Models and guidelines

for assessment and

recognition of MOOCs and microcredentials

EMC-LM deliverable 4.2

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Contents

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Executive summary

This report provides models and guidelines for the assessment and recognition of massive open online courses (MOOCs), microcredentials – and other courses offered on MOOC platforms – through the review of literature, good practices, and existing guidelines. That review has supported the creation of the models and guidelines (framework) included in the last section of the report. This report and framework are designed as part of the European MOOC Consortium – Labour Markets project (EMC-LM). For that reason, the Common Microcredential Framework (CMF) developed by the EMC is important as a reference list for the production of guidelines. The main objective of the framework is to define the microcredential, a new higher education and training level of study. Microcredentials are typically offered on MOOC platforms. They address the needs of employers and learners looking for small units of study at higher education level that are aligned with the labour market.

This report is based on previous work included in D4.1 *"Compendium on good practices in assessment and recognition of MOOCs"*. That compendium considered three important elements of assessment and recognition in the context of MOOC platforms: identity verification (ID verification), summative assessment processes and categories for microcredential recognition.

The research process used to create that report has been complemented by desk research on literature and practices related to the fast pivot to online teaching and learning by many higher education institutions in response to COVID19, as well as a review of current guidelines concerning MOOC quality from several research projects and providers. That research has led to a reflective process using the different sources to produce a framework for assessment and recognition.

Introduction

This report provides a framework for assessment and recognition of courses offered on MOOC platforms. Developing the framework involved:

- Desk research on literature and practices, taking into account the move to online teaching and learning at higher education institutions around the world due to Covid19
- A review of current guidelines in MOOC quality from several research projects and providers.
- A reflective process to produce models and guidelines (the framework)

The European MOOC Consortium and the Common Microcredential Framework

In 2017, the main European MOOC platforms (FutureLearn, FUN, Miríadax and EduOpen) and the OpenupEd partnership established the European MOOC Consortium (EMC). The EMC represents most of the MOOC development work in Europe. Its members offer more than 1,000 MOOCs with 15 million+ learners and link more than 280 universities in a variety of European countries and language areas. EMC is also open to newly emerging platforms in Europe. One of its missions is to stimulate and empower universities and other organisations to use digital education and MOOCs as open education and as part of programmes of continuous education (CE), continuous professional development (CPD) or continuous vocational training (CVT).

The MOOC platforms united by the EMC are experts in producing various types of course, including MOOCs, which are expected to be open and online courses designed in part to introduce higher education to learners. MOOCs are usually free, but some may have paid-for features like assessment and certification. The platforms also offer microcredentials; small units of study at higher education level that require 100-150 study hours). This new form of certification is designed to address the needs of employers and learners looking for small units of study at higher education level that are aligned with the labour market. The EMC sees the potential of courses on MOOC platforms, combined with digital continuous education/training to be a flexible and scalable solution to the training needs of the labour market, providing a transnational European response to the needs of the economy across Europe. Together, these forms of education and training have the potential to keep the knowledge and skills of the workforce up to date and can anticipate the careers of tomorrow. MOOC platforms in the EMC are therefore looking for systematic ways of reaching the labour market.

The members of the EMC collaborated to launch the CMF in 2019 (EADTU, 2019). This framework is now used by these MOOC platforms to enable microcredentials to lead to academic credit. The CMF responds to the demand for shorter accredited courses at higher education level, it brings Europe into line with some US and Australian universities which already offer formally acknowledged microcredentials, and it addresses the inconsistency between microcredentials from different providers. The CMF is designed to be part of an ecosystem which allows easier credit transfer of microcredentials between universities in the various regions of the European Union.

Courses produced with the CMF can be counted towards formal qualifications, as they should be designed in accordance with recognised national qualification frameworks. The aim is that eventually learners will be able to 'stack' the academic credits associated with CMF microcredentials from different providers to gain a full HE qualification. In this way, microcredentials and the CMF support personalisation of learning. In addition to awarding academic credit, the CMF creates the basis for a new form of certification which could stimulate further academic professional development by learners in paid work. For this reason, the CMF incorporates both academic and professional

recognition. The CMF specifications serve as guidelines in this report to produce models and guidelines for assessment and recognition

Figure 1 CMF criteria

As Antonaci, A., Henderikx, P., & Ubachs, G. (2021) report (see Figure 1) CMF uses the European Qualifications Framework (EQF), the European Credit Transfer and Accumulation System (ECTS) and the Diploma Supplement (DS) to provide a foundation for mutual trust and recognition through transparency. It promotes a common language between institutions and beyond.

What are good practices in the assessment and recognition of MOOCs?

The work in D4.1 "*Compendium on good practices in assessment and recognition of MOOCs*" (Habib, and Sanzgiri, 2020; Farrow et al., 2021), from now referred as the Compendium, summarised good practice in MOOC and microcredential ID verification systems, approaches to recognition, and summative assessment through the research, collection, and categorisation of practices. In that report, practices were collected through desk research on the public data available on platforms that offered microcredentials. In addition, online interviews and surveys were used as supplementary methods for data collection when needed. Key aspects identified in that research include:

- ID verification methods are reliable when they verify the authenticity and authorship of student work. Authenticity means that the learner was the person who produced the work, while authorship means that the work is original and is not plagiarised.
- For course providers to award academic credits, they need to demonstrate the execution of quality assurance (QA) processes and adhere to national qualification standards set by the accrediting bodies.
- There are three main categories for recognition which are 1) academic, 2) professional, and 3) combined recognition.

The Compendium research is analysed and synthesised here to produce effective guidelines for microcredential developers to utilise. For that purpose, as detailed above the CMF has been used as

a reference. On top of that, for this research QA is particularly relevant because in microcredentials academic credit is awarded. Microcredentials are designed to be self-standing or as a component part of a larger award. Since microcredentials are awarded by a body with the powers to award academic credit, they are subject to proportionate quality assurance mechanisms, and are mapped against the EQF or the equivalent levels in the university's national qualification framework.

The framework detailed in the last section of this document maps the elements of assessment and recognition, allowing platforms, universities, and employment services to easily place microcredentials in context. It is designed to form the basis for recognition between platforms in Europe. Therefore, the aims of this report are as follows:

- analyse good practices and case studies to produce guidelines
- review the existing literature on quality guidelines production
- produce guidelines (framework).

Method

The definition of microcredential to be used is the produced by Lantero, Finocchietti & Ptrucci (2021, p11), microcredential is defined as:

> *A micro-credential is a small volume of learning certified by a credential. In the European Higher Educational context, it can be offered by Higher Education Institutions or recognised by them using recognition procedures in line with the Lisbon Recognition Convention or recognition of prior learning, where applicable. A microcredential is designed to provide the learner with specific knowledge, skills or competences that respond to societal, personal, cultural, or labour market needs. Microcredentials have explicitly defined learning outcomes at an EQF/NQF level, an indication of associated workload in ECTS credits, assessment methods and criteria, and are subject to QA in line with the Quality Assurance in Higher Education (ESG)*

The first aspect to consider for this report is assessment. There are several different types of online assessment. Online assessment in the context of this study is the systematic process of documenting and using empirical data on the knowledge, skills and attitudes of learners. Assessment can be focused on the individual learner or on a group of individuals, an institution or specific programme (Zlatović, Balaban & Kermek, 2015).

Formative assessment is a process that is intended to promote student attainment and may encourage reflection. High-quality formative assessment has a positive effect upon student learning. Summative assessment differs in form and function from the formative assessment process. It represents a higher-stakes evaluation of student learning at a given point in time, used to assign grades to learners. Summative assessments provide a quantitative grade and are often carried out at the end of a unit or lesson to determine whether the learning objectives have been met (Tilghman, 2011).

The Compendium summarised good practices in assessment and recognition. The authors conducted desktop research and interviews to identify and collect good practices on platforms offering MOOCs and microcredentials in order to gather examples and categorise these examples of good practices.

This report also covers recognition. As Oliver (2019, p.1) indicates:

> *Micro-credentials and other forms of non-formal learning are emerging as potential solutions to the rapid upskilling that will be required. The formal qualification system is unlikely to cope, burdened with ever-increasing cost. The very people who could use micro-credentials most – mature learners already in the labour force – are engaging less in certified learning just when certification of skills will be required more. But microcredentials alone will not meet any nation's future educational needs: the key opportunity is to enable formal qualification systems to evolve to include short form credentials, some of which might be credit-bearing.*

The EU has been looking for ways of bringing together the shorter credit-bearing courses that MOOC platforms were developing together with universities and employers (European Commission, 2020). The terminology currently in use is confusing (i.e., nanodegrees, microcredentials etc) and these courses were wildly different in length, level, and quality (Pickard, 2018). The members of the EMC collaborated on the launch of CMF to help to unify terminology and criteria and respond to the demand of lifelong learners and employers for microcredentials in Europe.

To ensure the quality of courses, the CMF requires that microcredentials are associated with academic credit. In doing this, course providers create these courses in line with their national qualification

framework. For all those reasons, the CMF has been considered as the baseline to produce the guidelines included in this output. Courses described and designed in accordance with CMF meet the following criteria (Antonaci, Henderikx, & Ubachs, 2021):

- have a total workload of 100 - 150 hours (4-6 ECTS);
- are levelled at Level 6 (bachelor) to 7 (Master) of the EQF/NQF (European/National Qualification Framework), with options for level 5 (in combination with ECTS);
- provide assessment enabling the award of academic credit, either following successful completion of the course or recognition of prior learning (RPL);
- operate a reliable method of ID verification at the point of assessment; and
- award a transcript that sets out the course content, learning outcomes, total study hours, EQF level and number of credit points (ECTS) earned.

The research approach used in this report was a desktop review. Desktop research, or desk research, is a method that utilises the existing literature as the basis for the conducted research (Verschuren, Doorewaard & Mellion, 2010). Considering the objective of producing guidelines, exploring previous research was important, as guidelines are reported in the existing academic and report literature. Moreover, the EMC project proposal specified desktop research as a recommended research method. This desktop research has limitations since it only includes research on MOOCs and microcredentials platforms based in Europe and the USA, platforms included are: FutureLearn, FUN, EduOpen, Miríadax, Coursera, Udacity and edX.

