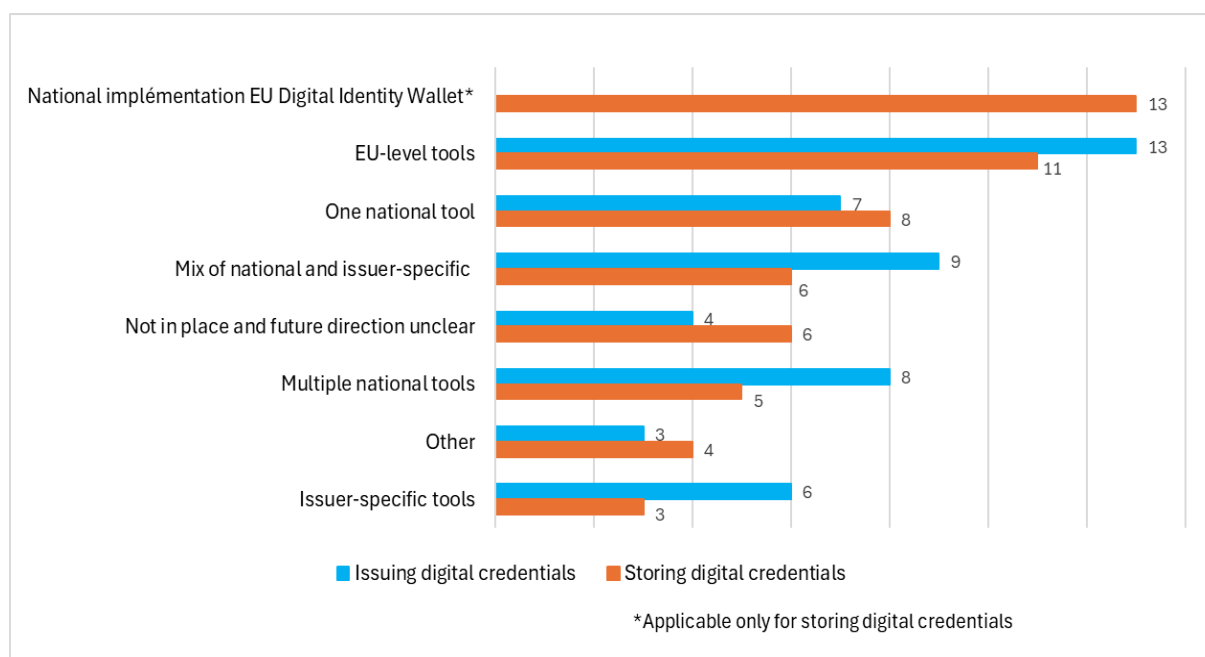
Digital credential infrastructures are not in place across all countries, though further developments are expected in some cases. Among the six countries reporting no use of digital credentials (Cyprus, Iceland, Portugal, Romania, Slovakia and Slovenia), Cyprus and Slovenia report current or potential reliance on EU tools for issuing digital credentials. Slovenia also refers to their use or possible use for storage, while noting ongoing governmental discussions on potential national solutions. Portugal, which reports no current use of digital credentials but plans future developments, identifies national tools for issuing and storing credentials (the Information and Management System for Educational and Training Provision and the [Qualifica passport](#)).

The other countries reporting undeveloped infrastructures for issuing, storing or verifying credentials also tend to report partial use of digital credentials. Hungary, for example, reports no national developments for issuing digital credentials, as education sectors continue to operate independently. However, a national cross-sectoral education register is being developed to support the registration and verification of credentials and improve interoperability. In Sweden, there are no developments related to storing digital credentials, as no political mandate has been assigned to any authority. At the same time, the higher education student information system ([Ladok](#)) enables the issuing and verification of digital certificates.

Overall, there is awareness and use of EU-level tools. For issuing digital credentials they were reported as primary or supplementary issuance mechanisms (13 systems). The category includes solutions such as the [European digital credentials for learning](#) and the [European blockchain services](#) infrastructures. For storing digital credentials, the most frequently reported approach is the use (or planned use). This is followed by other EU-level tools, which include [Europass](#) and the [European blockchain services](#) Infrastructure (11 systems). By contrast, the use of international commercial tools remains very limited, suggesting that most systems prefer to keep credentialing infrastructure within public or semi-public governance frameworks.

