CHAPTER 7

Assessing microcredentials

Assessment is both a defining characteristic of microcredentials and one of the greatest challenges to their success. These are not simply short courses, they are short courses that lead to a credential warranting the holder has certain skills, capacities or knowledge – typically those which employers are looking for. To be able to state authoritatively that this is the case, microcredential providers must assess learners against defined criteria. Doing this in a way that will be accepted as authoritative requires expensive infrastructure. It also raises the problem of identity. How do you know who is completing the assessment if your course runs online and you have never met your learners? An additional

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challenge is the expectation, which is often included in definitions of these credentials, that learners will be able to 'stack' microcredentials from different providers. This implies some degree of alignment between those providers, which requires additional infrastructure as well as complex negotiations.

Assessment

Assessment is required for accreditation to be awarded in a way that is both meaningful and trustworthy. When massive open online courses (MOOCs) became a worldwide phenomenon (Pappano 2012) it seemed possible that short online courses could be offered without a complex accreditation system because the value they offered to those who signed up lay in the opportunities for learning that they offered, rather than an opportunity to evidence that learning. Some MOOCs operated without any assessment; others used multiple-choice tests that could easily be gamed by individuals searching the internet for the answers or simply working through the same free course multiple times (Northcutt, Ho & Chuang 2016). Without reliable evidence that individuals had gained skills or knowledge from a course, providers instead offered certificates of participation or completion. These recognised that an individual had engaged in some way with the course but did not go any further. In other cases, the course itself was offered free of charge, but assessment and accreditation came at a price.

For some people, these approaches work well because they join a course to gain skills and knowledge rather than a piece of paper. However, those people typically have no need of a certificate because they already have one, or several. Although MOOCs initially appeared to be a way of opening up education for everyone, enrolments are heavily skewed towards those who already have

one or more degrees (Cannell & Macintyre 2014; Meaney 2021). Opportunities to develop knowledge and skills are valuable but, for those who want to access new employment opportunities, the opportunity to gain accreditation may be even more important. This need for accreditation has been one of the factors that has pushed MOOC providers to shift to Nanodegrees (Shen 2014), MicroMasters (Young 2016), MasterTracks (Valli 2018) and microcredentials (Stancombe 2020).

Assessment is valuable to employers because it leads to accreditation, which offers a way of filtering job applicants quickly. It is valuable to job applicants for much the same reason. More broadly, though, what is its value to learners? Although credentialing focuses attention on the high-stakes assessment, often an exam, that takes place at the end of a course, there are actually three types of assessment, each with a different purpose: assessment for learning, assessment as learning, and assessment of learning.

Assessment for learning gives educators and learners information about what learners know. This means that educators can target future teaching and feedback to address any areas in which a particular learner needs further development, while learners can determine areas of study that need additional attention. This type of assessment may take place before or during a course and can make a significant contribution to learner achievement and attainment (Black & Wiliam 1998). Before a course, it may take the form of diagnostic assessment intended to identify learners' existing knowledge, skills, strengths, needs, interests and learning preferences. Such assessment will often collect information from multiple sources, including the learner and previous educators.

Assessment during a course of study can provide information that helps learners improve their knowledge and skills, for example by an educator adjusting their teaching methods, giving

the learner additional resources, or providing resources in a different format. In a microcredential that provides limited tutor support, assessment for learning can be used to automatically assign a learner to a certain route through the course or it may prompt learners to return to material they have not yet fully understood. Incorrect responses to multiple-choice questions can lead to hints about the correct approach to take, or signposts to relevant parts of the study materials.

Assessment as learning emphasises the role of learners, engaging them in self-assessment so they can participate actively in directing their own learning. This approach, which often uses reflection-based activities, can involve educator-supported activities such as:

- Self-reflection: learners reflect on their own understanding and progress and set specific, measurable and achievable goals for their learning.
- Self-monitoring: learners monitor their progress towards their goals and adjust their learning strategies as needed.
- Self-evaluation: learners evaluate their own understanding and progress, then provide feedback to the educator and/or their peers.
- Feedback-seeking: learners actively seek feedback from the teacher and/or their peers to improve their understanding and progress.

By taking an active role in their learning, learners can become more invested in the material they are studying and more motivated to act. At the same time, they develop skills that are valuable both in the workplace and in other learning situations.

In the case of microcredentials, some students may decide they do not need to complete the assessment. This may be

because they do not need the credential to evidence their learning; they are not working towards a more extensive qualification that requires them to gather evidence of previous learning; or they have joined the course for the knowledge and skills it offers, rather than for a certificate. It is therefore useful to emphasise within the course the roles of assessment as and for learning, making it clear that assessment and learning are not necessarily separate activities.

Assessment of learning, or summative assessment, is generally used to confirm what learners know and can do, whether they have achieved learning outcomes, and whether they can be assigned credit for the work they have completed. It can also be used to rank learners in order of ability.

Assessment of learning in a microcredential may involve a variety of activities, such as:

- **Tests and exams:** Written assessments that measure student understanding of the material. These may include multiple-choice, short answer and essay questions.
- **Final projects:** Hands-on or applied assessments that measure student understanding of the material and the ability to apply it in a real-world context.
- **Portfolios:** Collections of student work that demonstrate their understanding and progress over time.
- **Observation:** This method is only possible in some microcredentials and involves observing and evaluating students as they engage in tasks or activities that demonstrate their understanding of the material.

These three types of assessment – for learning, as learning and of learning – can be used in combination throughout a course of study and tailored to different learning outcomes.

Learning outcomes and competency frameworks

All three types of assessment can be aligned with learning outcomes. These specify what learners should be able to do once they have completed the course (see Chapter 5 for more on learning outcomes). In the case of a microcredential, they may form an element of the final badge or certificate, specifying what the learner is able to do. Given the huge range of credentials and microcredentials on offer around the world, learning outcomes provide a useful guide for any employer who is unsure what a certain course covers.