This report seeks to understand existing quality guidelines in MOOCs and microcredentials. Therefore, the design strategy of the guidelines is based on reviewing the different existing models for MOOC quality guidelines to decide the structure for assessment and recognition. In that context, nine projects and platform existing guidelines have been identified. After reviewing the different guidelines, assessment and recognition criteria and rating schemes, the reflective process selected a structure due to its simplicity and indicative rating scheme.

In summary, the production of the models and guidelines as a framework is based on the CMF, the Compendium and a desk review of existing literature. This has facilitated the creation of two checklists as part of the framework:

- "Fulfils microcredential definition"
- "Assessment and recognition"

Between them, these checklists have seven dimensions and a total of 19 criteria to evaluate assessment and recognition in microcredentials.

Existing literature and practice

This section is based on the Compendium and new literature accessed after the completion of that report. It takes into account the impact of Covid19 on the landscape of online education. It covers the three key aspects identified in the Compendium:

- **ID verification.** Processes where the learners' ID is matched to verify identification and how they are implanted in platforms.
- **Assessment.** Different types of assessments applied in existing practices including microcredentials.
- **Recognition.** Different types of academic recognition available and which of those are being used in the context of microcredentials.

ID verification

When identifying ID verification methods for microcredentials several aspects need to be considered. First one is the online element since a microcredential could include face-to-face aspects. Second is the need for universities to be clear that the person who gets the credit is the person who took the test, which will be more challenging if microcredentials are not always run by universities. Third is that proof of ID varies across countries (although not all microcredentials are intended for an international audience). Finally, current methods can be discriminative against students regarding disability or race. For that reason, several methods were identified. The Compendium identifies several ID verifications for assessment methods which try to overcome these problems.

- **Basic Platform ID Verification (Basic).** Matches learner's own photo via a selfie or a webcam with an ID. This method offers the minimum authentication level of ID verification but does not offer any proof of ID at the point of taking the summative assessment and is not tied to a specific assessment scenario. This is only an authentication method and does not offer any authorship verification. Hence, this method is a basic practice.
- **University Registration**. Learners complete a registration process within the university as non-degree students. This method gives a second layer of authentication to online assessment, but it does not confirm authorship and it does not operate at the point of taking the assessment. Therefore, this method is also a basic practice.
- **Proctoring exams**
  - **Random Proctoring.** Software takes pictures at random times during the examination period; sends report of similarity to instructor. Proctoring mainly works at the level of exams and not assignments or other forms of work, and hence this category is limited to the scope of exams.
  - **Full Live Proctoring.** Full and live proctoring means that someone proctors the exam directly via software while the learner is taking the exam. This method is similar to traditional models but typically shifts the surveillance from the exam hall to the student's home. There is the logistical limitation of matching an online reviewer with the learner and securing a stable internet connection; otherwise, a learner might be disqualified if the session is disconnected.
  - **Full Recorded Proctoring.** Recorded proctoring exams involves recording a full exam section, checking it by a monitor, then sending a report to the instructor. This is a more conventional and common method of proctoring exams, which is used across MOOC platforms.

- **Interviews**
  - **On-site oral interviews.** Interviewing on the provider's premises. Onsite, or offline, oral interviews are one method of verification for microcredentials offered on MOOC platforms. With this method, learners finish the course, then they have an interview at the university premises at which their identity and learning are validated.
  - **Online interviews.** Conducting a short online interview to verify student identity and work. Online interviews involve learners taking a short interview with an educator to validate both students' identity and their work.
  - **Recorded presentations.** Recording a presentation as part of a capstone project. In this method, learners record a presentation about a capstone project to verify the authenticity and authorship of the work. Like the interview method, this can be considered as an assessment. However, asking learners to record a presentation is a more trustworthy method of verification in terms of authentication and authorship.
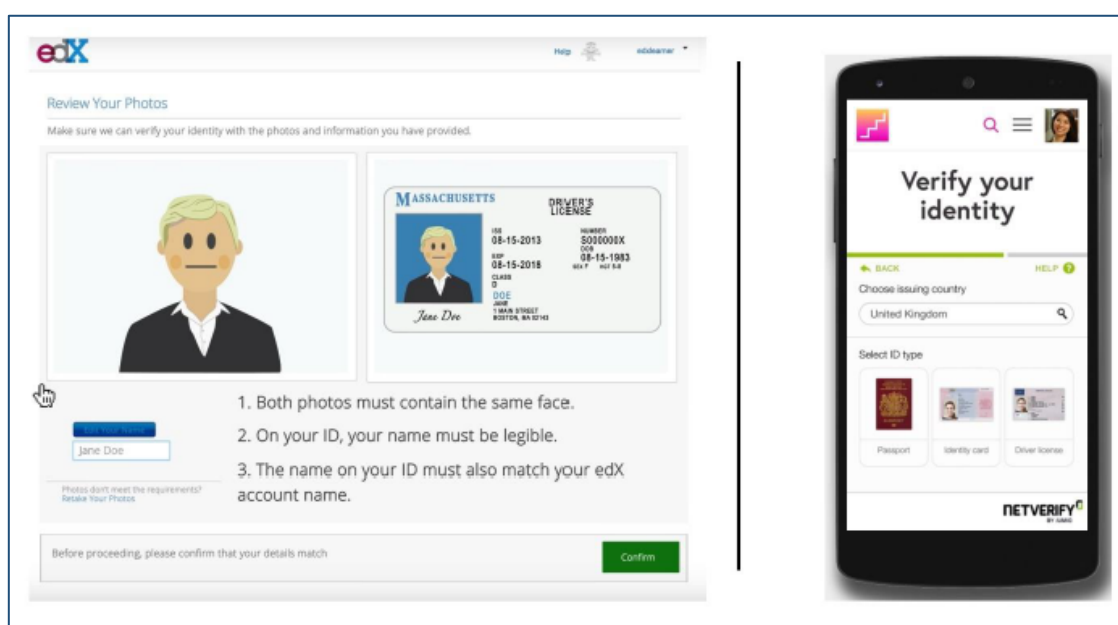
Figure 2 (edX & FutureLearn as examples of MOOC-based ID verification systems)

In practice, platforms such as FutureLearn, Coursera, Udacity and edX use Basic Platform ID verification systems (Figure 2). There are platforms, such as Miríadax, edX, FutureLearn and FUN, which include the option of using proctoring exams (Miríadax uses random proctoring, while edX, FUN, and FutureLearn use full proctoring). Some certification programmes require that learners complete a registration process within the university as non-degree students (for example, FutureLearn offerings "Business and Finance Fundamentals", "The Digital Economy", "Causes of Human Disease: Understanding Causes of Disease" and "Discovering Science"). Finally, examples of interview use include EduOpen with on-site oral interviews (i.e. "Content and Language Integrated Learning" and "B2- English Language Level Training"). On Udacity and edX microcredentials learners are required to schedule an online interview, while the recorded presentation method has been used by edX.

Reviewing current initiatives, literature points out that the EU-funded Adaptive Trust-based e-Assessment System for Learning (TeSLA)[1], provides identity verification for various forms of assignment at the point of the assessment, unlike proctoring which is only performed during exams. The use of technology for verification means that it can be scaled more easily than human-based methods of verification. However, the main concern about this system relates to the privacy of learner data (Edwards et al., 2018). When designing guidelines, it is necessary to bear in mind that the use of online assessment has raised concerns over malpractice, and e-Authentication systems are emerging for detecting plagiarism and cheating. The TeSLA project designed a system to check student authentication and authorship through a combination of the following instruments (Okada et al., 2019): (1) facial recognition (analysing the face and facial expressions), voice recognition (analysing audio structures) and keystroke analysis (analysing how the user uses the keyboard). (2) anti-plagiarism (using text matching to detect similarities between documents) and forensic (to verify the authorship of written documents). (3) digital signature (to authenticate) and timestamp (to identify when an event is recorded by the computer).

Hussein et al. (2020) evaluate various online proctoring tools used for ID verification and outline some recommendations on the design of assessment, technological considerations required for online proctoring. Unlike a live examination, online proctoring requires students to have access to suitable technological infrastructure, without which the option will not work reliably. This creates a divide between those with, and without access to this technological infrastructure. Then there are students with accessibility needs who may require a lot more assistance than is possible while taking online-proctored exams.

Covid19 and the associated shift to online environments have shown that proctoring is a technique that still needs the development of guidelines and training due to the associated ethical issues (Kharbat & Daabes, 2021). Dawson (2020) argues that different disciplines or perspectives would frame remote proctoring issues differently. Examples range from criminology and cybersecurity, which would argue for the need of detecting and deterring cheating through remote proctoring, to surveillance studies and critical pedagogy, which would be more concerned about the socio-political implications of remote proctoring in education. Recent research by Bergmans et al. (2021) indicates the limitations of current proctoring companies, proposing live online proctoring as an alternative, with a human invigilator watching over a limited group of students, and no recording.

The Compendium defined three levels depending on their reliability: "basic", "good" and "better". Methods marked as "basic" should be accompanied by another method marked as "good" or "better" to grant verification. The course should operate a reliable method of ID verification at the point of assessment that complies with the provider's policies and is widely adopted across platforms. The preference is using more than one method. After reviewing current practices, proctoring does not seem an ethically developed technology to be used, the following ID verification methods are recommended for microcredentials:

- **Platform ID Verification.** *Basic*. Match learner's own photo via a selfie or a webcam with an ID
- **Provider Registration.** *Basic*. Learners complete a registration process within the provider.
- **Interviews.**

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[1] TESLA, http://tesla-project.eu

- o *Basic*. Conducting an interview at the provider premises (On-site oral interviews)
  - o *Good*. Conducting a short online interview to verify student identity and work (Online interviews)
- **Recorded presentations.** *Better*. Recording a presentation as part of a capstone project (Recorded presentations)

Assessment

Assessment is concerned with the scientific study of determining what students have learned (Mayer, 2011). While the initial focus of learning outcome assessment was on response execution, it later shifted to retention of presented information and then to constructivist approaches (Mayer, 2019). The current trend is to adapt assessment to the needs of individual learners. Several types of assessment exist, as Tilghman (2011) defines while formative assessment is a process that is intended to promote student attainment, summative assessment represents a higher-stakes evaluation of student learning at a given point in time and is used to assign grades to learners. Summative assessments are preferred in microcredentials because they provide a quantitative grade, they can be employed at the end of a unit or lesson to determine whether the learning objectives have been met. In addition, formative assessment is difficult to provide on a short course because it takes time for markers to provide useful feedback to all individuals in a large cohort, and there is additional expense involved in hiring markers, which raises the price of the course. There are several issues when selecting an appropriate summative assessment approach for use online. Aspects such as cheating, evaluate certain concepts and skills, having an efficient or scalable form of assessment due to the associated time and costs and even offering many types of assessment can cause confusion to students.

