European MOOC Consortium Labour Market

Compendium on good practices in assessment and recognition of MOOCs for the EU labour market

EMC-LM deliverable 4.1

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Executive Summary

This report summarises good practice in MOOC Identity Verification Systems, Approaches to Recognition, and Summative Assessment through the research, collection, and categorization of practices. It was written as part of the European MOOC Consortium – Labour Markets project (EMC-LM). As the Common Microcredential Framework (CMF) was recently introduced by the project, it was important to highlight good practices to serve as a reference for microcredential providers. Practices were collected through desk research on the public data available on MOOC platforms. In addition, online interviews and surveys were used as supplementary methods for data collection when needed.

Identity verification (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. Categories of ID verification practices could be viewed as layers that add extra verification. Four categories of ID verification were identified, which are 1) Basic ID Verification System, 2) University Registration, 3) Proctoring an Exam, and 4) An Interview. In addition, the report notes the existence of a potential fifth category which is the use of the Trust-Based Authentication & Authorship E-Assessment Analysis (TESLA) systems in future MOOC-based microcredentials.

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. For example, UK universities must adhere to the quality code set by the Quality Assurance Agency for Higher Education (QAA). Moreover, Scottish providers need to adhere to the Scottish Credit and Qualifications Framework (SCQF) in order to award academic and professional qualifications. Furthermore, providers must follow regional qualification standards such as the European Qualification Framework (EQF) if credits are to be transferable.

Approaches to recognizing the study of MOOCs were categorised. There are three main categories for MOOC recognition which are 1) academic, 2) professional, and 3) combined recognition. Academic recognition is sub-categorised into awarding transferable and non-transferable academic credit. Professional recognition is sub-categorised to awarding informal credits such as digital badges or statements of participation; and formal credits, which can be professional development hours or qualifications that are accredited from professional accreditation bodies. The combined method is when a MOOC is associated with both academic and professional credits.

MOOC providers employ either single or multiple types of summative assessment in one programme. Employing a single type of assessment involves the use of computer-graded, peer-graded, or teacher-graded forms of assessment. Employing multiple types of assessment in one programme may involve 1) peer-graded and teacher-graded assessment, 2) peer-graded and computer-graded assessment, and 3) computer-graded and teacher-graded assessment.

Introduction

This Compendium summarises good practices in ID verification systems, approaches to recognition, and summative assessment. This involved:

- conducting desktop research within MOOC platforms to identify good practice and collecting current good practices on the EMC platforms;
- collecting good practices and evidence in other MOOC projects to gather examples;
- categorising these examples of good practices.

About the European MOOC Consortium (EMC)

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 by offering together more than 1,000 MOOCs with 15 million+ learners. Its members represent large networks of 280 universities in a variety of European countries and languages areas. EMC is 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).

EMC sees the potential of MOOCs combined with digital continuous education/training to be a flexible and scalable solution, providing a transnational, truly European response to the needs of the economy across Europe. Together, these forms of education and training can keep the knowledge and skills of the workforce up to date and can anticipate the careers of tomorrow. MOOC platforms in the European MOOC Consortium (EMC) are looking for systematic ways of reaching the labour market.

The Common Microcredential Framework

The members of the European MOOC Consortium collaborated to launch the Common Microcredential Framework (CMF) in 2019[1]. This framework will be used voluntarily by these MOOC platforms and will enable microcredentials to form part of formal qualifications. The CMF responds to the demand of lifelong learners and employers for shorter degrees, it brings Europe into line with some US universities which already offer formally acknowledged microcredentials, and it addresses the inconsistency between microcredentials from different providers. The CMF will be part of an ecosystem which allows easier credit transfer of microcredentials between universities among various regions of the European Union.

In order to ensure the quality of courses, the CMF requires that microcredentials are associated with academic credit. In doing this, course providers will create these courses in line with their national qualification framework. Furthermore, in order to award credits in Europe, university providers will create the courses according to the EQF[2].

The consortium partners set these guidelines and specifications for the creation of these courses:

[1] https://emc.eadtu.eu/images/EMC_Common_Microcredential_Framework.pdf

[2] https://ec.europa.eu/ploteus/en

- Total study time (100 to 150 hours) which translates to 4-6 in the European Credit Transfer and Accumulation System (ECTS) which includes the assessment.
- Be levelled at level 6/7 of the EQF.
- Employs a rigorous summative assessment method which allows the award of academic credit.
- Deploys a reliable method of identity verification (ID verification) at the point of the summative assessment.
- Awards a transcript that sets out the course content, learning outcomes, total study hours, EQF level and number of credit points (ECTS) earned.

In addition to awarding academic credit, the CMF creates the basis of a new qualification which could stimulate further academic professional development by learners in full-time work. For this reason, the CMF incorporates both academic and professional recognition.

These CMF specifications serve as guidelines in this report to identify and evaluate good practices of MOOC ID verification, methods of recognition, and summative assessment. This is why the CMF will be referenced in this report, where appropriate. There are similar frameworks in function. In the next section, we highlight two of them.

The New Zealand Qualifications Authority (NZQA) Microcredentials Framework

The NZQA has also introduced a microcredentials framework, which works as part of the New Zealand's education and training system. Unlike the CMF, which is mainly focused on courses provided on MOOC platforms, the NZQA framework works in online, blended, and classroom-based settings. Additionally, the microcredentials are prepared by the tertiary education organisations (TEOs) that submit their microcredentials for approval by the NZQA. In addition to the NZQA's requirements and training schemes, the NZQA has also set guidelines and requirements that defines microcredentials which are: 1) providing explicit evidence for demand by employers, industry, and community, 2) being unique from any other approved microcredentials that has been quality-assured and approved by NZQA, 3) being reviewed annually, and 4) being 4-50 credits in size.

The NZQA microcredentials framework is like the CMF in the sense that they both set guidelines and criteria for what a microcredential should look like. In addition, they both focus on the professional needs of the community, employers, and individuals. On the other hand, the CMF is more focused on MOOC platforms and online learning as the main methods of delivery for microcredentials. This is unlike the NZQA framework that accepts online, blended, and classroom-based training programs as microcredentials, which is understandable given the national focus of NZQA.

OERu Transfer System

The OERu credit transfer system is a framework that aims to make higher education accessible to everyone. OERu was initiated by the OER Foundation, a non-profit organisation that supports educators and academic institutions to reach their goals through open education. The system relies on open educational resources (OERs) created by a network of institutions. Through studying a selected sequence of OERs together, learners can complete them for free, then pass an assessment at a partner institution, and finally obtain a transcript credit and earn a qualification. The OERu is like the CMF in adapting an online method of delivery. OERu focuses more on academic credits while the CMF is concerned with both academic and professional credits and focuses on the professional needs of the learners, employers, and society.

In terms of quality assurance (QA) for OERu, the OERu community adapted an open, transparent, and accountable approach to the QA process led by the OERu curriculum and quality working group. The OERu quality review project page on WikiEducator[3] stated that the aim of the QA project is to create a 'checklist'-style tool that can be used to review OERu courses along with a supplemental artefact on how to conduct the review process. The QA tool is meant to be used to guide the design of new courses, review pre-released courses and courses that already exist on the OERu network, and demonstrate the existence of a QA process to accrediting bodies.