This means that assessment of learning should always be aligned with learning outcomes. If some learning outcomes go unassessed or some assessment tasks require skills that are irrelevant to the stated learning outcomes, this signals a lack of alignment between curriculum elements that may reduce learners' study performance. It is important that learners have an opportunity to demonstrate they possess the skills and knowledge associated with the course, particularly as these may be explicitly linked to the skills and competencies required for specific jobs.

Competencies are the behaviours and technical abilities needed for people to perform effectively at work. An individual's competency, their ability to perform effectively within a given context, 'can be measured by assessing key performance indicators that define and provide a map of the expected areas and levels of performance' (George 2022).

A 'competency framework' sets out and defines each competency required by individuals working in an organisation or as part of that organisation (George 2022). Examples include the European e-Competence Framework, which classifies 40 competences for professionals working in areas related to information

and communication technologies (ICT). The UNESCO Competency Framework includes 'a set of related knowledge, skills and abilities that result in essential behaviors expected from those working for the Organization' (UNESCO 2016). Published more recently, the European Sustainability Competence Framework (Bianchi, Pisiotis & Cabrera Giraldez 2022) comprises 12 main competences, organised in four areas: embodying sustainability values (such as supporting fairness), embracing complexity in sustainability (such as systems thinking), envisioning sustainable futures (such as adaptability) and acting for sustainability (such as political agency).

These frameworks can be used to inform the development of a curriculum that will enable learners to achieve the required outcomes (see Chapter 2 for more details about the pedagogy of competency-based learning). In the context of microcredentials, not only can these frameworks be used as a guide for course development but the competencies covered by them can also be used as metadata tags that will help learners to find relevant courses in online prospectuses when using search engines (Braxton 2023).

Assessment in a digital age

The majority of microcredentials are offered online, which may pose challenges when systems are set up for students who are taking exams on site or handing coursework to tutors who have worked with them face to face. However, since the Covid lockdowns, most institutions have gained some experience of technology-enabled assessment, while others have been working in this way for many years.

Technology-enabled assessment includes use of a computer (or, more broadly, a digital technology) as part of any

assessment-related activity. It is also referred to as e-assessment, computer-aided assessment, computer-assisted assessment, technology-based assessment or technology-enhanced assessment – these are all terms that can be used to search for practical support or research in the area.

This is not a new phenomenon. The presidential address to the American Educational Research Association (AERA) in 2007 drew on more than a decade of research in this area and included computer-assisted assessment authoring systems, computer scoring of written responses using optical character reading, speech recognition technologies to analyse learner discourse, and knowledge mapping, as well as assessment using computer games, virtual worlds, mobile phones and game platforms (Baker 2007).

Using technology in assessment has many benefits (Oldfield et al. 2012), including:

- assessment of skills that cannot be assessed in other ways;
- feedback that is perceived to be impersonal and non-judgemental;
- immediate feedback;
- improved cost-effectiveness;
- increased efficiency;
- more authentic assignments;
- new possibilities for the design of assignments;
- opportunities for repeated practice;
- students being able to check their understanding without having to wait for an educator;
- students being able to make mistakes in private.

On the negative side, though, technology-enabled assessment can:

- become constraining;

- prompt educators to teach to tests that can be automatically marked and assessed;
- mislead learners with badly phrased questions or a selection of wrong answers;
- waste teachers' time with a requirement to produce challenging questions, pitched at the right level, paired with a series of answers that are all equally plausible;
- make it easy for learners to game the system;
- enable learners to access previous answers;
- open up possibilities for plagiarised responses.

Technology-enabled assessment encompasses a wide range of tools and methods. In the context of microcredentials, these include the following.

- **Adaptive testing:** computer algorithms adjust the difficulty level of questions based on a student's responses, providing a personalised and efficient assessment experience.
- **Automated essay scoring:** uses natural language processing and machine learning algorithms to evaluate students' written responses.
- **Computer-based testing:** uses computer software to deliver and grade tests, quizzes and other assessments.
- **Electronic portfolios (e-portfolios):** digital representations of a learner's experiences and achievements. Creating and curating collections like these requires learners to develop organisation, planning, reflection and communication skills.
- **Multiple-choice questions (MCQs):** frequently used form of computer-based testing in which students must select their answer from several options.

- **Online exams:** although some countries and institutions require examinations to take place in person, since the Covid lockdowns online versions are increasingly common.
- **Online quizzes:** delivered and completed online, often using learning management systems, apps or specific educational software. These may include multiple-choice questions, questions that require one-word or one-sentence responses, or images to be labelled.
- **Peer assessment:** using a rubric, and usually with training and educator support, students are automatically assigned the work of others to provide feedback on. Learners become familiar with course content and requirements, with what to look for in good work, and with providing feedback. However, students do need to be aware of these learning opportunities, which should be well aligned with learning outcomes.
- **Simulation and gaming:** uses interactive simulations and games to evaluate student understanding of complex concepts and problem-solving skills.

Two of these approaches, MCQs and online exams, are frequently used in microcredentials. The following sections consider the possibilities they offer and the issues they present.

Multiple-choice questions

Multiple-choice questions (MCQs) have a simple format. The stem contains the question or sets up a problem. Distractors offer possible answers that are incorrect, while the key (or keys) gives the right answer. Students are asked to identify the correct answers while avoiding the distractors.

MCQs are well suited to an online learning environment. Once a computer has been programmed to identify the correct answers, these questions can be marked almost instantaneously. In some cases, MCQs are underpinned by a question bank,

> a collection of uniquely identified questions that allows the selection of questions to create tests based on various predefined criteria. Questions are tagged with descriptors such as: the difficulty of the question, topic, academic level, and the skill or knowledge component addressed. (Bull & Dalziel 2003: 173)

Question banks make it possible to set every student a different variant of the same test, making it difficult to copy the responses of others or to search online for a fully completed quiz. When quiz banks are used formatively, they can also be set to adapt to a student's ability level, with each question selected based on whether previous responses were correct.