The Compendium summarises summative assessment processes, based on Laurillard (2015), as:

- **Single-type assessment**
  - o **Computer-graded assessment**. This form of assessment could be a final exam or quizzes based on case studies and coding projects. The assessment could combine two assessments from a single method such as the use of computer-graded programming assignments and a final exam. It is a scalable and efficient means of performing summative assessment as it reduces the costs of marking per student. On the other hand, computer grading requires more work up front and reduces opportunities to change assessment in following presentations. It also might not be able to evaluate certain concepts and skills.
  - o **Peer-graded**. Peer-graded assessment is a form of evaluation where students receive marks from their peers, and they mark their peers in return. Online environments have contributed to the rise of peer assessment because of the need to scale marking for massive numbers of students. However, it is not a method that all students are happy to engage with and having peer-assessments in courses is challenging if the cohort size is limited.
  - o **Teacher-graded.** Teacher-graded assessment is the traditional form of assessment and the least scalable form due to the time and cost involved in marking the work of each student. Teacher-graded assessments are often observed with essays and capstone projects. To be credit bearing, marking by one teacher is unlikely to be sufficient to meet quality assurance standards. Marks will need to be checked and benchmarked against standards which makes this method expensive.

- **Multi-type assessment:** a combination of any of the previous ones:
    - **Peer-graded assessment and teacher-graded assessment.** This practice combines peer-graded and teacher-graded assessment to deliver best value for learners. With this method, there are multiple opportunities for feedback, and the time and cost per learner are lower than they would be if all the assessment were done by a staff member.
    - **Peer-graded assessment and computer-graded assessment.** The course team combines peer-graded and computer-graded assessments. This combination is mainly employed on programmes that award informal professional credit and can be scaled easily.
    - **Computer-graded assessment and teacher-graded assessment**. This practice is applied in different ways across different examples to achieve different results. This combination of assessments is employed more commonly in programmes that award academic credit. These methods allow for a robust summative assessment and offer more chances for students to get feedback but offering many types of summative assessment needs to be well planned in advance.

Examples of computer-graded assessment as a single-type means of assessment include edX and FutureLearn with the New York Institute of Finance (NYIF) seven programmes using multiple-choice questions (MCQ) and Coursera's professional certificates based on projects or case studies. edX combines weekly assignments with a final proctored exam. In that sense, peer-graded assessment has been used in Coursera and edX. Teacher-graded assessment has been used in FutureLearn programmes (for example "Management and Leadership Essentials" and "Management and Leadership, Personal Development" from The Open University, "Managing People" from the University of Reading).

The combination of assessment types is common practice, peer-graded and teacher-graded assessment was used by the University of Leeds for three of its academic programs hosted on FutureLearn ("Causes of Human Disease", "Discovering Science" and "Environmental Challenges"). A combination of peer-graded assessment and computer-graded assessment was used by IBM on its professional certificate offerings on Coursera and edX ("IBM Applied AI", "IBM Data Science" and "Python Data Science"). Finally, the combination of computer-graded assessment and teacher-graded assessment has been applied by Monash University on FutureLearn ("Introduction to Psychology") and Queensland University on edX ("Sustainable Energy" and "Corporate Innovation").

Assessment strategies previously used in MOOCs include peer assessment. Gamage, Staubitz & Whitin (2021) identify several issues associated with peer assessment. The main issue identified is whether learners can submit multiple assignment iterations and whether feedback received for an early draft can be integrated with the next iteration to improve the result, making the assessment summative instead of only formative. Peer-review interfaces in MOOC platforms contain rating rubrics and a text field to provide feedback, in that sense, it is relevant to having numeric ratings combined with text fields for feedback to combat empty review text fields. In peer-reviewing, students demonstrate different abilities as reviewers, therefore, reviewing by inexperienced students often makes sceptics question the fairness of grades. Finally, peer reviewing systems use reviews from teaching assistants to calibrate students' reviews; the use of algorithms in peer reviews is crucial, with two dominant types in use, algorithms to calculate accurate grades and algorithms to assign reviewers.

While designing assessment, recent research considers the benefits of providing authentic assessment which is embedded in real-life case studies and requires interpretation rather than being able to copy from textbooks in an open examination (Sambell, Brown & Race, 2019). Authentic assessment is not

a new research area, but the pandemic has increased interest in it, stressing the importance of making summative tasks meaningful to students. Fundamental aspects are the trust of the participants in the online assessment and the importance of designing assessment strategies that significantly influence student engagement (Nguyen et al., 2017). Whitelock (2011) considers several pedagogical rationales for assessment and foundational aspects about summative assessment:

- Change exams to match constructivist pedagogy and produce an authentic summative e-assessment.
- Assist students in self-diagnosing their skills and performance to progress to a next-level course
- Capture photographic evidence of students' processes (skills). Engage and motivate students with reading and writing difficulties, providing them with an alternative method to demonstrate competence.
- Address student concerns about the fairness of group assessment and encourage reflection and critique.
- Increase student confidence in a fair and reliable peer assessment of group work.

Morris (2018) examines the issue of contract cheating in higher education, which has a complex nature with a relatively low proportion of students engaging in outsourcing behaviours involving a third party. Contract cheating has been proved to change with the use of file-sharing sites to breach academic integrity during the Covid19 pandemic (Lancaster & Cotarlan, 2021). Morris (2018) proposes that institutions extend and establish strategies to embed the values, principles and practices aligned to academic integrity. Five areas of consideration are offered for higher education institutions that relate to determining academic integrity strategy; reviewing institutional policy; understanding students; re-visiting assessment practices, and implications for staff professional development. To reduce contract cheating, it is vital to train educators and students on what academic integrity implies and why it is so significant. Assessment literacy is needed for developing an understanding of how assessment relates to learning and the assessment process to build skills in self- and peer assessment (Mellati & Khademi, 2018). Future action includes awareness-raising with both staff and students, the messaging needs to provide consistent and clear advice that there are benefits to working with academic integrity and there are risks involved when breaching it (Lancaster & Cotarlan, 2021).

Sambell, Brown & Race (2019) emphasise the role of authentic assessment for student learning and employability, for reducing contract cheating and academic misconduct cases. Negotiated assessment is a technique by which students are able to negotiate how they will meet the learning outcomes of the course. Negotiated assessment engages remote students and lowers the risk of cheating (Monsen, Cook & Hannant, 2017). Unfortunately, an approach like this one is complicated in the context of microcredentials. Other strategies discussed are adoption of a variety of assessment types to prevent cheating: reflective pieces, blogs, quizzes, essays related to applying to learn to practice, and projects (Von Gruenigen et al., 2018); and distributing assessment across various types rather than having one high-stakes assessment (Bretag et al., 2019), something aligned with the previously identified types of summative assessment.

Literature (Iniesto et al., 2017; Iniesto et al., 2019) also tells us the relevance of evaluating accessibility in educational settings, something that covers both the previous section of ID verification as well as the assessment types, in such a way that both can be used by the largest number of students, attending to their accessibility needs.

When thinking about resources and examples for assessment, during Covid19 Sally Brown has been a leading voice in higher education on authentic assessment and her website, she has been collating resources and case studies on authentic assessment[2]. The Open University assessment hub also provides a wide range of resources in the design, pedagogy, and evaluation of assessment[3].

The Compendium identified several types of assessments and their combinations. After reviewing current practices, peer review does not seem appropriate, it is a difficult type of assessment to be used outside a MOOC environment with low numbers of participants such as formal recognition microcredentials (Baughan, 2021), the following types of assessment, considering their limitations, are recommended for microcredentials:

- **Computer-graded assessment**. These assessments could be a final proctored exam, or quizzes based on case studies and coding projects
- **Teacher-graded assessment**. Teacher-graded assessments are often observed with essays and capstone projects
- **Multi-type assessment**. Mixture of computer-graded assessment and teacher-graded assessment.

Recognition

Milian (2021) highlights the difficulty of ensuring microcredentials are recognised by HEIs or employers. Such recognition can help to maximise student interest in microcredentials, attracting both university students and lifelong learners needing to develop new skills. Therefore, it is important that studying microcredentials counts towards academic credit. Ensuring recognition of microcredentials also maximise their legitimacy in the eyes of employers. Short learning programmes (SLPs), which are defined by the European Short Learning Programmes Project (E-SLP) as a group of courses (units, modules or other learning building blocks) with a common subject focusing on specific needs in society which can be used as stackable elements of larger formal degrees targeting non-traditional and adult learners (Melai et al., 2020). Considerations for recognition include the intersection between microcredentials and SLPs; SLPs features are coherent with the CMF, with the reference to ECTS, DS, learning outcomes, EQF and a system of QA (Antonaci, Henderikx, & Ubachs, 2021).

The Compendium identifies the following recognition methods:

- **Academic Credit**:
  o The academic credit gained can only be applied to the programme offered by the same provider and cannot be transferred to another provider directly (**Non-transferable**).
  o Offering transferable academic credit which is more flexible and offers more convenience for students. This happens either through awarding ECTS or through making agreement with named universities to accept the credits (**Transferable**).
- **Professional Credit**:
  o Awarding professional credit hours or credits from formal professional accreditation bodies (**Formal**).
  o Informal awards such as certificates from the platforms and badges from the content provider (**Informal**).

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[2] Sally Brown, https://sally-brown.net/
[3] Open University assessment hub, https://learn3.open.ac.uk/course/view.php?id=300895

- o The professional certificate is backed by a business leader to enhance its credibility and offer more work relevance (**Endorsement**).
- **Combined**: Offering academic and professional credits in the same programme. This offers more opportunities for learners.