While EU solutions are used, national developments are also notable. Although most systems are advancing through partial, and hybrid approaches rather than fully operational or integrated solutions. Some countries report the existence or development of a single national tool, while others rely on multiple national systems, often reflecting sectoral or regional governance arrangements. A further group combines national infrastructures with issuer-specific solutions, indicating that digital credential ecosystems are frequently characterised by the coexistence of public infrastructures and decentralised solutions.

Figure 4. National approaches to issuing and storing digital credentials across 28 systems, 2026



NB: The survey asked how the development and/or use of digital tools for issuing digital credentials takes place or is expected to take place, and current and planned development and implementation of digital tools or platforms for storing digital credentials

Source: Authors' elaboration based on ReferNet data.

Some countries report the use of national registers or databases for issuing, storing, and/or verifying digital credentials. In some cases, these systems are also linked to, or integrated with, tools providing information on qualifications and programmes. This is the case in Estonia, Finland, Portugal and Spain, and also for the digital competence certificates' project in Bulgaria. In other cases, these registers do not appear to be connected to tools providing information on qualifications or programmes, although a register-based approach is used. This is the case, for example, with the [Norwegian diploma registry](#), [Odznaka+](#) in Poland, [the database of certificates of learning and experience \(LED\)](#) in Belgium (Flemish community), and the [register of diplomas, matura certificates and qualifications \(DAKPR\)](#) in Lithuania.

Regarding the storing of digital credentials, wallet or portfolio solutions also exist, exemplified by Luxembourg's use of the [Europass digital library](#) and its plans to integrate with the [EU digital identity wallet](#), Austria's [ID Austria](#) and [eAusweise app](#), or [Greece's Digital diplomas platform](#), where credentials are issued directly by institutions and made available digitally to learners.

At the same time, several responses point to a transitional stage of development. Some systems provide only partial functionality, while others were

not originally designed to support digital credential storage. In Germany, for example, no comprehensive national storage infrastructure is yet established; however, emerging initiatives such as the [MyEduLife](#) application illustrate future directions, using blockchain technology to enable the storage of continuing VET credentials in a machine-readable and standardised format, linked to the [ESCO classification](#).

4.6. Scope of tools for storing digital credential and verification practices

Only a limited number of systems support the storage of a broad variety of learning credential types. For example, [Estonia's education information system](#) covers all formal education certificates and micro-qualifications. In Belgium (Flemish community), systems include various types such as partial qualifications, recognition of prior learning and decisions on equivalence of foreign qualifications. In other cases, systems are explicitly open to learning taking place outside formal system. For example, Poland's [Odznaka+](#) allows to include participation in projects and events or the acquisition of skills, including those gained through non-formal and informal learning. The platform has recently been extended so that it can also handle microcredentials with clearly defined sets of learning outcomes. [Italy's Fascicolo Elettronico del Lavoratore \(FEL\)](#) combines training certificates, competence validated, micro-qualifications, and employment records. Similarly, Denmark allows users to upload a wide range of evidence, including work references or voluntary work and to support recognition of prior learning.

In the 20 systems reporting developments on digital tools for verifying digital credentials, their use is characterised by varying levels of functionality and maturity. The verification practices are more developed for technical validation purposes, while more advanced or user-oriented functions remain limited or unclear in many systems. The most supported verification functions relate to confirming the authenticity of a credential (15 systems) and its integrity (14 systems), followed by verification of whether a credential has been issued by an authorised or accredited provider (11 systems) and verification of the identity of the credential holder (12 systems). These functions reflect a strong focus on ensuring that digital credentials are valid, unaltered and issued by legitimate bodies. Verification of whether a credential is linked to a qualifications framework is reported in 10 system. Although this is the least frequently reported verification function among those analysed, it is still supported by half of the systems with some verification mechanisms implemented or planned, reflecting a moderate level of integration with national qualifications frameworks.

By contrast, more advanced or interpretative functions are significantly less developed. Only four systems report the ability to show the relationship between credentials and occupations, while four provide access to information or services supporting the recognition of foreign qualifications. This suggests that verification tools are rarely used to support broader understanding, comparability or labour market relevance of credentials, and remain largely confined to confirming their formal validity.

A further observation is the presence of 'Don't know' responses across functions. This indicates that, beyond actual implementation gaps, there is also limited visibility and awareness of verification functionalities within existing systems. In several cases, systems report that such tools are still in development or only partially implemented. This reinforces the finding that verification systems are still evolving and not yet consistently embedded across education and training ecosystems.