A downside of question banks is that they require a large amount of initial input. In the case of some mathematical or statistical subjects, similar questions can be generated automatically once realistic parameters have been set. In other areas, generative AI can help with this task, but is likely to require a lot of sense-checking. It can also be difficult to assess the difficulty of questions, as questions that are phrased in a similar way may vary from easy to impossible to answer. Despite these challenges, many exam boards and educational publishers have created robust question banks that are accessible at a price.

A criticism that has been levelled at MCQs is that they encourage the view that learning simply consists of the acquisition of facts. This is more likely to be true when the questions posed resemble those in trivia quizzes rather than ones that require deeper understanding of the material. As learners spend much

of their time practising for assessment, there is a danger that they will tend to adopt a surface approach to learning, gathering facts rather than seeking a deeper understanding. Likewise, teachers will be inclined to teach material that can be assessed using MCQs, rather than encouraging a detailed consideration of the material.

Draper (2009) argues there is no reason that technology-enabled assessment should have a negative impact on learning, because learning benefits do not depend on the choice of technology (in this case, MCQs) but on the teaching method that is paired with the technology. He suggests several ways of using MCQs to support deep learning. These include:

- **Assertion-reason questions.** These begin with a statement and offer a range of explanations of why it is true or false. A correct answer requires an understanding of the different explanations and how they apply to the case.
- **Considering each answer in depth.** Students are asked to respond to the MCQ but also to note for each answer why it is right or wrong. These notes can form part of their study or may be submitted as another element of the assessment.
- **Brainteasers.** Questions are based on the course material but are designed to challenge learners. For example, physics students might be asked what would happen to someone in a lift that was plummeting after its cable had snapped. If the person jumped just before the lift crashed, is it more likely they would (a) be killed or badly injured (b) escape with minor injuries (c) survive unscathed? Posing a question like this to a class via a polling system can assess understanding of the principles and forces

involved and form the basis for subsequent discussion. This approach is most suitable when tutor support is available within the microcredential.

- **Creating questions.** As part of a tutor-marked assignment, students are asked to produce MCQ items that would be suitable for their peers to answer. To design good questions, they need a deep understanding of the subjects they are testing. The questions they produce can be graded based on their lack of ambiguity, alignment with course learning outcomes, appropriate level of difficulty (neither too easy nor too hard), justifications supplied for each item and whether the answers marked as correct are accurate. The best questions could be incorporated within subsequent runs of the course.
- **Including questions in a presentation.** Students working in small groups can be asked to present their work to the class, including a certain number of MCQ items that others in the class respond to using a polling tool or electronic voting system.

A sixth approach is confidence-based marking (Draper 2009). In this form of the MCQ, students not only select a preferred answer but also indicate how confident they are that their answer is correct. Marks are then assigned on the basis not only of whether the answer is correct but also of confidence that the answer is correct. Assigning marks in this way makes it less likely that students will simply guess. It also indicates areas where many students are having problems and which students have misunderstood material.

One method of doing this is to assign students a certain number of marks for each question. They can then allocate these marks as they wish. An example is an MCQ test in which each question

has four possible answers, and the students all have four marks to distribute for each question. The correct answer to Question 1 in this test is (b).

- Some students are confident that answer (b) is correct, so each of them allocates four marks to that answer. In this case they are right, so each of them receives four marks for Question 1.
- One student is unable to decide between answers (a) and (b), so assigns two marks to each of them, and receives two marks for answering (b).
- Another student has no idea, and distributes marks evenly, allocating one mark each to answers (a), (b), (c) and (d). They receive the one mark they allocated to answer (b), but they have also clearly indicated their uncertainty to the tutor.
- A final student is falsely confident of the correct answer. They assign all their marks to answer (c) and therefore receive no marks. By allocating marks in this way, they indicate that they have a misconception, which the teacher can then address.

A related approach allows students several attempts at a question. If they get the answer right first time, they receive full marks for that question. If wrong, they receive a helpful piece of feedback, perhaps one that points them to the relevant course material. If they are right the second time, they receive half marks. If their second answer is wrong, they receive no marks but an explanation of the correct answer is provided. This works well on a large scale but the educator must write explanations for every answer, which makes this approach labour-intensive at the small scale.

No matter how MCQs are used, it is important to avoid common mistakes when writing questions.

- **'All the above'.** If students recognise two correct answers, then they can move straight to this option without considering any others.
- **Clear pattern to correct answers.** Students will be looking for patterns in the arrangement of distractors. Test setters often avoid putting the correct answer early on, meaning (c) and (d) are more likely to be correct.
- **Final distractor is obviously wrong.** It can be difficult to come up with plausible distractors, with the result that the last one is clearly incorrect.
- **Grammatical clues.** If the verb in the question implies the correct answer will be plural, then distractors should also be plural. If use of 'an' implies the correct answer begins with a vowel, then distractors should also begin with vowels.
- **Including absolutes.** Students know that things are rarely true or false in all situations, so words like 'always', 'never' or 'none' indicate the presence of a distractor.
- **Negative wording.** Students may miss the negative word and give the wrong answer because they have misread the question rather than because they do not know the correct answer.
- **'None of the above'.** Does not give students an opportunity to demonstrate that they know the correct answer.
- **Off-topic distractors.** One of the distractors is clearly from outside the subject area, which means students can eliminate it as an option.