Non-transferable academic recognition can be found across FutureLearn's academic programs. The Open University uses the Online Course Certification System (EOCCS)[4] (for example "Business and Finance Fundamentals") or microcredentials included in its MBA programs (for example "The Digital Economy"). A similar approach is used by Coursera's MasterTrack certificates, offering non-transferable academic credit towards postgraduate programs offered by the university provider ("Machine Learning for Analytics" or "Supply Chain Excellence"). While transferable academic recognition is available on edX micromasters programs (for example "Supply Chain" and "Managing Technology and Innovation") after finishing the programs students can apply to different universities across the globe or transfer their academic credits. The EduOpen platform offers ECTS credits (for example "Content and Language Integrated Learning").

In terms of professional recognition, European MOOC platforms offer formal recognition in the form of CPD hours or formally accredited programs, while US platforms tend to offer informal awards such as certificates and badges from the same platform where their programs are endorsed by leading businesses. That is not always the case. Coventry University microcredentials offer industry partners' accreditation from Tableau, Amazon Web Services, Xero and Salesforce as well as academic credit from the university. In that sense, FutureLearn offers formal professional accreditation across all its professional programs, while Miríadax, Coursera, edX, and Udacity offer informal recognition. Endorsement is commonly awarded by a leading business on edX and Coursera. Finally, the combination of accreditation can be found in FutureLearn academic programs ("Causes of Human Disease - Environmental Challenges" University of Leeds and "Genomics in Healthcare" St. George University).

Hanafy (2020) in his research shows that few microcredential platforms include skill-related data and that this might be due to the provider's prioritising the technical features of their platforms over the academic ones. Transparency of skill-related data is essential if earners want their skills recognised in different institutions to the ones, they got the skills from. Skill-related data can include skill definition, skill type, level of mastery of skills, whether the skill is derived from a particular taxonomy and the skill reusability. As Dunn (2021) reports, there is not still a single European-level framework for the process of recognising credit which involves European partners entering reciprocal recognition arrangements for their SLPs where a key aspect for recognition needs to be the agreement on the size of SLPs.

Camilleri & Tannhauser (2013) proposed a set of eight scenarios for the recognition of credits based on open educational resources and MOOCs simulating different situations students face. The scenarios while are useful to understand different casuistic are difficult to be applied on microcredentials. The CMF suggests that for certification the microcredential should provide a certificate supplement that sets out the course content, learning outcomes, total study hours, EQF level and number of credit points (ECTS) earned meaning it needs to be transferable. It can include a credible industry backer giving additional endorsement.

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[4] EOCCS https://www.efmdglobal.org/assessments/online-courses/eoccs/

The Compendium identified several methods for recognition. After reviewing current practices and CMF objectives non-transferable and informal options do not seem suitable for microcredentials:

- **Academic Credit**. Offering transferable academic credit, which is flexible and offers convenience for students. This happens either through awarding ECTS or through agreements with universities to accept the credits (**Transferable**).
- **Professional Credit**. Awarding professional credit hours or credits from formal professional accreditation bodies (**Formal**). The professional certificate is backed by a business leader to enhance its credibility and offer more work relevance (**Endorsement**).
- **Combined**: Offering academic and professional credits in the same programme. This offers more opportunities for learners.

Existing models and guidelines for quality

Microcredentials are designed to be standalone or to form part of a larger award. Since microcredentials are expected to be awarded by a body with the powers to award academic credit, they are subject to proportionate quality assurance mechanisms, and are mapped against EQF or the equivalent levels in the university's national qualification framework. To produce models and guidelines research in QA is relevant because in microcredentials academic credit is being awarded.

For that purpose, current quality guidelines in MOOCs and microcredentials have been reviewed. The quality of the design and the production for courses is an issue of relevance (Xiao, Qiu & Cheng, 2019), Mulder and Jansen (2015) concluded MOOCs cannot remove all barriers to learning but can contribute to ensuring quality education for all. In the same line of argumentation, Schuwer et al. (2015) pointed out the lack of quality MOOCs to offer formal pathways to recognised academic qualifications and the inequality of access that provides. Nine previous and ongoing initiatives have been identified which considered models and guidelines for MOOC and microcredential quality, including aspects related to assessment and recognition:

1. Ossiannilsson, Altinay and Altinay (2015) in their review of quality models in online and open education reflect the movement towards convergence in the processes of quality assurance in HE. The MOOC Quality Project (Creelman, Ehlers & Ossiannilsson, 2014) involved researchers who found that it is difficult to define what quality means for MOOCs since their nature is continually changing with new types and variants appearing all the time.
2. Stracke et al. (2018) reflect on the need to provide MOOCs with better quality to address new target groups allowing them to be used in multiple and diverse environments. MOOC quality needs to consider learners, designers, and developers to produce quality frameworks such as the Quality Reference Framework (QRF) (Stracke et al., 2017).
3. The Quality Code at the Quality Assurance Agency (QAA) (Rosewell & Barefoot, 2013) influenced the development of the OpenupEd quality label (Rosewell & Jansen, 2014) based on the E-xcellence approach of using a benchmark for quality assessment in MOOCs (Williams, Kear & Rosewell, 2012). It has been used to evaluate the quality in FutureLearn (Jansen, Rosewell & Kear, 2017) and UNED Abierta (Rodrigo et al., 2014). There have been several projects about quality in MOOCs within OpenupEd: ECO eLearning project (Osuna-Acedo et al., 2017), SCORE2020 (SCORE2020, 2016) and BizMOOC (BizMOOC, 2017).
4. The National eLearning Center[5] designed a set of criteria for excellence in MOOCs.
5. The MOONLITE project formulated four different scenarios that could be explored by HEIs to offer online learning and provided a cost-benefit tool to quantify the contribution that MOOCs and other informal online courses make to institutions (Traeger & Löwe, 2018).
6. MICROBOL and MicroHE provided comprehensive policy analysis of the impact of modularisation, unbundling and microcredentialing in European HE (MICROBOL, 2020)
7. OEPASS project explored the definition of 'open credential ', a credential that is fully transparent, and which can be used for a multitude of purposes. These might include accumulation towards a qualification, as evidence of skills for employment or as a means of transferring evidence of expertise between countries. The project proposed a quality system that evaluates the quality credential (OEPASS, 2020).

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[5] National eLearning Centre, https://nelc.gov.sa/en/nelc

8. The E-SLP project has designed guidelines for flexible and scalable SLPs. Those guidelines are oriented to illustrate how to design flexible, scalable, accessible, and relevant SLPs (Maina et al., 2020)

9. Finally, MOOC providers have developed publicly accessible guidelines to ensure quality within their courses like edX[6].

It is important to consider from these models and guidelines for quality which aspects can be transferred to microcredentials, which do not transfer, and which aspects are not covered. To identify good practices, the Compendium used a set of nine dimensions (see table 1). Based on that previous research and the CMF, eight dimensions have been used to produce guidelines since they identify the different aspects necessary to cover basic aspects of assessment and recognition in microcredentials.

Table 1 Dimensions in both deliverables

Identification dimensions for the *"Compendium on good practices in assessment and recognition of MOOCs"*	Identification dimensions for *"Models and guidelines for assessment and recognition of MOOCs and microcredentials"*

1. Type of accreditation
2. Minimum study hours
3. Summative assessment processes
4. Proof of identification systems
5. Types of associated assessment and ID verification
6. Existence of a QA framework
7. Endorsement by leading businesses
8. Connection to workplace
9. Integration of real-world assessment
	• Fulfils the CMF microcredential definition
	   1. Microcredential
	   2. Course
	   3. Study Time and workload
	• Assessment and Recognition
	   4. ID verification
	   5. Assessment
	   6. Accreditation and recognition
	   7. QA framework

While reviewing the projects on quality in MOOCs and microcredentials, two more aspects were identified that are covered in the guidelines:

- **The structure of the frameworks**. To understand which could be better for *"Models and guidelines for assessment and recognition of MOOCs"*. That means considering aspects such as the dimensions/indicators included and number of criteria.
- **The rating approaches**. How the different frameworks evaluate their criteria and which approach can be better for *"Models and guidelines for assessment and recognition of MOOCs"*.

In the following subsections, each of the main quality frameworks identified is analysed against the search dimensions.

The MOOC Quality project

The MOOC Quality Project was an initiative of the European Foundation for Quality in eLearning (EFQUEL) to address the question of quality and MOOCs. A series of blogposts by worldwide experts and stakeholders in the field addressed the issues from each participant's viewpoint. From the expert blog posts, key quality areas were identified for further discussion (Creelman, Ehlers & Ossiannilsson, 2014):

1. **Massive target group.** Although it is impossible to predict who will participate in a MOOC, some general assumptions must be made as to their objectives and levels of participation

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[6] edX MOOC development checklist, https://courses.edx.org/c4x/edX/edX101/asset/edX_MOOC_Development_Checklist-a11y.pdf

2. **Mixing formal and informal learners**. Many MOOCs involve both registered students studying for formal credits and informal learners studying purely for self-development.
3. **Learning across contexts.** MOOC providers need to be prepared to adapt their model to the learners' needs and evaluate as the course progresses.
4. **Declaration of contents.** Transparency is an essential feature of MOOCs and students must be able to see a clear declaration of what sort of course they are signing up for.
5. **Peer-to-peer pedagogy**. Peer learning, peer review and peer assessment are essential features of MOOCs since the sheer scale precludes a traditional teacher-based approach.
6. **MOOCs supporting choice-based learning**. As MOOCs are chosen by individuals' interest and demands, the term choice-based learning was coined.

The two quality areas at the top level from the MOOC quality project are "Learning across contexts" and "declaration of contents" against the "course" dimension.