[3] https://wikieducator.org/OERu/Planning/Quality_review_project/Outline_and_scope_-_for_comment

Method

Desktop Research and Online Interviews

In order to collect existing good practices in MOOC ID verification, summative assessment, and methods of recognition, this report adopted desktop research as a method. Desktop research, or desk research, is a method that utilises the existing literature as the basis for the conducted research[4]. Since this report is about current practices, it was justified to use desktop research, as most good practices are reported in secondary literature. Moreover, the project proposal recommended desktop research as one of the recommended research methods for this report.

In addition to desktop research, three online interviews were conducted using Skype and the Microsoft Teams meeting feature. These interviews were with representatives of the EduOpen, Miríadax, and FUN platforms. Online interviews were used in situations where the platforms were not based in the UK. Therefore, VoIP (Voice over Internet Protocol) technologies such as Skype and Microsoft Teams allowed us to go beyond geographical boundaries and conduct interviews using voice and video[5]. As with desktop research, using interviews was among the recommended research methods in the project proposal document.

Identification Criteria

FutureLearn led the development of this report along with The Open University. In addition, partner MOOC platforms helped with exchanging examples of good practice. After several meetings and correspondence among the team, the need for identification criteria was suggested. Good practice in microcredentials is evolving and dynamic. Therefore, in order to consider best practice (or better practice), we need to either look at recent implementations or common practices in MOOC credentialing that currently exist. For this reason, examples prior to 2019 have been excluded from this report. The CMF specifications and guidelines and the suggested identification criteria formed the basis for recognising good practice in MOOC ID verification, ways of recognition, and summative assessment. These identification criteria were circulated to the MOOC platforms for their suggestions. Below are the agreed criteria:

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.

Search Strategy

The data used for collecting practices were the examples of MOOC ID verification systems, methods of recognition, and summative assessment. These examples were available as public data in the major English-speaking platforms and through the consortium partners. These

[4] Verschuren, Doorewaard & Doorewaard, H., 1999. Designing a research project / Piet Verschuren and Hans Doorewaard., Utrecht: LEMMA.

[5] Lo Iacono, V., Symonds, P. and Brown, D. H. K. (2016) 'Skype as a Tool for Qualitative Research Interviews', Sociological Research Online, 21(2), pp. 1–15. doi: 10.5153/sro.3952.

MOOC platforms were: FutureLearn, Miríadax, EduOpen, FUN, Coursera, edX, and Udacity. In addition, the project proposal identified several EU-funded projects: MOOQ, TESLA, MoonLite, BizMOOC, EADTU led E-SLP, OpenupEd. Some of these projects were also examined in the WP1 report[6]. The TESLA project was of special interest to this report as it related directly to e-assessment and the suggested technology could have potential impact on the implementation of online assessment on MOOC platforms. While the results of the TESLA project have not yet been published, it is reported under the ID verification systems section as a potential good practice. A summary of other suggested publications is included in the appendix of this document.

The team focused on collecting public data from course pages in MOOC platforms. More specifically, research efforts were majorly focused on series of courses that are grouped and packaged together to offer an academic programme. The reason for this is that there are many MOOC offers on the above-mentioned platforms. Therefore, it was crucial to focus the research scope to the most relevant forms of microcredentials. In addition, the above criteria informed the creation of a survey tool that was populated by the researchers and was distributed to the MOOC platforms whose main language was not in English and, therefore, consortium members helped us by supplying their own examples. In addition, this survey served as a protocol for interviews with the members of the EMC to collect and further validate the collection of the examples.

The criteria specified above identified 66 examples of good practice from MOOC platforms across Europe and the US. Research focused on Europe due to the scope of the report and the scope of the EMC-LM project, which focuses on Europe. Research also focused on the US because platforms in the US host most MOOCs and learners. In 2019, Coursera reached 45 million learners studying 3,800 courses, edX reached 24 million learners studying 2,640 courses, and Udacity reached 11.5 million learners studying 200 courses.

These 66 examples were chosen because they matched the identification criteria. The examples were further categorized under each of the three sections. In some cases, more examples could have been investigated but a decision was made to discard examples where assessment and identification methods recurred across multiple MOOCs, which was the case with the Udacity and edX MOOC platforms. Consequently, a choice was made to only include a representative sample of these practices which captured the breadth and variety of practices on these platforms.

[6] https://emc.eadtu.eu/images/publications_and_outputs/EMC-LM_WP1_REA_Report_v.1_web.pdf

ID Verification Systems

According to the specifications of the Common Microcredential Framework, the programmess that adhere to this framework should deploy a reliable method of ID verification at the point of the summative assessment.

In a MOOC context, identity verification was defined as the process where the learners' ID is matched with an image of them. This can enable platforms to issue verified certificates or award credits when applicable. In the broader context of online assessment, the issue is more connected to verifying the authenticity and authorship of assessment (TESLA D2.1, State of the Art Report)[7]. Authenticity means that the learner is the same person who performed the assessment, while authorship means that the learner is the author of the assessment and he/she has not cheated or plagiarised to produce that work. Therefore, a reliable ID verification method in online assessment verifies authenticity and authorship. Performing authentic online assessment often comes with a trade-off in cost and time. Adding another layer of human-based verification can lead to an increase in time and cost of performing identity verification per student.

Therefore, a good practice in ID verification methods should be reliable in the sense that it verifies the authenticity and authorship of an online assessment at the point of taking the assessment. In addition, a better practice is a scalable verification method that balances the trade-offs in cost and time.

Table 1 Summary of identity verification systems

Main Category	Sub-category	Brief Description	Level of practice	Advantages	Disadvantages
Basic Platform ID Verification	Basic Platform ID Verification	Match learner's own photo via a selfie or a webcam with an ID.	Basic	Common across platforms – scalable	Not at the point of assessment – minimum level of identity verification
University Registration	University Registration	Learners complete a registration process within the university as non-degree students	Basic	second layer of authentication – scalable	Not at the point of assessment
Proctoring exams	Random Proctoring	Software takes pictures at random times during the examination period; sends report of similarity to instructor	Good	Another layer of authentication – at the point of assessment – scalable	Not reliable in being fully fool proof. Only deployed in exams
	Full Live Proctoring	Someone proctors the exam directly via software while the learner is taking the exam	Good	Offers more rigour – at the point of assessment	Not scalable for logistical limitations of time, cost, and physical resources.- Only deployed in exams

[7] http://tesla-project.eu/wp-content/uploads/2017/06/D2.1_Report_final_29_Feb_2016.pdf

	Full Recorded Proctoring	Recording exam session, checking it by a human, then sending a similarity report to the instructor	Better	Foolproof – at the point of assessment – more scalable – common	Only deployed in exams
Interviews	On-site oral interviews	Conducting an interview at the university premises	Basic	Reliable in terms of authenticity and authorship	Not scalable because of geographical limitations
	Online interviews	Conducting a short online interview to verify student identity and work	Good	Reliable in terms of authenticity and authorship – at the point of assessment	An increase in time and cost resources per verification incident if scaled
	Recorded presentations	Recording a presentation as part of a capstone project	Better	At the point of assessment – scalable – more flexibility for student	An increase in time and cost resources per verification incident if scalable – instructors can't offer real-time guidance for learner to verify authenticity and authorship of work
TESLA system	TESLA system	Verification of authenticity and authorship of work across various e-assessment scenarios using different software capabilities	Better	At the point of assessment for different scenarios – scalable – flexibility of students	Not implemented on MOOCs yet – still in pilot stage – privacy of data and ethics concerns

The research identified four categories of existing ID verification methods in MOOC-based microcredentials. Table 1 provides a summary of what will be explored. Each category demonstrates an increasing level of rigour and scalability. These methods are 1) Basic ID Verification System, 2) University Registration, 3) Proctoring an Exam, and 4) An Interview. In addition, the report notes the existence of a potential fifth category which is the use of TESLA systems in future MOOC-based microcredentials.