- **Off-topic questions.** One or more questions does not relate to the course. This can happen when the course is amended after the MCQs have been written.
- **Random success.** If each question has four options and one correct answer, a student who always gives the same answer in response – all (b)s, for example – is likely to score around 25%. Make this random success more unlikely by requiring students to identify two or more correct answers to some questions.
- **Response length.** If the correct answer is long and detailed, distractors should also be long and detailed.
- **Testing recall.** In an online course, a search of course materials will provide a quick answer to a question that tests recall. Instead, ask learners to interpret information, draw inference or predict results.
- **Testing the wrong thing.** Questions about where information appears in the course or how it is presented, rather than about knowledge that relates to learning outcomes.
- **Trick questions.** Questions that are designed to catch students out reveal little about their understanding of the subject and may leave them feeling cheated of the opportunity to gain full marks.
- **Two distractors are synonymous.** If one is true, the other will also be true, which means they can be assumed to be distractors if students know there is only one correct answer.
- **Using the correct terms more often.** If a term appears in multiple answers, students will assume that the answers without it are likely to be distractors.

- **Verbal association.** One or more words in the stem is picked up in one of the answers, suggesting that the two are closely related and that answer is likely to be correct.

Although MCQs are challenging to write well, they have an important role to play in assessment for and as learning as well as assessment of learning.

Because microcredentials are relatively short courses, with some running for 12 weeks and many even shorter, it is difficult to incorporate an online exam at any point except the end, so online exams in this context are almost invariably used as a summative assessment of learning.

Online exams

In a systematic review of 61 articles about students' views on online exams pre-pandemic, Topuz and Kinshuk (2021) found that online exams do not impact students in the same way as in-person exams. The most positive aspect of online exams was students' reduced anxiety about assessment, while the most negative aspect was students' concerns about the technical aspects of the exam.

The Quality Enhancement and Innovation team at The Open University surveyed more than 1,000 distance students about their perceptions of online exams (Aristeidou et al. 2023). Four in five participants preferred to have exams online rather than face-to-face. Students liked the convenience of not having to travel to an examination hall, which can be stressful and time-consuming, especially for students who have to travel for hours if they do not live near a study centre.

Students in the survey highlighted ways in which online exams can benefit students who are less advantaged, such as those with mobility or mental health issues. Benefits for all included students being in control of their environment and able to accommodate other commitments, such as arranging childcare or requiring less time off work. Some students looked at the bigger picture and commented that online exams can contribute to sustainability, as students do not need to use transport to get to the examination hall.

However, there are also downsides to online exams. Students will need a strong and consistent internet connection. In countries where internet connection and electricity supply are intermittent, maintaining a reliable connection throughout the exam period can be hard. Depending on how the exam is invigilated, students may need to have access to a device with a webcam and a microphone or will have to install the hardware and software necessary for scanning and quality control of any handwritten submissions. The design of the online exam interface can also impact students negatively, raising anxiety levels if they cannot backtrack to earlier questions or are given insufficient time to complete their answers (Novick et al. 2022).

Therefore, before designing online exams, it is important to think carefully about the technology that students can access. Microcredential students may be based in countries with different infrastructure and time zones; they may have disabilities that impact how they can engage with an online exam; they may have care commitments that make it difficult for them to spend uninterrupted time on an exam; and they may not have access to a dedicated study space. In addition, unlike most campus students, they may lack recent exam practice and opportunities to develop exam study skills.

Exam proctoring

In some cases, a high-stakes exam is an essential part of a microcredential, perhaps because it is a required component of professional recognition. This raises two significant issues. How can the institution be sure that a completed exam paper is the unaided work of the named student, and how can the institution be sure that students did not have access to the information resources and support that are available to them in everyday life?

In examination halls, these issues are addressed by the use of invigilators or 'proctors'. These are responsible for checking student IDs, collecting mobile phones and other study aids, preventing communication and enforcing timekeeping. Proctors are not infallible, but their actions make it highly probable that the exam scripts handed in are the unaided work of the named student.

In an online setting, some problems can be removed or reduced by good assessment design. Questions that test understanding can be completed by students who have access to their normal technology and resources. Questions that require some sort of personalised response, for example quotes from contributions a student has made in the past, make it more likely that the individual sitting the exam is the same individual who worked through the course.

If an online equivalent of the examination hall is necessary, online proctoring provides a way of making this a rigorous process. There are three main approaches. For full proctoring, an invigilator proctors the exam using webcam footage. At the start of the exam, each student displays their surrounding environment, showing it is clear of study materials. Proctoring may take place live or by reviewing recordings. Random proctoring uses software to take pictures of students at random times during the

examination; these pictures are analysed automatically to check that the same person is pictured each time, and reports are sent to an examiner. Automated proctoring requires little or no human intervention – an automated system encodes behaviours as normal or suspicious.

In a 2020 report that covers online assessment and verification practices, Sanzgiri and Habib (2020) outline an additional approach, TESLA, that is not yet in regular use but that combines tools already in use separately. This system includes:

- **face recognition:** as with random proctoring, still and video images are analysed and compared;
- **voice recognition:** recordings of the student's voice made during the exam are compared with each other and with previous recordings;
- **plagiarism checks:** the text submitted is automatically compared with published material and with work submitted in the past;
- **key-stroke patterns:** patterns of press and release times for different computer keys are compared with previous patterns.

Although students are used to major restrictions on their behaviour and a high degree of surveillance in an examination hall, moving these practices to their home environment highlights how intrusive and problematic these restrictions can be. Swauger (2020) provides a detailed overview of the main issues. These include but are not confined to:

- systems that flag loud noises as suspicious may be triggered if the student does not have a dedicated workspace where they can work in silence;

- systems that flag movement as suspicious may be triggered if a student is caring for children or pets, or if they are unable to sit still for long periods of time;
- systems that require identifying documents to be held stationary in front of a camera in order to identify an individual may be triggered if the student lacks fine motor skills;
- systems that have been trained on white students may fail to detect the faces of students with black or brown skin;
- systems that rely on video footage recorded in a student's home environment create an atmosphere of surveillance and suspicion.