The MOOC Quality Reference Framework

The Quality Reference Framework (QRF) was designed and organised by MOOQ, the European Alliance for the quality of MOOCs. The QRF provides quality criteria and a checklist for designing MOOCs. The checklist was discussed and developed in collaboration with all interested international stakeholders. Their contributions and evaluation produced tools for designers, facilitators, and providers to improve future MOOCs for learners worldwide. The main target groups of the framework are the designers, facilitators, and providers of MOOCs as well as the MOOC learners (Stracke et al., 2018)

The QRF can be used to analyse the needs and demands for future MOOCs, to design and implement new MOOCs and to evaluate and improve existing MOOCs. The QRF consists of three dimensions, including quality criteria and instruments:

- **Dimension 1 - Phases**:
  - Analysis: identify and describe requirements, demands and constraints
  - Design: conceptualise and design the MOOC
  - Implementation: implement a MOOC draft and finalise it through testing
  - Realisation: realise and perform the MOOC, including support and assessment
  - Evaluation: define, run and analyse the evaluation and improve the MOOC
- **Dimension 2 – Perspectives:**
  - Pedagogical, Technological and Strategic
- **Dimension 3 – Roles:**
  - Designer: Designer includes content experts, content authors, instructional designers, experts for MOOC platforms, technology-enhanced learning and digital media and any others who may contribute to the design of a MOOC.
  - Facilitator: Facilitator includes the pedagogical facilitators and experts with content knowledge (such as moderators, tutors, teaching assistants) who manage forums, provide feedback and monitor learning progress, technical facilitators (such as technical support for learners) and others who may contribute to support participants in their learning process in a MOOC.
  - Provider: Provider includes (internal and external) MOOC providers, technical providers (such as technology providers, programmers, software designers and developers), managers, communication and marketing staff and others who are involved in the decision-making processes leading to the delivery of a MOOC.

Aspects at top level in the QRF linked to "course" and "assessment" dimensions are the "design" and "realisation" phases.

OpenupEd quality label, SCORE2020 and BizMOOC

OpenupEd considers MOOCs to be online courses designed for large numbers of participants; that can be accessed by anyone anywhere as long as they have an internet connection; are open to everyone without entry qualifications and offer a complete course experience online for free. OpenupEd sees MOOCs as part of open education. This implies 'openness' in the sense not only of no financial cost, but also open accessibility; open licensing policy; freedom of place, pace and time of the study; open entry; and open pedagogy. OpenupEd also sees openness as an important business driver, enhancing the circulation of knowledge and increasing the pace of innovation.

The initial OpenupEd benchmark was derived from *Quality Assessment for E-learning: a Benchmarking Approach*. The benchmark was designed to complement or supplement existing QA processes by focussing on e-learning aspects. The overall quality process for OpenupEd MOOCs includes a set of eight distinctive features to contribute to an opening up of education to the benefit of both learners and wider society while reflecting European values such as equity, quality and diversity (Rosewell & Jansen, 2014):

1. Openness to learners
2. Digital openness
3. Learner-centred approach
4. Independent learning
5. Media-supported interaction
6. Recognition options
7. Quality focus
8. Spectrum of diversity

The structure summarised in table 2 was mapped to these features.

Table 2 OpenupEd framework structure

Benchmark	Indicator	Criteria	Total
Institutional level	Strategic management	6	21
	Curriculum design	2	
	Course design	3	
	Course delivery	3	
	Staff support	3	
	Student support	4	
Course level			11
			32

From the original OpenupEd benchmark, several indicators were already related to "Course", "Assessment", and "Accreditation and recognition" dimensions:

- Strategic management
  - The institution has a quality policy that relates to national frameworks, and the MOOC offering is related to that policy.
- Curriculum design
  - The institution makes explicit the relationship between its MOOC portfolio and its mainstream curriculum.

- o The MOOC portfolio provides for the development of students' cognitive skills, key/transferable skills, and professional/practical skills, in addition to knowledge and understanding.
- Course level
  - o Learning outcomes are assessed using a balance of formative and summative assessment appropriate to the level of certification.
  - o Assessment is explicit, fair, valid, and reliable. Measures appropriate to the level of certification are in place to counter impersonation and plagiarism

ECO was a European project based on Open Educational Resources (OER) that gave free access to a list of MOOCs in six languages. It offered the tools to create MOOCs as an educator. The main goal of this project was to broaden access to education and to improve the quality and cost-effectiveness of teaching and learning in Europe. ECO focused on the following quality dimensions:

- Public accessibility.
- Learning pathways.
- Typology of pedagogical resources.
- Typology of proposed activities.
- Progression, score, and challenges.
- Technical assistance and support.
- Design of animation and communication.
- Interaction with pedagogical team.
- Accessibility and mobility.

The Support Centres for Open Education and MOOCS in different Regions of Europe 2020 (SCORE2020) project built a European consortium of regional expertise centres on open education and MOOCs with the support of the European platform of OpenupEd experts. The partnership stimulated the set-up of regional support centres for the development and use of MOOCs and open education. These regional support centres promoted, stimulated, and activated the development and delivery of MOOCs and other modes of open education as well as the use of MOOCs in their region.

SCORE2020 project designed a set of guidelines based on the benchmark criteria of OpenupEd label and considering ECO dimensions as summarised in table 3.

Table 3 SCORE2020 framework structure

Checklist	Dimension	Criteria	Total
Is it a MOOC or not?	Massive	1	14
	Open	5	
	Online	1	
	Course – study unit	1	
	Full course	6	
Quality of the design of MOOC?	Target group	3	26
	Overall goal	1	
	Learning Objectives	4	
	Learning activities	5	
	Feedback mechanism	6	
	Study-time	1	
	Workload	2	
	Assessment	4	
Accessibility of MOOCs	Web-accessibility	2	6
	Accessible Information	3	
	Accessible learning	1	

Checklist	Dimension	Criteria	Total
Technical platform and support for staff and participants	Platform	2	12
	Staff support	3	
	Support for MOOC participants	7	
			58

The European-wide Knowledge Alliance (BizMOOC) was an EU-funded project which tackled the European challenge of enabling businesses, the labour force, and universities to increase their activities and exploitation of the MOOC potential. It focused on workforce & HEI-training and the acquisition of labour market key competences through applying new methodologies for online teaching and learning. That was achieved by creating common standards and frameworks for MOOCs by integrating experiences from Higher Education and the business world.

Table 4 BIZMOOC framework structure

Checklist	Dimension	Criteria	Total
Is it a MOOC or not?	Massive	1	13
	Open	5	
	Online	1	
	Course – study unit	1	
	Full course	5	
Quality of the design of MOOC	Target group	3	32
	Workload	2	
	Overall goal	1	
	Learning Objectives / Outcomes	5	
	Learning activities	5	
	Content / Assets	6	
	Feedback mechanism	6	
	Assessment	4	
Visibility	Project	6	6
Accessibility	Web-accessibility	2	6
	Accessible Information	3	
	Accessible learning	1	
Technical platform and support for staff and participants	Platform	2	12
	Staff support	3	
	Support for MOOC participants	7	
			69

The BizMOOC project applied several standards and best practices to ensure the quality of MOOCs, including the benchmark criteria of the OpenupEd label. As the label is designed to review QA at the institutional level only some criteria were relevant for BizMOOC. Therefore, the project adapted the checklist and criteria developed by ECO and SCORE2020 project (as shown in Table 4). These projects based on OpenupEd label rate the criteria using four values: not achieved, partially achieved, largely achieved, and fully achieved.

Dimensions covered against "Course", "Study Time and Workload", "Assessment" and "Accreditation and recognition" include:

- Course – Study unit / Study time:
  - The total study time of a MOOC is at least 1 ECTS (25-30 hours of study).
- Workload
  - The workload per week is feasible for typical learners from the specified target group (typically 6-8 hours for those with full-time jobs).
- Assessment:

- o Learning outcomes are assessed using a balance of formative and summative assessment appropriate to the level of certification.
  - o Assessment is explicit, fair, valid, and reliable. Measures appropriate to the level of certification are in place to counter impersonation and plagiarism.
  - o Participants can earn badges for completion of learning activities.
  - o Participants can follow they score and progression.
- Accessibility:
  - o Web-accessibility.
  - o Accessible Information.

MOONLITE

MOONLITE was a project which aimed to develop cross-national cooperation services to explore larger-scale uptake of MOOCs in Europe as well as creating learning and collaboration opportunities for refugees, stakeholders and MOOC providers in member states. The MOONLITE project had a particular focus on using MOOCs for refugees and migrants to improve their language and entrepreneurial skills and developed guidelines for European HEIs on how to maximise the potential of MOOCs. MOONLITE tackled the area of recognition since it recognised MOOCs do not automatically imply better access to the higher education system; without any formal credits for MOOC completion, MOOCs are just non-formal learning. Therefore, access to the higher education system requires that those credits count as part of a formal degree. In that sense and to fill that gap, the MOONLITE project gave specific attention to this topic and addressed the issue of giving credits to MOOCs – recognising those credits as part of formal degree education and making formal degree education more flexible by offering short learning programs (SLPs)

The MOONLITE consortium agreed on the following conceptualisation of four different scenarios to offer online learning to foster the social inclusion and employability of students and refugees:

- **Scenario 1**: Online learning is used to enhance the progression of registered students.
- **Scenario 2**: Online learning is used to enhance the skills of individuals and facilitate their access to HEIs.
- **Scenario 3**: Online learning is used to enhance the skills of individuals and facilitate their access to the labour market.
- **Scenario 4**: Online learning is used to enhance the skills of registered students and facilitate their access to the labour market.

In the case of EMC-LM, scenarios 3 and 4 are of particular interest. When evaluating scenarios in institutions, five variables need to be considered: 'Prerequisites for the Pathway', 'Strengths of the Pathway', 'Barriers of the Pathway', 'Cross-Institutional Considerations' and 'Effectiveness for project targets'. In that sense, MOONLITE produced a cost-benefit tool to quantify the contribution that MOOCs and other informal online courses make to institutions' triple bottom line (i.e., financial, environmental and social), and to show how their effectiveness compares to other more traditional services offered by the same higher educational institutions. Indicators included are:

Table 5 MOONLITE indicators

Indicators	Criteria
Students Given Access to Education	1
Participation of Students from Vulnerable Groups	1
Discrimination complaints received	1

Indicators	Criteria
Sustainability Education	1
Free Education	1
Workers	1
MOOCs for CPD	1
Training in MOOCs	1
Licencing of Content	1
Accreditation Status	1
Marketing complaints	2
Completion Rate	1
Data Protection	1
Support, Complaints and Resolution \ Access to learning	1
Learning to Learn	1
Energy Consumption	2
Energy Saved	1
Energy Intensity	1
Land Saved	1
Sustainability Education	1
Total	22

MOONLITE included several indicators with a particular focus on "Study time and Workload" and "Accreditation and recognition" dimensions: 'MOOCs for CPD' (Average hours of training per year per employee), 'Training in MOOCs' (Number and name of programmes offered), 'Accreditation Status' (MOOCs which lead to an accredited qualification), and 'Learning to Learn' (Quantity of Learning).