The main users of verification tools include employers, education and training providers, public authorities, such as qualifications and certification authorities, public employment services, and recognition authorities. In some systems they are also directed to individual learners. Employers typically use verification to confirm the authenticity of credentials during recruitment, while education providers rely on it for admission and progression decisions. Public authorities use verification in administrative procedures and certification and recognition processes. At the same time, several systems report fragmented or subsystem-specific approaches, rather than a single integrated verification infrastructure. In Czechia, for instance, verification is organised through a combination of national tools, European infrastructures and qualification registers, each serving different purposes. In other systems, verification tools are still at an early stage or not yet implemented, with future developments expected to be linked to the [EU digital identity wallet](#) and related interoperability frameworks.

4.7. Digital tools for employers

The use of digital credentials by employers for recruitment and training purposes is emerging but not yet established. According to the survey data, 13 systems report ongoing discussions or developments in this area and three refer to planned initiatives that are not yet in place, while five report no such discussions and seven indicate uncertainty.

Among the systems reporting developments, the focus is primarily on enabling individuals to share digital credentials with employers based on consent. This is reflected in several responses, where credentials are shared directly by individuals

(e.g. through digital wallets, links or platforms), rather than accessed by employers through centralised or searchable databases.

In some systems, existing tools already support credential sharing and verification in labour market contexts. For example, Norway allows individuals to share credential data directly with employers through the diploma registry, while Finland enables the transfer of competence profiles to job-matching platforms. In Italy, platforms such as [SIISL](#) integrate credential data into employment services, supporting both recruitment and training-related functions. Similar developments are observed in other systems where digital credentials are increasingly linked to skills matching and employment services, rather than used solely for verification purposes.

In other systems, developments are still at a pilot or design stage, often linked to microcredentials, digital portfolios, or national implementations of European tools. Poland and Portugal, for instance, report ongoing work to develop tools that allow employers to assess and verify skills through digital credentials, including cooperation with employer organisations. In several cases, these initiatives are embedded in broader strategies related to skills development, lifelong learning or digitalisation, and are closely connected to EU-level frameworks.

At the same time, a number of responses point to limited policy engagement or absence of concrete initiatives. In some systems, no discussions have taken place, while in others the topic has not yet been prioritised or remains insufficiently defined. In some cases, this is linked to specific national contexts. For example, in Iceland, the relatively small labour market and employers' direct knowledge of candidates reduce the perceived need for digital credential tools. In addition, some responses indicate that the topic is not yet a priority in the context of ongoing education or governance reforms.

4.8. Challenges, trust and resources

According to survey respondents beyond technical and economic challenges, political, social and cultural barriers also affect the adoption of digital credentials. Policy attention and expert engagement are key preconditions for their development and use. Coordination among the many authorities and actors involved in education, training, and certification systems is considered complex but essential. Progress is considered to depend on sustained cooperation, governance, and cross-institutional alignment to agree on common formats and support technical and semantic interoperability between systems.

Limited interoperability between different institutional frameworks and digital infrastructures is considered a key challenge. The absence of unified technical

standards for digital credentials, together with the lack of national solutions or a central platform for issuing and verification, leads to fragmented and inconsistent systems.

Discrepancies in approaches limit interoperability which, in turn, affect data quality. In Finland, data submitted to the [KOSKI repository](#) by VET providers vary in quality due to differences in student information systems. Similarly, in Luxembourg, national skills data collected are not always consistent and available in aggregated form, pointing to data governance gaps. In Estonia, priorities focus on promoting technical and semantic interoperability between key registers.

Limited system compatibility and poor data quality are major challenges affecting the reusability of data. This includes information on learning outcomes, which can be incomplete or outdated, described in non-comparable and non-structured ways, and not aligned with skills taxonomies or machine-readable formats. More generally, interoperable standards and frameworks for the structured description of qualifications are considered essential resources. Technical guidance, toolkits with good practices, communities of practice for sharing experiences, and international cooperation are also seen as important supporting resources. Uncertainty about their legal value, together with the absence of national solutions or guideline can limit their uptake as reported for example in Austria, Czechia, Lithuania and Poland. A stable legal framework, a coordinated national digital strategy and clear guidelines are considered important enablers

EU-level work and cooperation on the [European digital credentials for learning](#) infrastructure are acknowledged as relevant, and practical guidance is seen as supporting implementation. Another area requiring guidance related to the challenge of balancing interoperability and data reuse with compliance with privacy and data protection requirements, including for verifying digital credentials.