The challenges of online exams are so great for both students and institutions that alternative forms of final assessment are preferable. These typically require individual students to submit an extended piece of work, or collection of work, which will then be assessed by educators. Asking students to relate their responses to their own setting, to course materials, and to forum discussion or activities during the course are techniques that help to establish that the person submitting the assessment is the same person who completed the course.

An advantage of technology-enabled assessment is that it opens up new possibilities for assessing authentic activity. Pieces of written work can be shared online, as can presentations, videos and images. Assessed work can be developed for an international audience as well as for an examiner. Projects can be developed in collaboration with people in other parts of the world, even if they are assessed separately. Nevertheless, the majority of assessed work is still disposable, written for no one but the assessor or examiner.

Wiley (2016) advocates for 'renewable assessments' that are designed to add value to the world, perhaps by developing or modifying something that others can use. Carefully designed renewable assessments embedded within microcredentials have the potential to benefit students because they are meaningful and can be used to demonstrate expertise beyond the course. They can meet some of the needs of employers by aligning the microcredential with the world of work. They can also support the verification process by establishing multiple links between a student and the work they submit for assessment.

Closely related to renewable assessments are ecological (or authentic) assessments. These typically measure a learner's ability to apply knowledge and skills in real-world, meaningful contexts. Unlike traditional assessment methods such as multiple-choice tests or written exams, ecological assessments aim to provide a complete picture of a learner's understanding and competence by requiring them to use their knowledge in practical, hands-on ways. Ecological assessments typically emphasise the process of learning, not just the result. They include projects, simulations, case studies, portfolios and recordings of performances.

An advantage of renewable and ecological/authentic assessments is that they reduce opportunities for cheating and, by making tasks more relevant and valuable for learners, reduce some of the motivations for cheating. Tasks that must be answered in different ways by different students, that relate to known details about the context of those students, and that involve structured reflection on course experiences do not generate responses that can be shared verbatim on the internet and submitted by multiple students with only minor adjustments.

Artificial intelligence (AI)

Since the public release of ChatGPT in late 2022, there has been concern that students will use generative AI (tools that use artificial intelligence to produce material such as text, images, computer code or videos) to complete assignments. As these tools have become more commonplace, universities and other educational institutions have drawn up guidelines for their use.

Banning the use of AI tools entirely is not a viable option for several reasons. AI is now embedded in tools that students are expected to use to complete assignments, such as Microsoft Office. AI tools can help students to produce good-quality work without having a significant impact on the content – for example, Grammarly reviews aspects of writing such as spelling, punctuation and clarity. In some cases, AI tools are offered by the university, in order to help students structure their essays or reflect on progress. Many universities use AI tools themselves, for example employing Copycatch and Turnitin to identify potential cases of plagiarism.

More broadly, educational institutions are preparing students for a world in which AI tools are widely available. In many jobs, they will be expected to use these tools – programmers already make extensive use of generative AI to help them with their work. Students need to be aware of the tools that they can use, and how they can use them both effectively and ethically.

With these ideas in mind, assessment design needs to take account of the fact that students are very likely to have access to generative AI tools while being assessed, unless they are placed under high levels of surveillance. These tools can be very helpful to students when producing essays and reports, completing online

coursework, or working on online quizzes, standardised tests or book exams (Williams 2023). Students can be taught to use these tools appropriately. On the other hand, it is relatively difficult to use generative AI unnoticed when creating a novel artefact, solving an original problem, sitting a proctored closed-book exam, or carrying out a task that involves working with others (Williams 2023). If students are expected to work without using generative AI tools, then assessment needs to be designed in such a way that these tools will not be helpful – and students should be aware of regulations about use of these tools.

When introducing or revising microcredentials, it is important to check that the institution's policy on generative AI is up to date and fit for purpose. Some of the checks that are possible when teaching face to face cannot be carried out with learners who are studying remotely, connected to the institution for only a few weeks, and required to submit only one or two pieces of work for assessment. Microcredential students have very little time available to read university regulations and policies, so expectations about the use of generative AI should be clearly set out within assessment requirements and reviewed, if possible, with every presentation of the course.

Group assessment

The majority of microcredential assessment will focus on the performance of individuals. Group work and assessment present challenges in any environment and online groups face a series of challenges when working together. The differing participation patterns of students, taking full advantage of the flexibility offered by asynchronous learning, means that any significant change in a group's direction can cause significant problems for those who

do not log in frequently (Ferguson 2009). Additionally, students who have never met in person and who are working together for the first time will be unaware which members of the group can be relied on, who will need support and who is likely to engage.

The problems of free-loaders and team members who do not pull their weight are common in the workplace, but they feel particularly acute for students when assessment is key to gaining a credential or qualification. In the workplace, there are management structures and working practices in place that can be used to support teams. In student group work, these are usually lacking and students may not have been taught strategies that they can use to overcome the problems associated with working together.

Unless a group develops and sticks to clear reporting guidelines, it is often not clear to members which of them are working hard and which are unlikely to meet deadlines. These uncertainties increase anxiety around assessment.

Despite these difficulties, there are times when group work is necessary and has a clear pedagogic value within microcredentials. Collaboration enables people to share ideas and perspectives, challenge and defend ideas, and develop a line of reasoning. Many jobs require applicants to be able to demonstrate that they possess competences such as teamwork, collaboration and leadership. Some microcredentials are run in a blended setting, some are incorporated within a wider qualification, and others include cohorts from the same workplace.

Cooperation provides opportunities to split a workload that would be unmanageable for an individual. Group work offers opportunities to develop skills that are important in the workplace, such as work planning, progress monitoring and dispute resolution. Yet when it comes to collaborative assessment, group members are often concerned that they will not be marked fairly

– they will either be marked down for the failings of others, or colleagues will take the credit for their hard work.