MICROBOL and MicroHE

The MICROBOL project (Micro-credentials linked to the Bologna key commitments) explored whether and how the existing Bologna tools can be used and/or need to be adapted to apply to microcredentials. MicroHE aimed to provide the most comprehensive policy analysis of the impact of modularisation, unbundling and micro-credentialing in European Higher Education, forecasting the impacts of continued modularisation of Higher Education on HE Institutions and examining the adequacy of European recognition instruments for micro-credentials.

In the Microcredential Users' Guide (MicroHE, 2018) the project outlines a series of recommendations for microcredentials aligned with "Microcredential", "Accreditation and recognition" and "QA framework" dimensions which are:

- Awarding Micro-Credentials.
  - o Award micro-credentials in a digital and signed format, preferably as Europass Digital Credentials.
- Academic recognition & portability of micro-credentials.
  - o An institutional micro-credentialing strategy should not only address the provision of micro-credentials but also the recognition of micro-credentials.
  - o Micro-credentials should stack toward a registered certificate or degree. Stackable credentials are part of a sequence of credentials that can be accumulated over time to build up an individual's qualifications and help that individual move along a career pathway and further education.
  - o The recognition methodology used for micro-credentials should take the quality assurance policies of the institution and the region/country into account, and where possible recognise other QA systems, to avoid multiple QA processes being applied to the same micro-credential.

- Recognition of non-formal learning should not be the default recognition strategy for micro-credentials. It is time-consuming and expensive to implement, especially at scale. This should be saved for edge cases that cannot be covered by other recognition procedures.
- Accreditation & Quality Assurance.
  - The existing quality assurance structure of HEIs should easily be applied to microcredentials.
  - Institutions should explicitly include micro-credentials within their existing QA policies and apply all the same procedures in terms of course design, review and evaluation to microcredentials as applied to their main offering. Micro-credentials should never follow a separate 'quality track' within the institution.
  - Micro-providers who are offering higher education-level micro-credentials should attempt to be accredited as Higher Education Institutions. Where this is not possible, they should align with the principles of the Guidelines for Quality Assurance in Higher Education (ESG) and arrange for an external audit with a competent quality assurance body.

OEPASS and ECCOE

OEPASS (Open Education Passport) intended to address the recognition and transfer of individual credits, described in terms of ECTS, without a European approach to recognising, transferring, or scaling open education modules. For that purpose, they created a standard format for describing open education and virtual mobility experiences in terms of ECTS, which addresses common criticisms (lack of trust) of open education, in particular concerning student assessment and identity; is scalable to hundreds or thousands of students through automatic issuing and verification of certificates and can capture a wide range of non-formal and formal open education experiences.

OEPASS proposed a quality system that evaluates the quality of credentials based on their transparency, ease-of-recognition and ease of portability. The project identified four sectoral types of credentials – Formal qualifications, Non-formal certificates, Recognition of skills, and Records of experience – and five specific types of credentials:

- Participation (input type - presence).
- Activity (relative to other learners – awarding for active communication).
- Role (former earner – for teachers, authors, students).
- Performance (learning outcome, skills, containing learning experience as well).
- Context (for example prior learning, open learning or STEM).

The OEPASS system is based on the following indicators detailed in table 6

Table 6 OEPASS quality system

Checklist	Indicators	Criteria	Total
Content indicators	Learning Outcomes	1	6
	Quality of learning quality assessment system	1	
	Level of learning	1	
	Workload of learning	1	
	Identity of learner	1	
	Identity of HE institution	1	
	Distinct	2	10

Checklist	Indicators	Criteria	Total
Technical indicators (Statement and Medium)	Authentic	2	
	Accessible	2	
	Exchangeable	2	
	Portable	2	
			16

Those indicators can be used in the classification system by objectively analysing them to decide whether they are covered by the respective credential. The classification can be based on a points system. The pointis system uses the following values: Indicator that cannot be evaluated (observed), no info = 0 points; Indicator that is NOT fulfilled = 0 points; Indicator only partly observed/fulfilled = 1 point; Indicator fully observed/fulfilled = 2 points (Therefore 0 points means that the indicator is either not met or there is no information on it).

Indicators that cover "Study time and workload", "Accreditation and recognition" and "QA framework" dimensions are:

- Content indicators.
    - There is a standardised quality system that is compliant with the national or EU level QA system, or an internationally recognized quality system identified on the statement or the issuer portal (ISO)
    - The level of learning is indicated in compliance with a professional, national, EU or international classification system or systems (ECVET, EQF)
    - The workload is indicated in a quantitative and well-defined way by indicating learning time or credit. Definition of workload can be tracked.
- Technical indicators.
    - Statement.
        - Represents a specific, identifiable, and measurable experience, skill or fact and is attributable to a single, identifiable person.
        - Contains enough information to verify when, where and by whom it was issued, trace and reproduce the conditions under which it was issued.
        - Is issued in a widely spoken language or in an easy-to-read graphical format, in a standardised form, according to standardised processes.
        - Is modular, allowing the credential to be subdivided into smaller credentials or stacked into larger credentials and convertible into other types of credentials.
        - Is owned by the learner.
    - Medium.
        - Allows for storage and display of the statement, as well as all associated metadata
        - Only allows an issuer to create a certificate, does not allow for any kind of tampering or editing, is able to store or link to the information required to verify and display its validity status.
        - Allows for a credential to be issued in a widely used and open format
        - Allows for relational links to be created between credentials and allows for credentials to be created from other credentials.
        - Allows for the user to physically possess the credential in a place of their choosing and enables the credential to be easily shareable by the user.

ECCOE (European Credit Clearinghouse for Opening up Education) is an ongoing project to facilitate the endorsement and appropriation of open, online, and flexible higher education. In support of this overarching objective, the project aims to increase trust in technology-enabled credentials among students, higher education institutions (HEIs) and employers. It is producing the ECCOE-System, which aims at supporting the digitalisation and validation of credentials, enabling skills brokerage on the labour market, as well as letting learners use their credentials freely by referencing their (digital) credentials in their (online) job application, standard CV or personal e-Portfolio. ECCOE will produce The Model Credit Recognition Agreement (MCRA)

E-SLPs

The objectives of the E-SLP project are to define the concept and position of Short Learning Programmes (SLPs) as part of higher education systems and of policies for continuous education and continuous professional development. Responding to needs of the economy and personal development, developing institutional policies, strategies and frameworks for the development and delivery of flexible and scalable SLPs in Europe. Keeping pace with the size and diversity of needs of employers and employees and as an opportunity for learners to fit study programmes to their time horizon; and designing next steps for change towards systemic and sustainable institutional, governmental and EU policies. Strategies for continuous education, mainstreaming SLPs as a specific area of university provision, next to degree education and open education.

E-SLP has designed a set of templates of which the self-assessment quality indicator for SLPs is relevant to this report because evaluates quality aspects for SLPs as indicated in table 7.

Table 7 Self-assessment quality indicator for MOOCs

Checklist	Dimension	Criteria	Total
Self-assessment quality indicator for SLPs	The SLP must be	17	23
	The SLP can be	3	
	The SLP cannot be	3	

The criteria are evaluated against 4 values: 0 non-existent, 1 must be improved, 2 adequate, 3 excellent. Aspects that are related to "Microcredential", "Study time and workload", "Assessment", "Accreditation and recognition" and "QA framework" dimensions are:

- The SLP must
    o be awarded with a microcredential and able to be used as a stackable element of larger formal degrees
    o Be offered by higher education institutions (part of a national higher education system and subject to accreditation at the organisation level and at degree programmes)
    o Be offered at higher education level – EQF levels 4 to 8 (foundation, bachelor, master and doctoral level)
    o Have a study time horizon from 5 to 30 ECTS
    o Have a relation to larger formal degrees offered by HEIs
    o Have clear and transparent learning outcomes that are aligned to the learning outcomes of the European Qualifications Framework (EQF)
    o have aligned learning outcomes, activities and assessments
    o Be written in line with the cycle descriptors of the Framework for Qualifications in the European Area

- o Undergo quality assurance processes in line with those of the institution producing them
- o Be subject to quality assurance procedures in line with the standards and guidelines for quality assurance in the European Higher Education Area (ESG)
- o Have clear and transparent assessment methods to assess achievement of the learning outcomes
- o Be awarded by national HE institutions and offer a guarantee at the academic level
- A SLP can
  - o Be recognised and, preferably, accredited
  - o Have an assessment-only option to recognise students with prior informal or formal learning

Quality Scorecard - Criteria for Excellence in MOOCs

The National eLearning Center has designed a quality scorecard of criteria for excellence in MOOCs during 2020 (Table 8).

Table 8 Quality Scorecard framework structure

Checklist	Dimension	Criteria	Total
Course-Level Best Practices and Quality Indicators	Course Building Blocks	10	41
	MOOC Course Design	10	
	Developing Community	6	
	Teaching Principles	5	
	Continuous Improvement	3	
Institutional Best Practices and Quality Indicators	Institutional Foundations	7	7
			48

The quality scorecard includes a rubric which rates each of the criteria with three values (1=emerging, 2= Accomplished and 3= Exemplary), where a score of 0 is used if there is no evidence or presence of the quality indicator at the course or institutional levels. Dimensions with a particular focus on "Course", "Study Time and Workload" and "Assessment" are:

- Course Building Blocks
  - o Learning objectives are aligned to the activities, assignments and assessments.
  - o The projected time commitment for the course is outlined.
  - o Instructions for course activities and assignments are clear and well-written
- MOOC Course Design
  - o There is variation in the types of activities and assignments used in the course
- Teaching Principles
  - o Students receive feedback that is relevant and timely, allowing them to continuously assess their learning throughout the course.
  - o Assessment methods are selected to measure each stated learning objective.
  - o Assessment methods are aligned with course activities, resources and certificate requirements.

edX MOOC development checklist

To maintain course quality, edX developed a MOOC Development Checklist (MDC). The MDC is broken into two parts (minimum requirements and optional best practices). It is oriented to course teams, which are encouraged to use the MDC in conjunction with their own MOOC development tools.

