

An Assessment-Recognition Matrix for Analysing Institutional Practices in the Recognition of Open Learning

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This paper shares some of the findings of the OpenCred study, conducted by the Institute of Learning Innovation at the University of Leicester in collaboration with the European Commission's Institute for Prospective Technological Studies (IPTS), and funded by the IPTS. It describes a range of initiatives by higher education and professional training institutions in Europe in which non-formal, open learning achievements are recognised. Recognition of learning is almost always conferred in consideration of the type of assessment used, and so a matrix has been developed to show the relationship between these two features. The vertical axis of the matrix comprises a five-level hierarchy of formality of recognition (from no recognition to full recognition in line with the European Credit Transfer and Accumulation System), while the horizontal axis represents a five-level hierarchy for robustness of assessment (from no assessment to formal examinations). Examples of European open education initiatives are discussed and plotted on the assessment-recognition matrix. The paper concludes with a summary of the tensions between the assessment procedures used and the recognition awarded, and offers recommendations for institutions wishing to evaluate the nature of recognition awarded to open learners. It also identifies further areas in which the framework could develop.

1. Introduction

OpenCred is part of the OpenEdu¹ project of the IPTS, which is exploring institutional strategies on openness in higher education, with the aim of supporting the design of suitable policies at a European level. This paper therefore focuses on practices for recognition of open learning in Europe. Open Educational Resources (OER) and Massive Open Online Courses (MOOCs) have emerged in recent years and are triggering a mindset change in institutions. Generalisations concerning what learners require from participation in open education are premature, in that insufficient research has been conducted regarding, for example, the degree to which formal recognition of learning is important to these learners. While badging may prove motivating for some learners, formal recognition of learning may be the main goal for others. Certificates for open learning achievements vary in terms of their level of formality of recognition, depending largely on how they are linked to assessment. This paper looks into emerging practices around the issuing of certificates for open learning in Europe, and the relationship between assessment and recognition.

Tags

Recognition of open learning,
open education, assessment,
MOOCs, badges

* Disclaimer: The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.

1 <http://is.jrc.ec.europa.eu/pages/EAP/OpenEdu.html>

2. MOOCs and the issuing of certificates

The Open Education Europa (2014) 'European MOOCs Scoreboard' indicates that there are currently over 800 MOOCs being offered by Europe-based institutions. At a recent gathering of the Eurotech alliance, which comprises higher education institutions from Switzerland, Denmark, Germany and the Netherlands, a debate on MOOCs and the future of education was held, and recognition of credits was highlighted as one of the key challenges in the EU (Eurotech Universities, 2014). The report points out (Ibid) that recognition of open learning is not just an add-on to the established procedures of recognition of prior learning; it requires a substantial shift in mindset, particularly on the part of educational institutions, where traditionally the roles of teaching, content provision, assessment and credentialisation (the awarding of diplomas or degrees) have all been bundled together. The recognition of non-formal open learning achievements requires an 'unbundling' of services provided by these institutions (Camilleri and Tannhäuser, 2013, p.96; Gaebel, 2014, p.28), which can conflict with the requirements of national quality bodies.

The Trends Report by the Open Education Special Interest Group (2014) looks at the aspects that would need to be considered in order to recognise learning achievements in open, non-formal education. Where MOOC providers offer certificates, Verstelle et al (2014, p.25) recommend considering two key aspects in order to determine the value of these certificates:

1. Is the certificate merely proof of attendance or does it provide evidence of learning? If the latter, how robust was the assessment? (Multiple-choice questions with automated marking at one end of the range; the completion of an examination under supervision at the other).
2. To what degree is the student's identity validated, and how much supervision is provided? The report identifies four levels for these two intertwined elements:

a) No validation of identity – the MOOC relies on the honour of the student,

b) Online validation by facial recognition or keystroke tracking,

c) Online monitoring, which requires a moderator/ proctor to have a 360-degree view of the student's room transmitted via a webcam. The Trends report notes that some institutions would not accept online proctoring as a qualifying examination

environment, regarding it as being prone to fraud, although it is increasingly being seen as legitimate (Verstelle et al., 2014, p.25),

d) Attendance at a physical examination site.