There are many ways of assessing group work. The list below sets out the main options. Students should be clear which method will be used to assess their work and why that method has been selected.

- **Shared group mark:** the group hands in one piece of work and all group members are awarded the same mark for it.
- **Group average mark:** parts of the task are submitted individually by different students and marked separately. Group members receive an average of these marks.
- **Group average mark – based on process:** each student's contribution is assessed using predefined criteria and evidence from observations and records. The mark awarded to group members is the average of these marks.
- **Individual mark – allocated task:** each student is given a task that makes up part of the final group product and is marked on that task.
- **Individual mark – individual report:** group members work together on the project. Students submit individual reports on that work and receive a mark for their report.
- **Individual mark – examination:** exam questions are based on the group projects, so questions can only be answered by those who have been fully involved.
- **Individual mark – based on process:** each student's contribution is assessed using predefined criteria and evidence from observations and records.
- **Individual mark – analysis of process:** students submit and are marked on a paper that assesses the group process, including their own contribution and that of peers.

- **Combination of group and individual:** a mark is assigned to the group but is adjusted for individual students, based on their contribution.
- **Student distribution of pool of marks:** the educator awards a set number of marks for the project and group members decide how to distribute those marks between themselves.
- **Students allocate individual weightings:** the educator gives a shared group mark that is adjusted according to a peer assessment factor.
- **Peer evaluation – random marker:** parts of the assessment are randomly distributed among group members, who must mark the work they have been assigned, based on a set of assessment criteria. The marks they assign are moderated by an educator.
- **Peer evaluation – average:** students evaluate the contribution of other group members using predetermined criteria. The final mark is an average of all marks awarded.
- **Self-evaluation – moderated:** students use predetermined criteria to evaluate their own contribution. The marks they decide on are moderated by an educator.

Concern about assessment can be a serious block to progress. It is therefore important to be clear about how it will be carried out in a way that gives everyone an equal chance of success. It is also essential that assessment relates closely to the learning outcomes of the microcredential. If these state that those who complete the course successfully will have team-working skills, it is reasonable to assess students on these. On the other hand, if collaboration has been selected simply as the best way of helping students to understand subject matter, then it is individual understanding of subject matter that should be assessed. Whichever is the case, if

the assessment is formative – involving assessment for learning or assessment as learning – then feedback is an important element of it.

Feedback

If a student submits an assignment partway through a course and the mark counts towards their final grade, then it is assessment of learning. If they receive detailed feedback on that assignment, indicating both where they could have improved and links to aspects of the course coming up, then it also operates as assessment for learning. Feedback is therefore an important part of making assessment valuable for the learner and has been shown to be one of the most important influences on learning gain (Hattie 1999).

Effective feedback helps students to understand how they are progressing towards their learning goals and what they need to do next. It not only clarifies how well they are doing but it also enables them to improve their performance and can provide confidence and motivation. Assessment is most useful for learners when the feedback they receive is relevant, constructive, accessible, consequential and timely.

The short timescales of microcredentials mean there are limited opportunities for students to receive feedback from educators. Composing, submitting and marking an assignment all take time, especially because educators are likely to have many other responsibilities and will not necessarily be able to mark an assignment as soon as it is submitted. In addition, some microcredentials have large student cohorts, making a fast turnaround very difficult. This means some feedback is likely to consist of automated responses. These can be set to go far beyond a correct/

incorrect binary, instead identifying common errors, providing encouragement, pointing to relevant sections of the course material, and providing further explanations.

As learning analytics (which use data to support learning and teaching) become more sophisticated, there are increasing opportunities for the provision of automated feedback. This has the advantage that it is timely – there is little or no delay between submission of work and receiving feedback. It is also non-judgemental – students are happier to show work in progress to a computer program than to a human. They also feel confident to submit and resubmit work without the worry that they are overloading or annoying a teacher.

The *On Task* open-source tool has been used across courses and universities to provide students with personalised messages and feedback (Pardo et al. 2022). The system can send personalised messages to groups of learners based on rules defined by the educator (for example, students who have not yet submitted an assignment, or students who have not yet clicked on the link for a certain set of material). These messages can contain blocks of text that are visible to certain subsets of learners, so each learner receives a personalised message based on their activity, which reinforces or builds upon previous feedback messages.

Despite its advantages, automated feedback is an approach that works best in subject areas where answers are clear and can be presented succinctly, in a standard way. Opportunities for automated feedback on longer, free-text answers are very limited. Nevertheless, it can work very effectively with multiple-choice questions, which is one of the reasons these are so frequently used for assessment within microcredentials.

Whitelock and her colleagues (Whitelock & Watt 2007) developed a system for assessing the pattern between feedback and

the assigned grade using Bales's (1950) 'interactional categories' system, which distinguishes between 'task-oriented' feedback intended to improve the content of future work, and the 'socio-emotive element' provided to maintain student motivation.

Bales's (1950) system has four main categories:

- positive reactions – socio-emotive category
- attempted answers – task-oriented category
- questions – task-oriented category
- negative reactions – socio-emotive category.

The system recognises that, in any setting, feedback on performance can energise, encourage and motivate students or leave them feeling demoralised.

The balance of comments should change as the mark awarded decreases. Students who receive the lowest marks need more direct teaching and so the number of teaching comments should increase. However, praise should be given where it is due to encourage and motivate students to complete their studies. Feedback in the 'questions' category can be used both to stimulate further reflection and to point out constructively where there are problems with a response.

Writing multiple-choice questions, selecting appropriate answers and distractors, and devising feedback for each potential response is a time-consuming process but it is well worth it. Learning cannot happen without feedback, so learners need a clear picture of the progress they are (or are not) making. When assessments and feedback do not inform instruction or when they are not given to the students in a timely manner, learning cannot change because students do not know what to do differently. They need feedback that is explicit, timely, informative and accessible. Especially important is feedback that allows them

to monitor their own progress effectively and to use that information to guide their own effort and practice.