Table 9 edX MDC structure

Requirement	Indicator	Criteria	Total
Minimum requirements	Course Announcement and Introduction	5	21
	Course Structure	3	
	Instructional Materials and Assessments	5	
	Course Administration and Learner Engagement	8	
Best practices	Course Announcement and Introduction	2	16
	Course Structure	1	
	Instructional Materials and Assessments	8	
	Course Administration and Learner Engagement	5	
			37

MOOCs should meet the MDC's minimum requirements prior to work with edX. The structure of the checklist can be seen in table 9. The checklist is designed to be completed by partners and then reviewed by edX. Regarding "Course", "Assessment" and "Accreditation and recognition" dimensions, MDC covers the following:

- Course Structure.
  - Grading criteria and certificate requirements posted in the course.
- Instructional Materials and Assessments.
  - The course includes gradable assignments, e.g., exercises/homework/quizzes and assigns a grade.
  - Assessment deadlines are clearly articulated.

Production of models and guidelines for assessment and recognition

This section first describes the design of the models and guidelines based on the desk research from the previous section. Then each of the dimensions based on CMF and the Compendium are revisited considering the most up-to-date research for the "*Models and guidelines for assessment and recognition*" introduced in the next section to be used in the pilots.

Models and guidelines design

The models and guidelines framework proposed from this report includes a total of 19 criteria within the seven dimensions proposed and divided into two checklists.

Dimensions in existing models and guidelines for quality

Dimensions identified in the desk review conducted for the previous section showcase in Table 10 that they are differently addressed, which is normal considering many of those were designed for MOOCs which do not necessarily need summative assessment, and formal and transferable accreditation. In that sense, none of the models and guidelines identified considers ID verification.

Table 10 Dimensions for assessment and recognition

	Microcredential	Course	Study Time & workload	ID verification	Assessment	Accreditation and recognition	QA framework
MQP	No	Yes	No	No	No	No	No
QRF	No	Yes	No	No	Yes	No	No
OpenupEd	No	Yes	No	No	Yes	Yes	No
Score2020 and BizMOOC	No	Yes	Yes	No	Yes	Yes	No
MOONLITE	No	No	Yes	No	No	Yes	No
MICROBOL and MICRO HE	Yes	No	No	No	No	Yes	Yes
OEPASS and ECOOE	No	No	Yes	No	No	Yes	Yes
E-SLP	Yes	No	Yes	No	Yes	Yes	Yes
Quality Scorecard	No	Yes	Yes	No	Yes	No	No
MDC	No	Yes	No	No	Yes	Yes	No
Total	2	6	5	0	6	7	3

The dimensions in the guidelines are as identified for the search of quality models and guidelines:

- Fulfils the CMF microcredential definition
  - Microcredential
  - Course
  - Study Time & Workload
- Assessment and Recognition
  - ID verification
  - Assessment
  - Accreditation and recognition
  - QA framework

The structures of the frameworks in existing models and guidelines for quality

The CODUR project (CODUR, 2017) performed a systemic comparison of current online education quality assurance tools and systems. Researchers compared a variety of benchmarking and QA systems, highlighting the simplicity and structure of OpenUpEd. Several research projects have based their quality work on the OpenUpEd label, refining and adapting its checklists. These include ECO eLearning, Score2020 and BizMOOC. For that reason, the adaptation of OpenupEd benchmark has been chosen as the baseline structure for the models and guidelines for assessment and recognition design.

There are several aspects to consider when using the OpenUpEd label:

- Every platform provider has quality criteria for the MOOCs to be designed against.
- The checklist is not designed to be used by experts.
- It is oriented towards self-assessment. Providers are expected to reflect on their MOOC production to provide the first measure of the strengths of performance and areas for improvement.

The framework has three structural levels:

- **Checklists**: each of the main areas to evaluate
- **Dimension**: the different key aspects for each area
- **Criteria**: each of the different criteria to cover a dimension

Table 11 summarises the checklists, guidelines, and number of criteria for *"Models and guidelines for assessment and recognition"* following Score2020 and BizMOOC structure*.*

Table 11 Guidelines for assessment and recognition structure

Checklist	Dimension	Criteria	Total
Fulfils microcredential definition	1.1 Microcredential	3	8
	1.2 Course	3	
	1.3 Study-time and Workload	2	
Assessment and recognition	2.1 ID verification	2	11
	2.2 Assessment	3	
	2.4 Accreditation and recognition	4	
	2.5 QA framework	2	
			19

Rating approaches in existing models and guidelines for quality

Table 12 indicates the several rating options to evaluate the dimensions in the models and guidelines identified (those that merely were not a simple yes/no option).

Table 12 Different quality framework rating on how well criteria have been achieved

OpenupEd, Score2020 and BizMOOC	OEPASS
-NA (Not achieved) -PA (Partially achieved) -LA (Largely achieved) -FA (Fully achieved)	-Indicator that cannot be evaluated = 0 -Indicator that is NOT fulfilled = 0 -Indicator only partly observed = 1 -Indicator fully observed = 2
E-SLP	**Quality Scorecard**
-0 non-existent -1 must be improved -2 adequate -3 excellent	-1=emerging -2= Accomplished -3= Exemplary

Each of the criteria included in the dimensions has information to help the evaluator know what to evaluate and how to proceed to test. Space for comments has been added for each of the criteria (instead of dimensions) to allow the evaluator to add any comment that can enrich the evaluation with qualitative information. The chosen rating method for each of the criteria is from Score2020 and BizMOOC as follows:

- **NA (Not achieved)**: The feature to test is missing.
- **PA (Partially achieved)**: The feature to test is available but not integrated.
- **LA (Largely achieved)**: The feature to test is available and partially integrated.
- **FA (Fully achieved)**: The feature to test is available and fully integrated.
- If the criterion is not applicable, none of the previous options is selected. In this case, comments should be added.

Each of the checklists and dimensions is defined in the following subsections.

Fulfils CMF microcredential definition

Microcredential

Microcredentials aim for small units of study that meet the desired outcomes. Lay foundations for a new qualification to address the needs of employers and learners looking for small units of study that meet their career goals and/or to develop higher education-level skills. Enable Courses produced to the CMF to be recognised towards Formal Qualifications, as they will be designed in accordance with recognised national qualification frameworks. Finally, enable Courses produced to the CMF to be stackable between different higher education institutions in Europe and beyond to support personalisation of learning.

Course

The course is defined by CMF as a plan of study which includes a Summative Assessment created and evaluated by a nationally recognised university under its national quality assurance framework. Course content is aimed at employees and should combine a mix of theory and practice to ensure it has direct relevance to the workplace.

According to the CMF, a microcredential should award a transcript that sets out the course content, learning outcomes, total study hours, EQF level and number of credit points (ECTS) earned. It should be designed for those studying at university level – anywhere from first-year undergraduate (EQF Level 5) to doctoral standard (EQF Level 8).

Study time & workload

The CMF indicates the total study time including assessment is 100 to 150 hours which translates to 4-6 in the European Credit Transfer and Accumulation System (ECTS). The expectations of a course are that it is designed so that the number of hours of study per week are suited to learners who will need to fit study around full-time work and familial responsibilities.

Assessment and recognition

ID verification

The CMF specifies that the course should deploy a reliable method of ID verification at the point of the summative assessment. This should comply with the provider's policies and/or be a method that

is widely adopted across platforms. The Compendium defined three levels depending on their reliability: "basic", "good" and "better". Methods marked as "basic" should be accompanied by another method marked as "good" or "better" to grant verification. The following ID verification methods are recommended for microcredentials:

- **Platform ID Verification.** *Basic*. Match learner's own photo via a selfie or a webcam with an ID
- **Provider Registration.** *Basic*. Learners complete a registration process with the provider.
- **Interviews.**
  - *Basic – On-site oral interview*. An interview at the provider's premises
  - *Good – Online interview*. A short online interview to verify student identity and work
- **Recorded presentations.** *Better*. Recording a presentation as part of a capstone project

As reported in the BizMOOC project it is important to consider the accessibility and be compliant with W3C accessibility guidelines[7] and WCAG 2.0 according to the European Commission[8].

Assessment

The CMF indicates a microcredential must employ a rigorous summative assessment method that allows the award of academic credit. This credit can be achieved either directly following successful completion of the course or via recognition of prior learning upon enrolment as a student on the provider's course of study. The Compendium identified several types of assessment and their combinations. The following types of assessment are recommended for microcredentials although all, as noted above, have some limitations:

- **Computer-graded assessment**. This could take the form of a final proctored exam, or quizzes based on case studies or projects
- **Teacher-graded assessment**. Teacher-graded assessments are often associated with essays and capstone projects
- **Multi-type assessment**. Mixture of computer-graded assessment and teacher-graded assessment.

Assessment types should, as well consider their accessibility as indicated in the BizMOOC project.

Accreditation and recognition

The CMF suggests the course should provide a transcript (certificate supplement) that sets out the course content, learning outcomes, total study hours, EQF[9] level and number of credit points (ECTS)[10] earned. In addition, a credible industry backer for a microcredential might endorse its relevance for employment purposes. Endorsement is not always necessary, especially if the university's brand or the course subject would not benefit from a non-university endorsement.

The Compendium has identified several methods for recognition:

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[7] W3C, https://www.w3.org/WAI/fundamentals/accessibility-intro/
[8] Accessibility, https://wikis.ec.europa.eu/display/WEBGUIDE/12.+Accessibility
[9] EQF, https://europa.eu/europass/en/european-qualifications-framework-eqf
[10] ECTS, https://ec.europa.eu/education/resources-and-tools/european-credit-transfer-and-accumulation-system-ects_en

- **Academic Credit**. Offering transferable academic credit which is flexible and offers convenience for students. This can be done by awarding ECTS or by making agreements with universities that they will accept the credits (**Transferable**).
- **Professional Credit**. Awarding professional credit hours or credits from formal professional accreditation bodies (**Formal**). The professional certificate is backed by a business leader to enhance its credibility and offer more work relevance (**Endorsement**).
- **Combined**: Offering academic and professional credits in the same programme. This offers more opportunities for learners than offering only one form of credit.

MICROBOL and MicroHE projects identify microcredentials should be awarded in a digital and signed format, for example, the identified Europass Digital Credentials (EDC)[11]. As well as the need to have a strategy that addresses recognition of microcredentials.