Similarly, a report published by the Norwegian Ministry of Education (Kjeldstad et al. 2014), proposes that for the awarding of formal academic credit, proof of learning will need to be demonstrated via examination, and the importance of validation of the identity of the examinee is stressed (Ibid, section 8.4). The report (Ibid) lists the following situations in which validation of identity is required:

- A student wants transfer of credits obtained in a MOOC conducted by a foreign provider to a degree at a local institution,
- A student wants their achievements in a MOOC studied with a foreign provider to be validated as part of the admission process to higher education in a local institution,
- A local institution offers a MOOC and awards credits for successful completion of assessment tasks,
- An employee wants to include their participation in a MOOC in their documentation of competence when applying for a job.

These reports underline the importance of linking the means of assessment with the nature of recognition awarded to learners. Other aspects also need to be considered, as noted above by the Eurotech alliance, but for the purposes of this paper we will consider the relationship between assessment and recognition practices currently observed within institutional initiatives in Europe.

3. The OpenCred Study

This study is mainly based on publicly available information from open education websites, working groups, projects and studies across Europe. The aim was to identify any general principles regarding recognition of open learning that could inform discussions in the field and support developers and learners, by clarifying the range of options and models for recognition of open learning that existed and might be replicated.

During the study, it became apparent that the concept of 'open' was rather blurred, and that it can mean different things to

different developers and learners. Furthermore, although non-formal learning was the focus of the study, it is often difficult to distinguish between formal and non-formal learning. (See glossary for definitions used in the study.) Rather than impose limitations on how open or non-formal a course must be to be included, we included any course or initiative promoted under the banner of open education.

The initiatives identified ranged considerably in the degree to which open learning was formally recognised, with some offering no recognition at all, or simply a completion certificate or badge, and others offering exemption from examinations or courses, or ECTS credits. They also varied enormously in relation to the criteria identified in the Trends Report for robustness of assessment described above, both in terms of the nature of the assessment, and in the degree to which the learner's identity was verified. Treating assessment as a separate category from recognition could appear to be a purely academic exercise, since in most discussions about open education these tend to be inextricably intertwined; however, there is variance in the degree to which they are linked, as two similar assessment processes may not lead to the same sort of award. Treating them as two discrete categories enables numerical values to be separately ascribed to both assessment (assigning a higher value to assessment processes that appears to be more robust) and recognition (assigning higher values to more formal credentials) and so provides an opportunity to test how strong this link actually is.

A proposed hierarchy of descriptors for the formality of recognition of open learning in European open education initiatives is shown in Table 1. This set of descriptors was developed with reference to the discussion of MOOCs and credits in the reports by the Dutch Open Education Special Interest Group (2014) and the NVAO group (2014, p.6-7), also from the Netherlands. A value has been provided for each descriptor, and these values will be used to organise the information about institutional open education initiatives in the following section.

Table 1: Formality of recognition

Level	Descriptors
0	No formal recognition
1	Unauthenticated completion certificate/statement of accomplishment or badge showing proof of participation or completion ²
2	Authenticated certificate or badge which either (a) contains limited/no information on the nature of the course, the nature of the learner's achievement and the nature of the assessment process used, or (b) indicates that the learner's identity was verified online but there was no supervision during assessment (as is typical in Coursera MOOCs with Signature Track) ³
3	Certificate providing exemption from a specified entrance exam
4	Certificate conferring between 1 and 4 ECTS credits
	Certificate conferring a minimum of 5 ECTS credits
	Certificate providing exemption from a specified module/course or part of qualification at the issuing institution
	Certificate from an accredited institution which '(a) formally and clearly states on whose authority it was issued, provides information on the content, level and study load, states that the holder has achieved the desired learning objectives, provides information on the testing methods employed and lists the credits obtained, according to a standard international system or in some other acceptable format, (b) is demonstrably and clearly based on authentication [i.e. student's identity is verified] and (c) states that the examinations have been administered under supervision and specifies the nature of this supervision.' (NVAO 2014, p.9)
	Continuing professional development (CPD) credits

² http://bluebox.ippt.pan.pl/~vkoval/vk_files/coursera/Game_Theory_II_130707.jpg

³ For example, see this sample certificate on Coursera's website: https://s3.amazonaws.com/coursera/specializations/jhudatasience/cert_icon.png