1. Basic Platform ID verification systems

This is the most basic and common verification of identity for MOOC platforms. Through this system, the learners match their own photo, taken via a selfie or a webcam, with an ID document such as a passport, national ID, or a driving licence[8]. FutureLearn, Coursera, and Udacity use NetVerify as a third party for verification, the other platform verification service providers are not publicly available.

[8] Witthaus, G.R., Inamorato dos Santos, A., Childs, M., Tannhauser, A.C., Conole, G., Nkuyubwatsi, B. and Punie, Y., 2016. Validation of non-formal MOOC-based learning: An analysis of assessment and recognition practices in Europe (OpenCred). https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/validation-non-formal-mooc-based-learning-analysis-assessment-and-recognition-practices

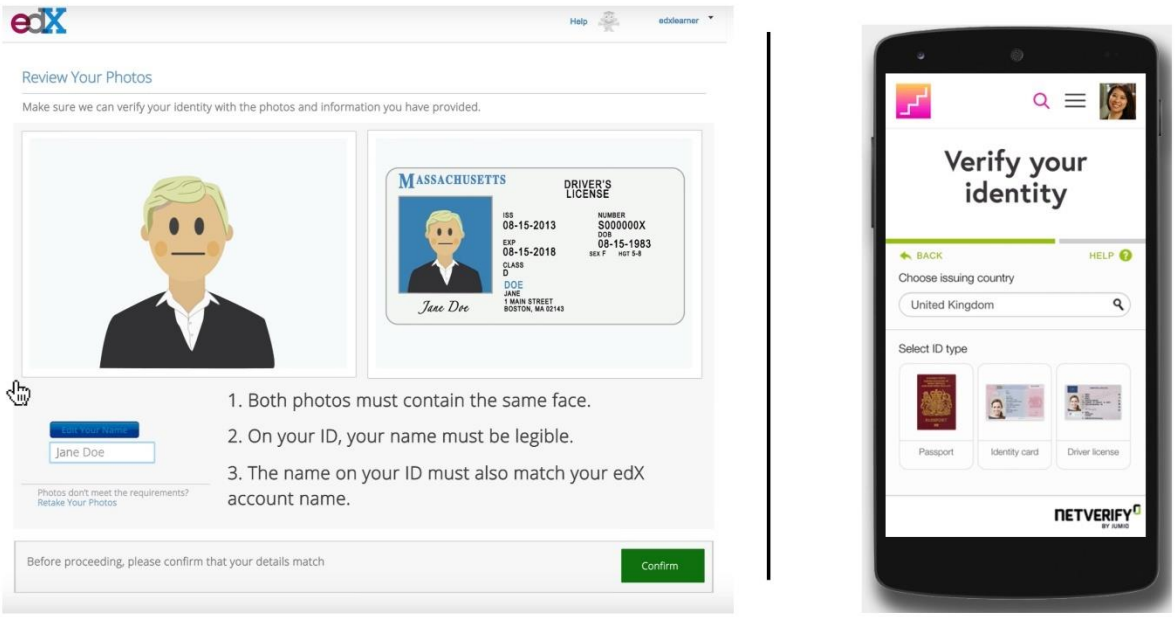

Figure 1 (edX & FutureLearn as examples of MOOC-based ID verification systems)

This form of ID verification usually happens once at the beginning of the registration process on all platforms. The only exception is edX, which asks learners to verify their identity on an annual basis. EduOpen does not employ any method of verification and they only settle for on-site ID checking at universities headquarters when they physically meet the learners to hand them their qualifications. Udacity activates ID verification after the learner submits an assessment. It also uses an exit interview, which we will refer to later as an extra step of ID verification. Other than edX and EduOpen, all the other providers in this report implement the same verification technique through various software features.

While this method offers the minimum authentication level of ID verification, it does not offer any proof of ID at the point of taking the summative assessment and it is not tied to a specific assessment scenario. This is only an authentication method and it does not offer any authorship verification. Hence, this method can be seen as a basic practice.

2. University Registration

Some programmes require that learners complete a registration process within the university as non-degree students, which provides another layer of ID verification. This example was used by The Open University on the FutureLearn platform in offerings such as “Business and Finance Fundamentals” and “The Digital Economy”. It has also been employed by the University of Leeds’ offerings on FutureLearn platform, including “Causes of Human Disease: Understanding Causes of Disease” and “Discovering Science”.

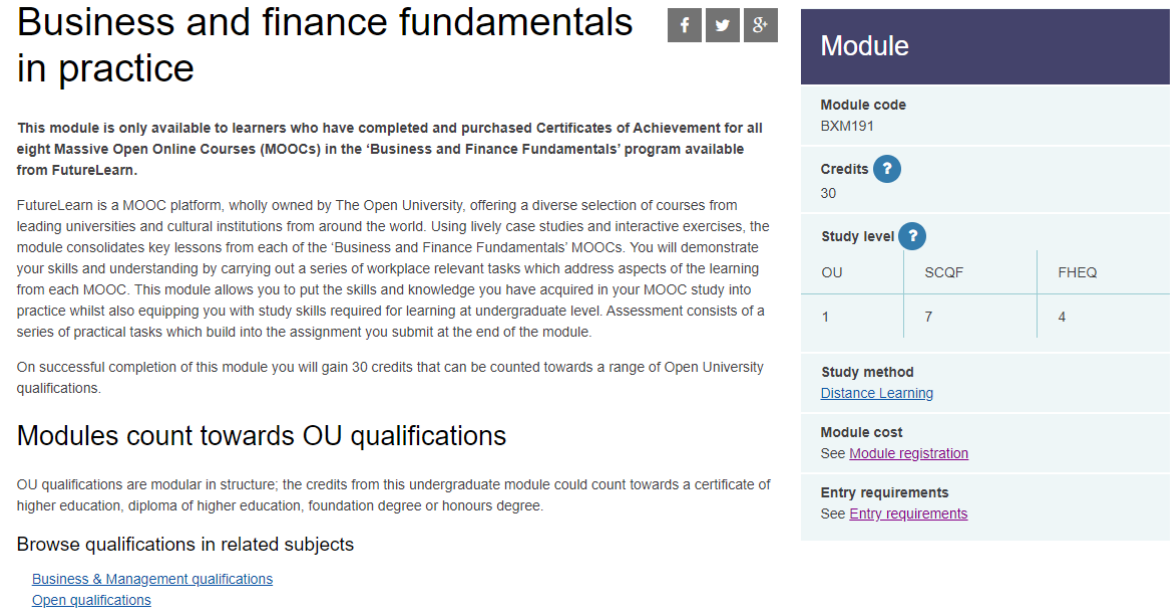

Figure 2 University Registration Process with The Open University for the Business and Finance Fundamentals Academic Micro-credential

While this method gives a second layer of authentication to online assessment, it does not confirm authorship and it does not operate at the point of taking the assessment. Therefore, this method can also be seen as a basic practice.