OEPASS and ECCOE project indicate the transcript should be issued in a widely spoken language or an easy-to-read graphical format, in a standardised form, according to standardised processes.

Quality Assurance framework

The CMF suggests the ENQA Guidelines (ESG) should be the reference framework used[12]. Every microcredential must be associated with the award of credit, either directly or via recognition of prior learning. In that regard, the quality is assured by providers confirming that the microcredential passes the provider's standard quality assurance processes. Providers are responsible for ensuring that their internal quality assurance mechanisms follow strict Internal quality criteria and procedures, in line with national quality standards, creating a guarantee for quality

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[11] Europass digital credentials, https://europa.eu/europass/en/europass-digital-credentials

[12] European Higher Education Area (ESG), https://www.enqa.eu/esg-standards-and-guidelines-for-quality-assurance-in-the-european-higher-education-area/

Framework for assessment and recognition of microcredentials

This framework maps the elements of assessment and recognition, allowing MOOC platforms, universities and employment services to place microcredentials and similar courses in context. The EMC-LM project is piloting this framework on different courses and platforms in autumn 2021 so that the framework can form the basis for assessment and recognition between MOOC platforms in Europe.

The two checklists below can be used to check:

a) that a course is a microcredential, according to the Common Microcredential Framework[13] and
b) that it is following current best practices for assessment and recognition.

Apply the following two checklists to the microcredential considering the explanation of terms from the *"Models and guidelines for assessment and recognition of MOOCs"* based on CMF and the *"Compendium on good practices in assessment and recognition of MOOCs"* included at the end*.* The checklists are designed to be used at the planning and design stages of microcredentials, to allow check if best assessment and recognition approaches are in place, allowing reflection.

Each of the criteria have information to help the evaluator to know what to evaluate and how to proceed to test. Space for comments has been added for each of the criteria to allow to add any comment that can enrich the evaluation. The rating method for each of the criteria is as follows:

No. The feature to test is not correctly addressed:

- **NA (Not achieved)**: The feature to test is missing.
- **PA (Partially achieved)**: The feature to test is available but not integrated.

Yes. The feature to test is correctly addressed:

- **LA (Largely achieved)**: The feature to test is available and partially integrated.
- **FA (Fully achieved)**: The feature to test is available and fully integrated.

If the criterion is not applicable none of the previous options is selected, comments should be added.

Review "Fulfils CMF microcredential definition"

Levels: NA (Not achieved); PA (Partially achieved); LA (Largely achieved); FA (Fully achieved)

Dimension	Criteria	Fulfils microcredential definition			
		NA	PA	LA	FA
1.1 Microcredential	The course defines units of study which do one or more of the following: • lay the foundations for learners to gain a new qualification that will enhance their employability • are designed to meet the career goals of learners • develop higher-education level skills				
	Comments:				

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[13] CMF, https://emc.eadtu.eu/images/EMC_Common_Microcredential_Framework_.pdf

Dimension	Criteria	Fulfils microcredential definition			
		NA	PA	LA	FA
	The course defines units of study which enable the course to be counted towards formal qualifications issued in line with recognised national qualification frameworks				
	Comments:				
	The course defines units which can be combined with those at other higher education institutions				
	Comments:				
1.2 Course	The course includes a plan of study which includes a summative assessment created and evaluated by a nationally recognised provider under its national quality assurance framework				
	Comments:				
	The course combines theory and practice that are directly relevant to the workplace.				
	Comments:				
	The course is levelled at Level 4 - 8 in the EQF or the equivalent levels in the provider's national qualification framework considering combination with ECTS (doctorate, bachelor, master, undergraduate level).				
	Comments:				
1.3 Study-time & Workload	The course has a total study time, including completion of the summative assessment of 100-150 hours				
	Comments:				
	The course is designed so that the number of hours of study per week are suited to learners who will need to fit study around full-time work and/or familial responsibilities				
	Comments:				

Review "Assessment and recognition"

Levels: NA (Not achieved); PA (Partially achieved); LA (Largely achieved); FA (Fully achieved)

Dimension	Criteria	Assessment and recognition			
		NA	PA	LA	FA

2.1 ID verification	The course operates a reliable method of ID verification at the point of assessment that complies with the recognised University's policies or is widely adopted across platforms using (more than one could be used). Methods defined as "basic" should be accompanied by another method marked as "good" or "better" to grant verification for full achievement:
	• Platform ID Verification. (Basic)
	• Provider Registration. (Basic)
	• Interviews.
	    o On-site oral interviews (Basic)
	    o Online interviews (Good)
	• Recorded presentations (Better)				

	Comments:				
	The ID verification method has been checked as accessible for participants with accessibility needs.				
	Comments:				

Dimension	Criteria	Assessment and recognition			
		NA	PA	LA	FA
2.2 Assessment	The course provides a summative assessment to enable the award of academic credit via recognition of prior learning upon enrolment for specified qualifications offered by the course provider				
	Comments:				
	The course provides a summative assessment that enables the award of academic credit via completion of the course using: • Computer-graded assessment • or Teacher-graded assessment • or a mixture of Computer-graded assessment and Teacher-graded assessment				
	Comments:				
	The summative assessment (s) has been checked as accessible for participants with accessibility needs.				
	Comments:				
2.3 Accreditation and recognition	The course provides at least a method for recognition: • Academic Credit: Formal and transferable. • Professional Credit: Formal and endorsement • Combined: Academic and professional				
	Comments:				
	The course should be awarded in a digital and signed format, for example, the identified Europass Digital Credentials (EDC).				
	Comments:				
	The course provider has a strategy that addresses recognition of microcredentials.				
	Comments:				
	The transcript issued in a widely spoken language or an easy-to-read graphical format, in a standardised form, according to standardised processes.				
	Comments:				
2.4 QA framework	The quality is assured by passing the normal provider quality assurance processes: • The course offers academic credit and is quality assured using the same procedures that are used for other courses for academic credit offered by the institution. • The course offers professional credit and is quality assured using the same procedures that are used for other courses offering similar professional credit				
	Comments:				
	The provider of the course applies internal quality assurance mechanisms following internal quality criteria and procedures.				
	Comments:				

Explanation of terms

- "Accessible". For both ID verification and summative assessment in case they include web content it needs to comply with WCAG[14] accessibility guidelines. Videos need to include

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[14] WCAG, https://wikis.ec.europa.eu/display/WEBGUIDE/12.+Accessibility

subtitles and a transcription and participants can download, store, and use resources through the process without an internet connection

- "Accreditation and recognition". Methods for recognition for microcredentials are:
  - o **Academic Credit**. Offering transferrable academic credit which is more flexible and offer more convenience for students. This happens either through awarding ECTS or through agreeing with a list of universities to accept the credits (**Transferable**).
  - o **Professional Credit**. Awarding professional credit hours or credits from formal professional accreditation bodies (**Formal**). The professional certificate is backed by a business leader to enhance its credibility and offer more work relevance (**Endorsement**).
  - o **Combined**: Offering academic and professional credits in the same programme. It offers more opportunities for learners.
- "ID verification". The course deploys a reliable method of identity verification (ID verification) at the point of the summative assessment. that complies with the provider's policies and/or is widely adopted across the Platforms. Three levels depending on their reliability are defined: "basic", "good" and "better". Methods marked as "basic" should be accompanied by another method marker as "good" or "better" to grant verification. The following ID verification methods are recommended for microcredentials:
  - o **Platform ID Verification.** *Basic*. Match learner's own photo via a selfie or a webcam with an ID
  - o **Provider Registration.** *Basic*. Learners complete a registration process within the provider.
  - o **Interviews.**
    - ▪ *Basic*. Conducting an interview at the provider premises (On-site oral interviews)
    - ▪ *Good*. Conducting a short online interview to verify student identity and work (Online interviews)
  - o **Recorded presentations.** *Better*. Recording a presentation as part of a capstone project (Recorded presentations)
- "ECTS". The European Credit Transfer and Accumulation System[15]. The ECTS is a tool of the European Higher Education Area for making studies and courses more transparent.
- "EDC". Europass Digital Credentials (EDC)[16]. A Europass Digital Credential is a digital file, issued by the institution where you studied. It describes your qualification, and can also include information on your classes, grades, projects and other achievements.
- "EQF". The European Qualifications Framework (EQF)[17] is a common European reference framework whose purpose is to make qualifications more readable and understandable across different countries and systems.
- "Formal Qualifications" Qualifications defined within a national qualification framework and regulated by the relevant Quality Assurance authority.
- "Quality Assurance framework". Every Microcredential must be able to award credit, either directly or via recognition of prior learning. In that regard, the quality is assured by

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[15] ECTS, https://ec.europa.eu/education/resources-and-tools/european-credit-transfer-and-accumulation-system-ects_en

[16] Europass digital credentials, https://europa.eu/europass/en/europass-digital-credentials

[17] EQF, https://europa.eu/europass/en/european-qualifications-framework-eqf

participants to pass the normal provider quality assurance processes. ENQA Guidelines (ESG) should be the reference framework used[18].

- "Recognised Provider". An institution with degree awarding powers, which is regulated by the relevant applicable national education quality assurance authority.
- "Recognition of Prior Learning". The policy operated by a Recognised Provider for the identification, assessment and formal acknowledgement of past learning and achievement, which is considered when admitting a student to a formal qualification.
- "Summative Assessment". An activity that evaluates what a learner has achieved after a period of study, relative to the learning aims and in accordance with a national qualification framework. A microcredential must employ a rigorous summative assessment method that allows the award of academic credit. That is achieved either directly following successful completion of the course or via recognition of prior learning upon enrolment as a student on the provider's course of study. The following types of assessment, considering their limitations, are recommended for microcredentials:
  - **Computer-graded assessment**. These assessments could be a final proctored exam, or quizzes based on case studies and coding projects
  - **Teacher-graded assessment**. Teacher-graded assessments are often observed with essays and capstone projects
  - **Multi-type assessment**. Mixture of computer-graded assessment and teacher-graded assessment.
- "Workload". A measure expressed in hours of all learning activities that may feasibly be required for the achievement of the learning outcomes.

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[18] European Higher Education Area (ESG), https://www.enqa.eu/esg-standards-and-guidelines-for-quality-assurance-in-the-european-higher-education-area/

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