However, even in cases where assessment is well designed and feedback appropriately targeted, students may struggle for reasons connected with wellbeing, mental health and accessibility. Issues that might be raised and addressed in a face-to-face environment, such as an obvious accessibility challenge, may be more difficult to identify online. Other issues, which might have become apparent over the course of a student's multi-year university career interacting with multiple educators and other staff members, may be neglected during the short span of a microcredential. For these reasons, it is important to build attention to wellbeing and accessibility into assessment from the start.

Test anxiety

Students often bring with them a negative experience of assessment. They recall it being 'done to them' at school and may associate it with being punished if they did not do well. Many people – up to one in five – experience extreme anxiety and stress during and before a test. Hundreds of studies carried out over more than 70 years have demonstrated a direct relationship between higher test anxiety and lower test performance (Von der Embse et al. 2018). Anxiety can be amplified in specific subject areas, particularly mathematics. Maths anxiety is a strong emotional reaction that occurs when someone needs to solve mathematical problems or manipulate numbers. It provokes tension and anxiety that can be debilitating and correlates with poor performance.

In a longer course or qualification, there are various strategies for reducing test anxiety. These include opportunities to seek emotional support externally, role-playing exercises or simulations to

increase coping skills, and activities designed to help students develop internal controls and coping skills. On a microcredential, there may not be opportunities for any of these approaches, so assessment and feedback should be designed to reduce anxiety levels wherever possible, so that students are able to demonstrate what they have learned without being overwhelmed by anxiety.

A strategy for assessment that supports wellbeing should help learners to manage stress and anxiety, employ inclusive assessment, and create a supportive assessment design. These factors are closely linked to general good practice, making sure assessment is relevant, authentic and well designed.

Whenever possible, educators should consider whether learning outcomes could be assessed in different ways, including the type of assessment, required output, and time given to complete the task. Expectations should be transparent, including unambiguous mark schemes and clarity about word counts. Sharing the assessment schedule with learners well in advance enables them to plan their workload and means that clashes with major holidays, festivals or other important events can be avoided. Authentic assessments that are valued, relevant and valid can be created by using realistic or real-world data or scenarios.

The following suggestions for supporting wellbeing and accessibility in relation to different types of assessment draw on the Universal Design for Learning guidelines (CAST 2018).

Numerical assessment

- Allow students extra time to complete their assessment.
- Assess understanding of tools and related methods separately to the application of those tools and methods.
- Present information in stages, allowing students to complete each stage separately if they wish.

Multiple choice/short answer

- Give students as much time as possible to complete the assessment task.
- If the test is formative, provide supportive feedback.
- Switch between multiple-choice and short-answer questions.
- To avoid unnecessary confusion, follow the MCQ guidelines listed earlier in this chapter.

Visual/presentation/participatory/spoken assessment

These forms of assessment are very demanding for some learners, especially those with pre-existing anxiety. In the case of online microcredentials, this type of work will typically need to be submitted as a recording or a presentation. For some students, this will require them to learn to use a new set of software and technology.

- Consider whether the assessment is in line with the learning outcomes of the course. Were students expecting to spend hours becoming familiar with presentation software to be able to submit an assignment?
- Include options for work in multiple formats, such as posters or scripts.
- Make it clear whether both content and presentation will be assessed or only content.
- Make time in the curriculum for students to become familiar with new software and technology (not everyone has used PowerPoint or created a video).
- Provide support for students who are unfamiliar with the tools they will need to use, including opportunities for risk-free practice before submitting a final piece.

- Take into account the needs of students who have limited sight or hearing, and those with social anxiety. Including multiple options for presentation means they can demonstrate their skills and understanding of content without having to overcome additional barriers.

Written assessment

- Assess work in separate stages, so learners can gradually build a piece of work in response to ongoing feedback.
- Give learners assistance with planning and time management.
- Minimise the pressures of tight deadlines by allowing learners to complete self- and peer-assessment exercises over time, or to compile a portfolio of evidence or reflection over time.
- Offer flexible deadlines, if possible.
- Offer opportunities to present information in alternative formats such as oral presentations, posters, leaflets or scripts.
- Provide a list of sources or a presentation of key readings.
- Where possible, provide feedback on plans or drafts of written work.

Online exams

- Familiarise students with exam technologies and processes.
- Embed assessment-related study skills activities early in the study journey.
- Promote a shared understanding of academic integrity. Views on plagiarism vary considerably worldwide, so,

if a microcredential is offered internationally, ensure students are aware of and understand the rules at your institution.
- Make extra time in exams, alternative formats of exam papers, rest breaks in exams or use of assistive technology available to students with certain types of disability.

The main theme in all the above adjustments is flexibility, particularly in listening and responding to learner needs. Using a range of assessment approaches, wherever possible, gives all learners a more equitable chance of success in demonstrating their learning. In all cases, it is important to ensure that the skills being assessed are relevant to the course or lesson learning outcomes and that the assessment task information and instructions are given to learners in multiple formats.

Accrediting and stacking microcredentials

A final challenge associated with assessment in microcredentials is accreditation. Elements of this are covered in Chapter 3, which points to the role that internally aligned microcredential team members play in dealing with assessment and certification processes, as well as the roles of outward-facing team members who deal with external policies and credit transfer. These outward-facing team members will also be dealing with the national and international quality standards that are covered in the next chapter.

The need for quality assurance when assessment leads to accreditation requires a great deal of resources. Markers must be trained and, if several people are marking the same microcredential, their marking needs to be standardised. Outcomes must be compared across the department or faculty, and across the institution, to

ensure consistency. An external examiner or assessor is required to ensure marking within the institution aligns with that at other institutions. In addition, assessment questions and rubrics may require regular updates, plagiarism checks will need to be carried out, there are likely to be student requests for special circumstances (such as serious illness or bereavement) to be considered, and many microcredentials will need to demonstrate that their assessment aligns with the latest version of external professional schemes or certificates.