3. Proctoring an Exam

One common method of ID verification across different providers is the online proctored exam. This comes in the form of a timed final exam in which learners set up proctoring software on their computers which monitors both the computer screen and the learners through their webcam. This category was observed on the Miríadax, edX, FutureLearn and FUN platforms. There are different ways of proctoring an exam. 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. Proctoring exams adds another layer of verification to online assessments. It mostly guarantees the authenticity of assessment. While it does not guarantee that the learner was the true author of some of the work, it could be argued that this is also the case with other exams.

a. Random Proctoring

Random proctoring means that software is used to take random pictures across the examination period. After that, this collection of photos is sent to the instructor to determine whether the learner has passed the exam. This example was found on the Miríadax platform, especially in the "Expert in PPP Contract Management" final exam. On the day of the exam, learners must give permission for the camera to be on the entire time so it can take pictures and register their activity while taking the test. After concluding the exam, the biometric system checks whether the photo previously submitted matches the person taking the test and whether any other non-permitted activity was registered (the student opened a new window, talked on the phone, left the room or read a book or text, for example). That means that the students may complete the

exam successfully but if the biometric result is faulty, they may still fail. The software that Miríadax uses is called "Smowltech[9]".

While this example is scalable and provides another layer for verification, it is not foolproof. Miríadax is currently looking at the implementation of another tool.

b. Full Proctoring

i. Live

Unlike random proctoring, full and live proctoring means that someone proctors the exam directly via software while the learner is taking the exam. This example is from the FUN platform. FUN wanted to replicate the exam experience that students have in traditional university courses. Using this method, an online reviewer monitors the screen as the assessment takes place. At the beginning of the exam, the students show their surrounding environment to verify that their desk does not contain any materials that would help them to answer the exam questions. Then the learners proceed with the exam and the software streams the exam via the webcam and the computer audio.

While this method is reliable as it replicates the traditional models, it has its limitations. First, there is the logistical limitation of 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. This affects the potential of this method to scale. FUN platform reported that one limitation of the live proctoring method is that learners may feel uncomfortable about being watched and this may affect their performance. Therefore, the FUN platform discontinued this method and adapted a recording method.

ii. Recorded

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 very common across most MOOC platforms. Using this method learners can take a timed exam at any point that they like. The proctoring software will record the exam session through the webcam and computer audio. Then, a reviewer monitors the session and sends a report to the university running the MOOC, reporting whether the learner completed the exam without any suspicious activity or whether the instructor needs to take a further look at some timed marks within the exam. This method is used by edX, FUN, and FutureLearn and it is preferable to its counterparts because it provides flexibility for both the learner and the software provide. Therefore, recorded proctored exams offer a more scalable alternative for proctoring exams than live proctored exams. In addition, this method is as reliable as live online proctoring.

4. Interviews

Conducting an interview with the learner is another layer of verification. Using this method, the provider can validate the authenticity and authorship of learners' work by asking them questions. This interview can be onsite or online, and may take the form of a recorded presentation at which the learner is asked to record a video to demonstrate knowledge in relation to certain learning outcomes. This category adds another layer of verification, with a focus on authenticity. In addition, this method of verification takes place at the point of the assessment as interviews are a form of assessment. However, running individual interviews for each learner increases both cost and time.

[9] https://smowl.net/en/

a. On-site oral interview

Onsite, or offline, oral interviews are one method of verification for MOOC-based microcredentials. Through this method, learners finish the course, then they have an interview at the university premises at which their identity and learning is validated. This method is employed at EduOpen, which operates on the national Italian system. After learners finish all the courses and the assessment, they meet at one of the university partners and they perform an identity verification process. Sometimes this verification is accompanied by onsite assessment which makes this method more reliable in terms of authenticity and authorship. However, this method is only successfully employed at EduOpen as the number of enrolled learners is not massive. The minimum number of enrolments was 114, which was in "Content and Language Integrated Learning". The maximum number of enrolled learners was 903 enrolments, which was in "B2- English Language Level Training". This method would be difficult to scale due to the geographical, cost, and time limitations.

b. Online interview

Online interviews involve learners taking a short interview with an educator in order to validate the identity and students' work. Usually, these interviews last five to ten minutes. This example was present in Udacity's Nanodegrees and three Micromasters on edX.

On Udacity, learners are required to verify their identity after passing an exam, and are often prompted to schedule an exit interview. According to one learner[10] on the Android Nanodegree, the exit interview is quick and takes less than five minutes. During this interview, the learner was asked about the exam project. In Udacity's case the interviewers do not turn on their webcam.

Three edX Micromasters employed interviews as a method of identity verification. These were: two Micromasters by the University of Queensland, "Sustainable Energy Queensland University", and one Micromaster from University System of Maryland "Instructional Design and Technology". For the Instructional Design and Technology Micromasters, learners were asked to complete a capstone project which included working on designing and developing an online course, then scheduling a 10-minute interview via Zoom in which learners were asked about the decisions they made during the project and also discussed the course content.

c. Recorded presentation

In this method, learners record a presentation about a capstone project in order to verify authenticity and authorship of 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. Moreover, it can be considered as a better practice than live interviews as it gives learners more space for trial and error and creativity. Hence, it is a better medium for learning, and it can provide a more trustworthy layer of verification. In addition, it adds flexibility for the learner and the assessor, removing time limitations. However, an advantage of live interviews over recorded presentations is that interviewers can guide learners to specific questions that can directly verify the authenticity and authorship of the work.

The recorded presentation method was observed in the "Corporate Innovation" Micromasters developed by the University of Queensland on edX. During this course, learners were asked to take one test, work on one oral presentation around a photo essay, and provide a written essay

[10] https://android.jlelse.eu/heres-my-experience-of-taking-the-associate-android-developer-fast-track-scholarship-program-8e5bae51cb18

based on the business model canvas. A potential flaw for recorded presentations is that they could be easily gamed. Someone can prepare a presentation and another person can just repeat their notes. Hence, it is not always the best indication of student authorship.

5. Potential Good Practice (TESLA System)

Project TESLA, or Trust-based Authentication and Authorship E-assessment Analysis, is a project funded by the European Commission. It follows the interoperability standards for integration of different learning environments. While TESLA was not implemented in any MOOC so far, yet it is added here as a potential good practice that can offer a scalable solution to enhance reliability and authorship in e-assessments in MOOCs. Using this system, authenticity and authorship of the learner's work can be verified across different e-assessment scenarios such as written assignments, online discussions, quizzes and exams, and presentations[11]. This can be done through different software capabilities which are[12]:

1. face recognition: analysing visual data such as images and videos and recognising a face within the giving data.
2. voice recognition: analysing and verifying the learner's identity by comparing the characteristics of the voice within the data.
3. plagiarism, and authorship validation: detecting word-for-word copies in each set of documents.
4. Key-stroke patterns: recognising patterns based on the times of press and release on keys when typing on a keyboard.