Frequently cited barriers include financial and technical capacity constraints. Survey respondents emphasised that short-term funding needs to be replaced with sustained investment to support the development and maintenance of technical infrastructure, which also requires adequate human technical expertise. A risk identified in the use of digital credentials is vendor dependency over time, especially in case there is limited in-house technical capacity. The readiness of staff, for example in providers, is frequently mentioned as element influencing uptake. Consequently, capacity building and training programmes are often mentioned as important to strengthen capacity and awareness across actors. In general, diverse digital readiness at national and/or sectoral levels can slow adoption and digital literacy gaps risk excluding vulnerable groups from the system.

The move to digital credentials, as part of the digital transformation, also entails social and cultural changes. This is considered to require organisational changes and new thinking about qualifications and representation of skills. The emotional attachment to paper-based documents is also mentioned as factor that could slow down such changes. Low levels of awareness are considered to act as barrier, limiting uptake and public scepticism reducing trust and acceptance. Respondents stressed that education and training providers and employers may struggle to interpret, understand or properly value the competences digital credentials represent. Early stakeholder engagement, along with active promotion, awareness campaigns are considered important to help employers, institutions and learners understand the uses and benefits of digital credentials.

Overall, respondents perceive digital credentials as more trustworthy than paper-based ones. The main issues relate to what digital credentials represent, who issues them, and their quality. While concerns around data security and cybersecurity threats are mentioned, concerns about trustworthiness are limited. This is particularly true for systems where authenticity and integrity can be verified through qualified electronic seals under the [eIDAS regulation](#), such as in Luxembourg, or through central platforms and registers such as in Estonia. Alignment in standards, consistent issuance and verification processes as well as accessible tools to verify digital credentials – ideally through a single national verification portal – are considered important for promoting trust.

At the same time, as digital credentials cover a wide range of skills, including soft skills and learning outcomes acquired outside formal education, questions arise about how these are assessed. More broadly, concerns about quality assurance, and its variation across sectors, are considered to undermine trust. One consideration raised is that without clear and agreed rules on who is authorised to issue credentials for non-formal learning, there is a risk of proliferation of credentials with uneven quality and credibility.

Opinions on the broader risks are divided. Some argue that digital credentials may give too much prominence to microcredentials while employers may still prioritise full qualifications. Others note that digitalised systems, particularly those relying on standardisation and AI, may instead prioritise only formal qualifications, overlooking non-formal and informal learning.

CHAPTER 5.

Conclusions

5.1. What the evidence shows

The analysis suggests that digitalisation efforts to promote the portability of learning outcomes exist but are only partially utilised. Digital tools that support the portability of learning outcomes attract policy attention in all countries examined. Most attention is given to digital tools that provide information on qualifications, programmes and accreditation, and their importance is expected to grow in the future. Although many qualifications databases and registers exist, there are efforts to centralise information from different providers and sectors, reflecting a more inclusive approach across different types of learning. Comprehensive systems are considered to help education and training providers and employers to easily access and use relevant information for decision-making. In a few countries, there are also efforts to develop personalised services connecting different information, illustrating gradual shift from static qualifications registers towards more integrated and user-oriented services.

Digital credentials are also attracting, although not in all countries, policy attention. Overall, developments remain fragmented, and the update of digital credentials is limited. No country has a fully-fledge system, and their use is often confined to small-scale pilots or sector-specific initiatives. This is often due to inconsistent policy support and prioritisation. Higher education institutions and education and training providers are the dominant actors in issuing digital credentials, indicating that developments are mainly anchored in formal education and training, with limited involvement of actors outside formal learning contexts. At the same time, digital credentials are seen as important tools for increasing the visibility of learning taking place outside formal systems, while raising concerns on the value and quality of credentials issued by a broad range of actors.

Digital credentials infrastructures developments are limited, especially for verification. They primarily address technical validation like authenticity and integrity, while more advanced applications, such as connecting credentials to specific occupations or facilitating recognition, are largely absent. However, especially in systems pursuing centralisation, qualifications registers appear to play a role in issuing, storing and/or verifying digital credentials. This suggests a possible relationship between investment in comprehensive qualifications databases, common data standards, coordinated governance arrangements and the uptake of digital credentials. At the same, while digital credentials are seen as

having the potential to support flexibility in learning and labour market integration, they seem to be more used to support administrative efficiency. The limited comparability and common approaches to structuring or presenting of learning outcomes limits the potential of digital credential use.