Alongside this work, identity (ID) checks are needed to reduce the possibility of cheating and ensure that credit is awarded to the correct person. This can be done using basic platform ID verification, university registration, interviews (online, on-site or recorded) or proctored exams (Iniesto et al. 2022). A survey of how ID checks were carried out across European MOOC providers revealed considerable variation. FutureLearn certification programmes required learners to register with a university as a non-degree student. The Spanish/Portuguese platform MiríadaX used random proctoring, taking pictures of learners at random times while completing an exam; the French platform FUN employed full proctoring on some exams, and the EduOpen platform made use of on-site interviews (Iniesto et al. 2022).

All this work is valuable for learners who need to be able to produce evidence that they have gained academic credit. However, this work is also time-consuming – delaying results for weeks or months – and requires a lot of effort from expert professionals, which raises the price of microcredentials. However short the microcredential, all these processes are required if quality-assured academic credit is to be issued. This reduces the economic viability of very short courses because the associated administrative work is too time-consuming and expensive. As a

result, some microcredentials use a simplified process and award digital badges rather than academic credit.

As Chapter 1 noted, a digital badge is an online record of achievement that includes information about the achievement, the community that recognised that achievement and the work carried out to achieve it. Digital badges have two elements: an image file that represents the badge, and an electronic record of the award's criteria and validator (Hauck & MacKinnon 2016). In some cases, they are awarded automatically once certain criteria are met, while in other cases they are linked to more traditional assessment approaches. Badges from different providers can be gathered on websites such as LinkedIn or in electronic backpacks, creating an individual record of competencies that have been acquired or demonstrated.

If a microcredential does award academic credit, then there is an expectation that this will be 'stackable' or will become so in the future. Stackability 'means that micro-credentials can be accumulated and grouped over time, building into a larger, more recognisable credential' (Lantero, Finocchietti & Petrucci 2021: 31). In some cases, this is seen as an essential aspect of microcredentials: 'The basic idea behind the awarding of micro-credentials is to "stack" a series of certificates or courses in a related area' (Lang & Sharp 2023: 4). However, a Europe-wide study identified 16 countries where microcredentials were not stackable, often owing to national legislation (Lantero, Finocchietti & Petrucci 2021).

'Stackable microcredentials could be organized either around development ladders of advancing skill levels or around patchwork areas of complimentary credentials' (Ifenthaler, Bellin-Mularski & Mah 2016: 429). There are problems with both approaches. The patchwork approach allows individuals to select courses in any order so that gaps in knowledge can be filled.

However, qualifications typically include an element of progression – more is asked of a final-year undergraduate than is asked of a first year. Study skills introduced at the start of a qualification may be reinforced later but will not be taught again from the beginning. However, if students can take courses in any order, this progression is lost, meaning each short course must devote some time to introductory material in case learners have not encountered it before. On the other hand, a 'skills ladder', which requires courses to be taken in a particular order, may force experienced learners to pay to enrol in courses that go back over areas with which they are already familiar.

The Open University (OU) in the UK now offers some qualifications that can be completed by stacking microcredentials with other courses. Its Postgraduate Certificate in Academic Practice (PGCAP) is made up of four microcredentials offered on the FutureLearn platform – but this qualification is only open to members of staff (Rienties et al. 2023; Sargent et al. 2023). For non-staff members, four microcredentials can be used to earn sufficient academic credits to make up a third of the university's Masters in Online Teaching (MAOT). However, the intention is that microcredentials will be 'clickable' – series of them can be studied to build a set of skills and knowledge. They are not currently 'stackable' – they cannot be combined to complete full OU qualifications. The university requires at least two thirds of credits on any master's qualification to come from longer courses, and students are required to complete a 'capstone' module that demonstrates their capacity for individual study and scholarship.

Although the ability to make up qualifications by stacking a variety of courses from different expert providers is attractive, most providers are finding that this cannot be done at a price that would make these qualifications attractive to learners. As

noted above, the quality assurance measures required to award academic credit require a lot of resource. If universities must then spend time checking the syllabus and requirements of other providers' microcredentials then the costs spiral out of control. Educational providers need to 'develop and adopt at scale a much more joined-up taxonomy and recognition system for skills and credentials across countries, education systems and industries' (World Economic Forum 2021: 33).

This is easier said than done – international systems that bridge sectors take time and effort to develop. At present, 'there is very little economy of scale' (Usher et al. 2023). The difficulties are summarised by the UK's Quality Assurance Agency for Higher Education:

> there are challenges in a learner designing and accumulating in a modular manner, particularly if the credit is achieved across a number of different providers. Under current pricing arrangements, it is likely to be more expensive. Other challenges include the risk that a learner struggles with a sense of belonging, and continually has to navigate different systems and Recognition of Prior Learning processes. The time and effort involved in familiarising themselves with a range of different approaches, resources and support services might also impact on the space available for extra-curricular skills development. (QAA 2022: 7)

Conclusion

Overall, assessing and accrediting microcredentials pose multiple challenges. The vision of a wide range of short courses on offer from multiple expert providers that can be stacked to build a widely recognised qualification is resource-heavy, time-consuming and

expensive in practice. However, assessing and accrediting individual microcredentials is more straightforward, and principles of good practice for online assessment and feedback support these processes. As with other aspects of microcredentials, assessment must take into account learners' relatively short engagement with the educational provider, the wide range of contexts in which they are studying, and the possibilities and constraints of online study. Around the world, national agencies and institutions are working on frameworks for quality and evaluation that can help to ensure assessment and accreditation are carried out to high standards. This work is the subject of the next chapter.

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