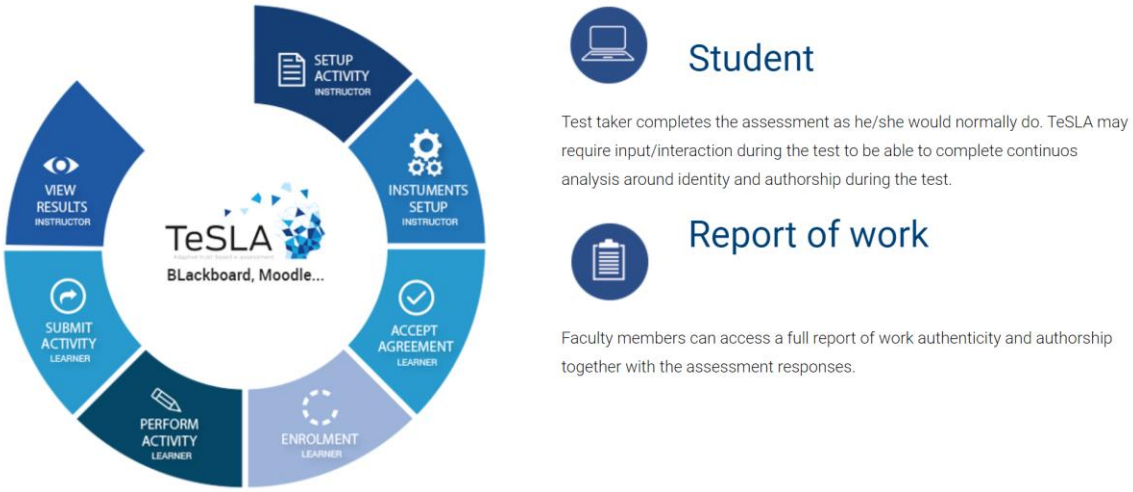

Figure 3 Image taken from TESLA website on How it Works[13]

In an assessment scenario, this is how the TESLA system works:

1. The instructor sets an activity such as a written assignment;

[11] http://tesla-project.eu/wp-content/uploads/2017/06/D2.1_Report_final_29_Feb_2016.pdf

[12] http://tesla-project.eu/wp-content/uploads/2017/06/D5.7_final.pdf

[13] https://tesla-project.eu/how-it-works/

2. The instructor chooses the verification instrument to be deployed from the TESLA system;
3. The learner accepts the agreement;
4. The learner provides input to the TESLA system for the software to build a model of the learner which will be used for verification at the point of the assessment;
5. The learner performs the assignment activity;
6. The learner submits the activity via the system;
7. A report of work is submitted to the instructor who can view the result and verify the authenticity and authorship of work with the assessment responses.

Using the TESLA project 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 other than human-based methods of verification. However, the main concern about this system relates to the privacy of learner data. This has been addressed under work packages in the TESLA project[14].

The TESLA system has not yet been implemented in any MOOC platform. The project is currently running pilots with three universities. However, it is considered a potentially better practice than those currently available and it offers the potential of a better practice for identity verification in MOOCs and microcredentials that are currently being implemented in online learning settings.

[14] https://tesla-project.eu/work-package/wp3/

Methods of Recognition

Recognition in this context refers to the award or the degree that students receive after successful completion of a study programme. According to the specifications of the Common Microcredential Framework, programmes that adhere to the framework should award a transcript that sets out the course content, learning outcomes, total study hours, EQF level and number of credit points (ECTS) earned. In addition, it states that total study time should be between 100 and 150 study hours and the award should be 4-6 ECTS or equivalent. The paper that sets the CMF[15] out in full emphasises that the framework is very relevant to employers and people at work and is intended to stimulate further development in continuing professional development. This report highlights the differences in practice between European and US providers. Table 2 gives a summary of the methods explored in this section.

Table 2 Summary of recognition methods

Main Category	Sub-category	Brief Description
Academic Credit	Non-transferable	The academic credit gained can only be applied to the programme offered by the same university provider and it cannot be transferred to another university directly.
	Transferable	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.
Professional Credit	Formal	Awarding professional credit hours or credits from formal professional accreditation bodies. This practice is found more in FutureLearn.
	Informal	informal awards such as certificates from the MOOC platforms and badges from the content provider
	Endorsement	The professional certificate is backed by a business leader to enhance its credibility and offer more work relevance.
Combined	Combined	Offering academic and professional credits in the same programme. Not as common as other practices but offers more opportunities for learners.

In the context of MOOCs, platforms have been offering MOOCs which are recognised under three main categories: 1) academic, 2) professional, and 3) general. This structure of offering has been consistent with many MOOC platforms. For example, FutureLearn calls their offerings academic programs, professional programs, or programs; edX calls their offerings Micromasters, professional certificates, and x-series; and Coursera calls their offerings MasterTrack, professional certificates, and specializations.

[15] https://emc.eadtu.eu/images/EMC_Common_Microcredential_Framework.pdf

Therefore, this section observes that microcredentials based on MOOC platforms are either academically or professionally recognised and also notes the difference between the European and US methods of recognition, especially in terms of professional recognition.

QA Processes and Awarding Credit

It is crucial that providers – MOOC platforms, universities, corporates, and training institutions – demonstrate to accrediting bodies that they are following appropriate quality assurance processes. In addition to the internal QA processes of each provider, they need to adhere to the quality standards set by the accrediting bodies. Addressing the different QA standards directly impacts practices in ID verification and forms of assessment when awarding academic or professional credits.

For example, UK universities must adhere to the national qualification standards set by the QAA. The QAA quality code[16] establishes a set of standards required from providers that intend to award credits. These serve as a reference to conduct effective quality assurance. The code has three main parts: expectations, core practices, and common practices. It is also supported by advice and guidance. Expectations are the objectives that providers should reach after setting the standards and managing the quality of their awards. Core practices are effective ways of working that underpin the delivery of the Expectations and result in positive outcomes for students. Common practices focus on enhancement. While expectations and core practices are mandatory for all the UK, common practices are mandatory for providers in Scotland, Wales, and Northern Ireland only. Similarly, Scottish providers need to adhere to the SCQF[17] quality standards in order to award academic and professional qualifications.

Microcredentials in New Zealand follow the NZQA quality standards. NZQA integrates front-end QA with ongoing self-assessment. Tertiary education organisations (TEOs) are responsible for self-assessment to assure the quality of the microcredentials. In addition, they are required to review and monitor the quality of other microcredentials when asked to by NZQA. The NZQA adapts the Te Hono o Te Kahurangi[18] QA approach which is used for other training schemes. This approach adapts six policies that acts as a reference point for educators (as individuals and organisations) to help undertake evaluative conversations for training and microcredentials.

1. Academic Recognition

Academic recognition is given when a learner is awarded academic credit after successful completion of a micro-credential. On MOOC platforms, different providers award different credits according to the length and depth of each programme. The CMF specifies the award of 4-6 ECTS per microcredential, although some current offerings on MOOC platforms offer more than that. For example, EduOpen offers 11, 16, and 20 ECTS credits in three different programs. FutureLearn academic programs can award between 10 and 20 credits, although microcredentials on the platform are aligned with the CMF.

[16] https://www.qaa.ac.uk/quality-code

[17] https://scqf.org.uk/interactive-framework/

[18] https://www.nzqa.govt.nz/maori-and-pasifika/te-hono-o-te-kahurangi/

a. Non-transferable Academic Credit

Academic credit gained in this category can only be applied to a programme offered by the same university provider. It cannot be transferred to another university without appropriate work on credit transfer. This practice is applied across all FutureLearn's academic programs and Coursera's MasterTrack certificates. It is also observed in many examples on edX.

In FutureLearn, there are several programs that offer academic credit. For example, The Open University offers two academic programs in the field of Business Management. The first program is "Business and Finance Fundamentals", which is accredited using the Online Course Certification System (EOCCS). It offers 30 UK credits (equivalent to 300 study hours) that count towards the Business Management BA degree provided by The Open University. The second program is "The Digital Economy", which is not accredited by EOCCS. This program offers 15 UK credits (equivalent to 150 study hours) that count towards an MBA programme provided by The Open University.

Coursera follows the same approach, offering non-transferable academic credit towards postgraduate programs offered by the university provider. For example, completing the "Machine Learning for Analytics" MasterTrack from the University of Chicago enables learners to fulfil 18% of the requirements of the Analytics MS provided by the same university. Similarly, completing the "Supply Chain Excellence" MasterTrack from Rutgers University enables students to earn three credits on the Supply Chain program at the same university. A MasterTrack offered by the University of Michigan on Coursera does not publicly specify what a student would get on successful completion of "Construction Engineering and Management".