Awareness of and reliance on EU-level infrastructures and developments is evident across systems. At the same time, a mix of national and issuers solutions also exists. The lack of agreed standards, interoperability and coordinated national approaches based on coordinated governance emerges as a major barrier to the wider implementation of digital credentials. Limited technical expertise among actors and authorities responsible for issuing certifications, and low awareness among users such as employers, together with financial constraints are also important challenges which slow down development and use.

5.2. Policy pointers

The analysis points to a set of policy priorities that can help move towards digital ecosystems supporting the portability of learning outcomes:

- **Build on and connect existing transparency tools:** Digitalisation offers the opportunity to connect different information and systems. However, without cooperation and interoperability, it risks creating multiple parallel developments, increasing fragmentation and dispersion of information. Transparency tools have long promoted portability of learning outcomes. For example, work on the European Qualifications Framework supported the development of National Qualifications Frameworks and databases, quality assurance initiatives contributed to the emergence of accreditation registers, Europass has promoted work on common templates for sharing information on qualifications and promoted interoperability between national and European infrastructures. Leveraging the structures they created to advance in digital credentials can support coherent developments, while reinforcing their integration and effectiveness. Developments related to the European Digital Identity Wallet further reinforce the need for interoperable and coordinated approaches to promote a coherent ecosystem.
- **Shift towards comprehensive people-centred approaches:** For learning outcomes to be portable across contexts, the focus should be on individuals' skills, knowledge and competences. This requires digital tools to take a comprehensive approach to different forms of learning, both by providing information on different types of qualifications and by supporting the certification and storage of a wide range of skills and competences. This calls for moving beyond separate and institutional approaches and agree on

common approaches, supporting technical and semantic interoperability. These developments should provide services to people, enabling them to explore trusted information on qualifications, learning opportunities and jobs but also to manage and share digital credentials either via registers or e-wallets.

- **Build trust and value in digital credentials:** Uncertainty regarding the status, value and acceptance of digital credentials limits their use. Their openness to different forms of learning is an enabler of portability but also a source of questions regarding value and trust. Discussion should take place on how to make digital credentials used, valued and trusted across contexts and for different purposes. Efforts could be made towards creating multi-layered verification systems that also allow to explore them, including quality assurance aspects.
- **Move towards stackable and data-rich digital credentials:** While the possibility to verify the authenticity and integrity of digital credential is a key strength, the move to machine readable data can offer more. It can facilitate the accumulation of small learning experiences towards full qualifications or support better alignment between learning offers and labour market needs. At the same time, these possibilities depend on common ways of describing skills, knowledge and competence, raising the need to discuss the use of skills taxonomies and how to balance standardisation for interoperability with the risk of oversimplifying learning experiences.
- **Support inclusive uptake of digital credentials:** The development and use of digital credentials across countries and sectors is uneven. This is also due to different levels of digital readiness. Similarly, limited digital literacy among both potential issuers as well as receivers of digital credentials, compounded by limited awareness, slow their use and acceptance. Uneven use and access risk widening, rather than reducing, gaps between countries, sectors and learners. Addressing disparities in digital readiness and literacy requires investments in digital competences, capacity-building, awareness campaign as well as guidance and support.
- **Strengthen cooperation and peer learning on qualifications databases and digital credentials:** These developments are often perceived as technical issues, but policy attention can shape their direction and impact. Discussions in existing European experts group, such as the Europass and the European Qualifications Framework Advisory Groups, as well as joint discussions and exchanges between groups and national coordination points, provides an important basis for peer learning and coordination. The time seems right for strengthening European cooperation on common approaches, standards and

governance supporting the coherent development and use of digital infrastructure on qualifications and credentials and their link to related developments.

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Digital tools for the portability of learning outcomes

From qualifications databases to digital credentials, digital tools supporting the portability of learning outcomes have gained policy attention across countries. Despite notable developments, the landscape remains fragmented, and the potential of digitalisation underexploited.

Efforts are underway to centralise information of qualifications and strengthen links with labour market data. Yet parallel and poorly integrated tools may create confusion. Similarly, infrastructures for issuing, storing and verifying digital credentials are emerging but rarely form a coherent ecosystem. Limited attention has been paid to verification functionalities that can improve understanding, trust and usability.

European developments support progress. However, greater policy attention, cooperation and investment in interoperable systems are still needed. New developments should build on existing European transparency tools, such as the EQF and Europass, to improve the understanding, portability and integration of learning outcomes and within broader digital infrastructure.

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