This approach was also seen on several edX Micromasters programs. For example, successful completion of the "Business Fundamentals" Micromasters program from the University of British Columbia would credit the learners with six of the 31.5 credits for the Master of Management degree provided by the same university.

Overall, awarding non-transferable academic credit for the students may not offer flexibility for students as they will be limited to the same university provider after they finish the programme.

b. Transferable Academic Credit

The other method of academic recognition is the offer of transferrable academic credit. This is more flexible and offer more convenience for students. This method was seen on the edX and EduOpen platforms.

Within edX, one example that highlights this practice is the "Supply Chain" Micromasters program from MIT. In addition to earning transferrable credits from MIT, completing this program can help students apply to 18 different universities across the globe and transfer the academic credits obtained from finishing the Micromasters program. A list of the different pathways can be checked from this link[19]. In another example, completing the "Managing Technology and Innovation" from RWTH Aachen University enable the student to obtain 15 ECTS for the MME-TIME MA program. Awarding ECTS enables students to transfer credits across Europe.

The EduOpen platform offers Unità di Credito Formativo (CFU), the Italian equivalent of European ECTS credits, on all its academic pathways. For example, the "CLIL – Content and Language Integrated Learning" pathway offers students 16 CFUs that can count towards a master's degree from Universita Di Foggia in particular or other universities that accepts the transfer of ECTS credits.

[19] https://micromasters.mit.edu/scm/pathways-masters

Pproviding transferable credits for learners is flexible as it gives them the freedom of choice if they want to continue their degree at another university or in another geographical region. However, awarding transferrable credits involves a large amount of administration work which translates into higher costs for the university provider, the learners, and the MOOC platform.

2. Professional Recognition

The second category of recognition is the award of professional credit. This category is less obvious than academic credit as there are different practices across different regions. It is important here to notice the difference between the practice on the European-based platforms and the practice on the US-based platforms. When it comes to MOOC-based microcredentials and offering professional credit, European MOOC platforms, especially FutureLearn, tend to offer formal recognition in the form of CPD hours or formally accredited programs. US platforms edX, Coursera, and Udacity tend to offer more informal awards such as certificates and badges from the same platform. Moreover, US platforms have their programs endorsed by leading businesses more often than their European counterparts. This compensates for the lack of formal accreditation awarded by professional societies and accreditation bodies.

a. Formal recognition and accreditation:

In this category, learners receive professional credit hours or formal accreditation awards. This practice is occasionally observed on different platforms such as Coursera and edX and is most common on the FutureLearn platform.

For example, the University of California Irvine (UCI) offers a professional certificate for project management on Coursera. On successful completion of the program, the learner receives 120 contact hours to meet The Project Management Institute's educational hours requirement. Similarly, the TESOL professional certificate provided by Arizona State University offers a 150-hour TESOL certificate upon successful completion. The University System of Maryland professional course on "Spiritual Competency Training in Mental Health" awards six Continuing Education (CE) credits for successful completion on edX. However, this practice of awarding formal credits is not widely adapted across the platform.

Table 3 Professional Programs at FutureLearn and their Awards[20]

Program Title	Provider	Award
Edward Jenner Leadership for Veterinary Professionals	NHS Leadership Academy & Royal College of Veterinary Surgeons	Professional credit NHS Leadership Academy Award
Management and Leadership, Essentials	The Open University	CMI Level 5 Award
Management and Leadership, Personal Development	The Open University	CMI Level 5 Award
Managing People: Understanding Individual Differences	University of Reading	certificate + teacher feedback

[20] https://www.futurelearn.com/programs

Mergers and Acquisitions: Accounting Principles	New York Institute of Finance (NYIF)	professional certificate from NYIF

On the other hand, FutureLearn offers formal professional accreditation across all its professional programs (see table 3). Almost all these programs offer accreditation according to a formal body. The only program that did not offer recognition from a formal body was from a US institution, the New York Institute of Finance (NYIF). Moreover, one program on Blended Learning Essentials from University of Leeds and UCL Institute of Education is certificated by the CPD certification service but is not branded as a professional program. Awarding formal accreditation for professional learning is a common practice on FutureLearn.

b. Informal recognition:

In this category, learners are offered informal awards such as certificates from the MOOC platforms and badges from the content provider. This practice is more common in the professional development offerings for US-based platforms Coursera, edX, and Udacity. In addition, this practice was also observed on the Miríadax platform through its professional certificate.

On Coursera, professional certificates are usually programs offered by business leaders rather than academic institutions. The majority of Coursera's professional certificates were provided by IBM, Google Cloud, and SAS. The common practice for these programs is to only offer a certificate after successful completion of the program. IBM professional certificates offer an IBM Digital badge after completing a certain learning course. For example, after completing the "IBM z/OS Mainframe Practitioner Learning Path", learners are awarded a digital badge, an informal method of validating and recognising learning in a course of study, for each course[21].

Similarly, edX offers informal recognition at the end of its professional certificate program. This was the case across all the observed samples of edX's professional certificate.

On Udacity, the learners receive a certificate of achievement after completing a nanodegree program. This practice is observed across all Udacity's offerings.

Miríadax's branding of its professional programs, "Expert in PPP Contract Management" provided by the Development bank of Latin America, follows the same approach. Upon successful completion of the program, learners receive a certificate. The certification of Expert in Contract Management of Public-Private Associations is issued by the Development Bank of Latin America, a recognised institution in its field and one of the most important in the region.

Offering informal recognitions awards is very common practice across microcredentials that are offered on MOOC platforms, yet it is not as credible as offering formal accredited awards for either learners or employers.

c. Endorsement:

While informal awards are not as credible as formal awards, they can be complemented by endorsements from leading businesses. These endorsements give the awards more weight and

21 https://www.ibm.com/developerworks/community/groups/service/html/communitystart?communityUuid=5a4231b9-5f5e-42f6-bba8-7625a212f7a3

enhance their reputation, making them more acceptable in the workplace. There are several examples of endorsements on the edX and Coursera platforms.

On edX, many of the professional certificates are either endorsed by a senior professional from a business leader, or the programs themselves are offered by a business leader. For example, the professional certificate in Corporate Finance provided by Columbia University is endorsed by Nitin Julka, a senior product manager for LinkedIn. Similarly, a professional certificate in the Science of Happiness is endorsed by Mike Pepperman, a Manager of Corporate Social Responsibility and Community Relations at LG. The professional certificate in Python Data Science is offered by IBM, and is endorsed by Leon Katsnleson, CTO and Director Emerging Technologies at IBM.

Coursera endorses its professional certificates by offering its professional programs from leading businesses. Most of Coursera's professional certificates are offered by leading businesses such as SAS, IBM, Google Cloud, and (ISC)². One notable example is the Google IT professional certificate by Google Cloud which is recognised by a hiring consortium that includes: Bank of America, Best Buy, Cognizant, GE Digital, H&R Block, Hulu, Infosys, Intel, Sprint, The Home Depot, Walmart, Google and more.

Obtaining an endorsement from a leading business can enhance the credibility of informal professional credits which may have little credibility on their own. It is therefore a better and more useful practice with more value for learners than professional informal awards alone.

3. Combined

In this category are programs that are mainly academic or professional in nature but that offer additional credit from the other category. Three examples are highlighted from FutureLearn and one example from Coursera.

In FutureLearn, the two academic programs "Causes of Human Disease - Environmental Challenges" provided by University of Leeds offer 14 CPD credits in addition to the academic credit awarded upon successful completion of the program. Completion of "Genomics in Healthcare" provided by St. George University offers 35 CPD credits from RCPath and 10 RCGP learning hours along with the academic credit awarded upon successful completion of the program.

On Coursera, the Google IT professional certificate by Google Cloud mentioned above can earn learners academic credit along with the professional certificate. This is because they earn a credit recommendation from the American Council on Education (ACE) ACE CREDIT®, which transforms professional learning to college credit. On completion of the certificate, learners can earn a recommendation of 12 college credits for completing the program, which is equivalent to four college courses at associate degree-level.

While this practice of offering mixed credits is not as common as other practices, it may be considered a better practice offering more value for learners as it is more relevant to employers and employees, an aspect that is emphasised in the CMF. Having mixed credits further supports the creation of new qualifications that help learners enter a new career or advance their careers, which is also encouraged by the CMF.

Summative Assessment

The CMF defines summative assessment as "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." The CMF specifications state that microcredentials should employ a rigorous summative assessment method which allows the award of academic credit. Hence, a good practice for this report will be assessments that occur at the end of a microcredential programme.

Table 2 Summary of summative assessments

Main Category	Sub-category	Examples	Advantages	Disadvantages
Single-type assessment	Computer-graded	Final proctored exams Multiple-choice quizzes based on case studies or projects. Weekly computer-graded assignments and final exams	Common in MOOCs as it is a scalable and efficient way of carrying out summative assessment that reduces the cost of marking per student. Offers opportunities for instant feedback depending on the tasks. MCQ tests allow automatic evaluation of group and individual performance	Might not be able to evaluate certain concepts and skills
	Peer-graded	Peer-reviewed project plan Peer-reviewed PowerPoint presentation	There can be significant pedagogical benefit in peer assessment. More valid with learners who are trusted to have some knowledge	Not highly approved by students Having peer-assessments in self-paced courses cant be a challenge as there may not be enough people to assess an assignment
	Teacher-graded	Written assignments tasks Portfolios	May offer more value to the learners through offering constructive and developmental feedback	Feedback is delayed. Not the most efficient or scalable form of assessment due to the associated time and costs
Multi-type assessment	Peer-graded assessment and teacher-graded assessment	Essay for self-assessment against marking criteria, then for peer-review, then for tutor marking	Associated time and cost per student can be reduced while enabling more chances for feedback	
	Peer-graded assessment and computer-graded assessment	MCQ quizzes and report on project for peer evaluation.	Using computer-graded assessments and artificial intelligence allows the methods to scale easily. Peer	Having peer-assessments in self-paced courses might be a challenge as

			assessments offer a greater chance of better feedback	there may not be enough people to assess a learner's assignment
	Computer-graded assessment and teacher-graded assessment	Written literature review + recorded video + final exam. Final proctored exam + online interview. Online test + oral presentation around a photo essay + written essay on the business model canvas + 3-minute live oral pitch followed by questions and answers with the faculty members.	Employing these methods allow for a robust summative assessment. Offer more chances for students to get feedback	Offering many types of summative assessment can cause confusion to students if they are planned poorly.

Diana Laurillard, currently professor of Learning with Digital Technologies at the Knowledge Lab, UCL Institute of Education, has been researching technology-enhanced learning since 1974. According to a paper[22] she published in 2015, technology contributes to the challenges of summative assessment. It supports teacher grading, peer grading, and computer grading. All three types of assessment have been observed in MOOC assessment practices. Table 4 provides an overview of what is explored in this section. There are two main categories of summative assessment. The first is single-type assessment – learners are only assessed in one way (using computer-, peer-, or teacher- graded assessments). The second category is the use of multi-type assessments. Learners go through different phases of assessment and each phase corresponds to a different assessment type.

1. Single-Type Assessments

a. Computer-graded assessment

This section reports on practices that depends entirely on computer-graded assessments as summative assessments. These assessments could be a final proctored 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 proctored exam. Using computer-graded assessments is very common in MOOCs. It is a scalable and efficient means of performing summative assessment as it reduces the costs of marking per student (Laurillard, 2015)[23]. Moreover, it can offer opportunities for instant feedback, depending on the tasks set. Multiple-choice tests allow teachers to quickly evaluate the performance for the group against the individual. However, computer-grading may not be

[22] https://discovery.ucl.ac.uk/id/eprint/1549749/

[23] https://discovery.ucl.ac.uk/id/eprint/1549749/

able to evaluate certain concepts and skills (Laurillard, 2015)[24]. Computer-graded assessment was observed more on programs that offer professional recognition.

Final proctored exams are heavily used on almost every platform. Proctoring as an identity verification practice is discussed above (see online proctoring under ID verification methods). One example of final proctored exams is the use of timed exams by NYIF across its seven programs on edX and FutureLearn. Each examination ranges between 20 to 70 multiple-choice questions and lasts one to two hours. Another example was noted by EduOpen on two of their programmess (Enabling and rehabilitating approach to sensory disabilities - Introduction to sensory disabilities), using MCQ tests as the form of assessments. This is a scalable method of assessment as the cost of marking ecreases. Moreover, the use of MCQ tests is common when granting professional credentials. Although MCQ tests can give students instant feedback, depending on final exams for summative assessments means that there is less opportunity to provide in-depth feedback for students.

A different practice in computer-graded assessment is the use of MCQ quizzes based on projects or case studies. This method is very common on Coursera's professional certificates that are of a technical nature such as the SAS programmer professional certificate and the Data Engineering with GCP professional certificate. Using computer-graded assessments and artificial intelligence (AI) to detect code bugs allows the program to scale easily, decreasing marking costs. Computer grading is commonly used for technical topics. Hence, it can be considered as an efficient form of assessment. However, reliance on MCQ automated grading reduces chances for feedback on different skills and concepts, and there is more potential for cheating with MCQs.

The other observed form of computer-graded assessment combined weekly assignments with a final proctored exam. Two notable uses of this combination were observed on edX. The first is from the Corporate Finance professional certificate from the University of Columbia where mini-case MCQ quizzes were used along with a final exam. The second is the Introduction to Python Program professional certificate from Georgia Tech University, which is amongst the top 100 courses run on MOOC platforms over the last ten years according to people who engage with Class Central[25]. This example combined problem sets and a final proctored exam. Combining these forms of computer-graded assessment increases opportunities for instant feedback. Moreover, the use of problem sets is very common in programming. However, relying on computer-based assessment for grading means there is less chance for feedback about certain skills and concepts.

b. Peer-graded assessment

Peer-graded assessment is a form of evaluation where students receive marks from their peers, and they mark their peers in return. MOOCs have contributed to the rise of peer assessment because of the needs to scale marking for massive numbers of students (Laurillard, 2015)[26]. When using peer assessment, good practice is for learners to be trained to grade assignments until the grade that they give matches the grade given by the tutor, tutors randomly revise the grading of peers to ensure quality, and several students grade each assignment once to give an average grade. Laurillard (2015) notes there is a significant pedagogical benefit in peer

[24] https://discovery.ucl.ac.uk/id/eprint/1549749/

[25] https://www.classcentral.com/report/top-moocs-2019-edition/

[26] https://discovery.ucl.ac.uk/id/eprint/1549749/

assessment, however, it is not highly approved by students according to an evaluation report[27]. Moreover, peer assessment is more valid with learners who are trusted to have some knowledge.

An example of using peer-graded assessment as the only form of assessment is the Project Management Specialization developed by University of California, Irvine on Coursera. Learners were asked to submit a project plan as the capstone project of the program. Then, these project plans were assessed by 5 peers and the learners received an average grade of the five grades that they received.

Another example of peer-graded assessment is the Strategic Management professional certificate offered by Wharton Business School on edX. Learners were asked to create a PowerPoint presentation that the learner would use to convince the organisation's leaders to adopt the strategy recommended by the learner. Then, learners were asked to review their peers.

Overall, using peer-graded assessments gives students an opportunity to produce authentic and meaningful work and a chance for feedback at a large scale. In addition, it requires learners to critically evaluate other learners' work, reinforcing and reflecting their own learning in the process. However, it is not highly approved and trusted as a reliable assessment method. It could be considered a better practice if peer-graded assessments were combined with other types of assessment to provide a more reliable measure of student performance.

c. Teacher-graded assessment

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. There are several examples of teacher-graded assessments on FutureLearn. These include three examples from The Open University and the University of Reading. This section also highlights an example from the TESOL professional certificate at Coursera. And notes Udacity's nanodegrees as an example of using project-based summative assessments as teacher-graded assessments.

The first two examples are the "Management and Leadership Essentials – Management and Leadership, Personal Development" from The Open University. Through the summative assessment, learners submit a 3,000 to 3,500-word assignment that consists of six writing tasks over 12 weeks. After submission, the assignments are graded either pass or fail by the CMI tutors (CMI is the accreditation body for the course), within 8-10 weeks of submission. Tutors also provide constructive and developmental feedback for students. The third example is the "Managing People" program from the University of Reading. For the summative assessment, learners submit an assignment of at least 1,500 words on changes needed in their workplace. They then receive feedback from Henley Business School at the University of Reading.

Another example is the TESOL professional certificate offered by Arizona State University (ASU) on Coursera. Through two capstone projects, learners build a portfolio of artefacts. This portfolio is submitted for expert review by ASU in order to be awarded the 150-hour TESOL certificate.

A final example of teacher-graded assessment is Udacity's summative assessment. Udacity's nanodegrees have project-based summative assessments which involve the creation of a portfolio that showcases the technical skills the learner has gained. Experts assess and give personalised feedback for each learner on their submitted projects.

[27] https://iite.unesco.org/files/news/639194/Anatomy_of_a_MOOC.pdf

While using only teacher-graded assessment in MOOCs can offer more value to the learners through offering constructive and developmental feedback, this feedback is not as instant as other forms. Moreover, this is not the most efficient or scalable form of assessment due to the associated time and costs.

2. Multi-Type Assessment

This section identifies and highlights combinations of assessment types.

a. Peer-graded assessment and teacher-graded assessment

This practice combines peer-graded and teacher-graded assessment to deliver best value for learners. The example that is highlighted here was developed by the University of Leeds for three of its academic programs hosted on FutureLearn: "Causes of Human Disease – Discovering Science – Environmental Challenges". Through a three-week summative assessment, learners submit a 1,200-word essay and a 300-word reflective log. In week 1, learners self-assess their essay against an example answer using marking criteria. In week 2, learners refine the essay and go through a peer-review process with the same grading criteria. In week 3, learners refine their essay and submit it for final tutor grading. Learners pass the course if they pass the assessment with 40% or more. This example uses self-assessment and peer-assessment as instruments to familiarise students with the grading criteria and help students get feedback on their work before the final submission. It also gives learners opportunities to improve their written essays and refine the final submissions which makes marking easier for tutors. Using this method, there are multiple opportunities for feedback, and the time and cost per student are lower than they would be if all the assessment were done by a staff member.

b. Peer-graded assessment and computer-graded assessment

In this case, the course team combines peer-graded and computer-graded assessments. This practice was adopted by IBM on its professional certificate offerings on Coursera and edX "IBM Applied AI – IBM Data Science – Python Data Science". During the final capstone projects, learners worked through MCQ quizzes in addition to submitting a report on their project for peer evaluation.

This combination is mainly employed on programs that award informal professional credit.

c. Computer-graded assessment and teacher-graded assessment

This practice is applied in different ways across different examples in order to achieve different results. One example is the "Introduction to Psychology" academic program offered by Monash University on FutureLearn. For this summative assessment, learners record a 5-7-minute video to be graded by a teacher, submit a 1,000-word written literature review that is teacher graded, and finally go through a final online exam that covers the concepts of the program.

Another two examples are delivered by Queensland University on edX. In the summative assessment of the first course, "Sustainable Energy", learners sit two online proctored exams that last for three hours each. Then, learners attend an online Zoom meeting. The second example is from the "Corporate Innovation" program. For their summative assessment, learners take a computer-graded online test, prepare an oral presentation around a photo essay, prepare a written essay based on the business model canvas, and present a 3-minute live oral pitch followed by questions and answers with faculty members.

This combination of assessments is employed more commonly in programs that award academic credit.

Conclusion

The aim of this report has been to summarise good practices in proof of identification systems, approaches to recognition, and summative assessment in MOOCs and on MOOC platforms. The specifications set by the CMF, along with the input of the EMC partners, guided the process of identifying and evaluating the practices in each of these categories. After reviewing the major MOOC platforms from Europe and the US, either through researching secondary data or online interviews, the different practices were categorised.

Good practice in identity verification was identified and evaluated according to its reliability in verifying the authenticity and authorship of student work. In addition, each category was viewed as adding a separate layer of verification at the point of assessment. The categories for ID verification are the basic default platform ID verification systems, university registration, proctoring exams, and interviews. In addition, the TESLA project is seen as a potential good practice.

Regarding methods of recognition, microcredentials offered on MOOC platforms award academic credit, professional credit, statements of participation, and badges. Academic credit is often non-transferable but, in some cases, can be transferred across different programs and universities. Professional credits can be formal ones backed by professional bodies, or informal ones backed by the MOOC provider and platform reputation or by endorsement from a business leader. Combined recognition takes place when academic programs are complemented by formal professional credits or professional programmes are created in line with a framework that transforms professional programmes into academic credits to support further academic study.

As for summative assessment, the use of technology allows for computer-graded, peer-graded, and teacher-graded assessments. Within MOOCs, summative assessments can employ either one or multiple assessment types. Combining multiple assessment types can help reduce the time and cost of marking per student and provide more chances for students to obtain helpful and meaningful feedback.

Appendix (1) Further Readings

The following are associated European projects that have a focus beneficial for EMC-LM

Publication Name	Summary
TESLA	The TESLA project developed a trust-based e-assessment authentication system. Link: https://tesla-project.eu/
MoonLite	The MoonLite project considers using MOOCs for refugees and migrants to improve their language and entrepreneurial skills. while also developing guidelines for European HEIs on how to maximise the potential of MOOCs. Link: https://moonliteproject.eu/
BizMOOC	BizMOOC was a European Knowledge Alliance that explored the potential of MOOCs for the world of business. Link: https://bizmooc.eu/
E-SLP	European Short Learning Programmes (E-SLPs) is led by EADTU. SLPs are a group of courses with a common subject that can also be integrated as part of a larger degree. This project creates institutional policies, strategies and frameworks for the development and delivery of SLPs in Europe. Link: https://e-slp.eadtu.eu/
OpenupEd	OpenupEd is a non-profit partnership, lead by EADTU, that focuses on the 'Open' aspect of MOOCs and delivers high quality courses with the aim of increasing access and successful participation in education. Link: https://www.openuped.eu/
ECCOE	The main aim of ECCOE is 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. https://eccoe.eu