Table 2: Robustness of assessment

Level	Descriptors
0	No assessment
1	Record of completion of activities
	Self-assessment
	Assessment with automated checking, e.g. multiple-choice questions (MCQs), submission of programming code, or acceptance of a submission of text on the basis of word count (No verification of identity)
	Peer assessment (No verification of identity)
2	Online examination with verified identity and no real-time supervision, e.g. Coursera's Signature Track ⁴ or Accredible's ⁵ 'self-proctoring' (in which a recording is made of the student's screen and face while examination is in progress, and is compressed into a 2-minute time-lapse video, embedded in certificate).
3	Submission of coursework and/or performance of practical tasks where the student is personally known to the examiner. (The context may be either face-to-face or online. The assumption is that inconsistencies in performance style will be picked up and this minimises the likelihood of cheating. This is common practice in traditional online courses, e.g. online MBA programmes.)
	Online examination with identity verification and real-time proctoring (e.g. ProctorU ⁶ , Proctor2Me ⁷ or Remote Proctor ⁸ , which has a panel of proctors check individual examination recordings)
4	On-site examination (including on-site challenge exams)
	Recognition of prior learning (RPL) conducted by recognised expert(s) (e.g. based on portfolio submission and/or interview – requires a relatively low candidate-to-assessor ratio and hence generally not scalable to open initiatives)

Table 2 lists the proposed descriptors for robustness of assessment.

The open education initiatives discussed below were selected from those included in the European-wide desk research undertaken for the OpenCred study. The selection was a stratified sample, in that it aimed to provide a good range of different combinations of formality of recognition versus robustness of assessment, but within each stratum examples were chosen randomly. The initiatives are organised according to formality of recognition, as per Table 1, starting with Level 1.

4 <https://www.coursera.org/signature/guidebook>

5 <https://accredible.com/>

6 <http://www.proctoru.com>

7 <http://www.proctwise.com>

8 <http://www.softwaresecure.com/product/remote-proctor-now/>

After that we will map selected initiatives onto a matrix in order to test the degree to which means of assessment is linked to the nature of recognition awarded to learners.

Examples of Level 1 recognition initiatives (unauthenticated certificates or badges)

The first MOOC in Croatia⁹ was convened by the organisation CARNet (Croatian Academic Research Network) and was on the subject of creating courses in Moodle. It began in January 2014, and had 440 participants (CARNet 2014). Learners could earn one or more of the three badges offered: Attendant, Designer and Distinguished Attendant. Peer assessment was used to ascertain whether participants qualified for badges. At the end of the course, 80 participants obtained the Attendant badge, over 70 obtained the Designer badge and around 70 achieved the Distinguished Attendant badge. Learners' feedback indicated that obtaining badges motivated them to learn, and several individuals obtained all three badges. (In summary, this initiative has a 'formality of recognition' level of 1 and a 'robustness of assessment' level of 1, according to Tables 1 and 2 respectively. These levels will be represented as R1; A1, and this convention will be used for all the remaining initiatives in this section. The MOOC will be referred to as 'Moodle' for short in Figures 1 and 2 below.)

The openHPI¹⁰ platform for free, online learning, which launched in 2012, is an initiative of the Hasso Plattner Institute based at the University of Potsdam, Germany. They specialise in IT and computer programming topics and claim to have offered the first German language MOOC. This focused on the technological functionality of the Internet. 11,000 learners participated, of whom 1,662 received a certificate of successful completion (Allgaier, 2013). A 'graded record of achievement' is offered to candidates on 'successful completion' of openHPI courses. 'Successful participation means that you earn at least 50% of the sum of maximum possible points for homework and final exam. The final exam will weigh 50%. The record of achievement will be issued in the name you used to register at open HPI' (openHPI 2012-2014). Certificates also indicate whether the learner's results fall within the top 5, 10 or 20% of the class (Meinel and Willems 2013, p.6) (Short name 'Internet': R1; A1.)

In France, the National Ministry of Education launched a national portal for MOOCs through the France Université Numérique

9 http://www.carnet.hr/loomen/moodle_mooc

10 <https://open.hpi.de/>

(FUN)¹¹ in October 2013. MOOCs offered via this portal are required to adhere to a set of quality standards and guidelines. The guidelines suggest that recognition should be given for attendance and participation, rather than for achievement of learning objectives, citing the difficulties involved in supervising online assessment. The perspective of FUN is that assessment in MOOCs can only be conducted through automation or peer assessment, and both have limitations: automation provides assessment of only superficial information, and the answers can also be easily disseminated amongst participants leading to high potential for cheating, while peer assessment is ‘a trade-off between workload imposed on participants and the precision of the evaluation’ (Cisel 2013, pp.19-25). The use of badges is recommended, mainly as a way of encouraging participation. Badges can be awarded automatically for completing tasks and can act as a gradual record of completion. Cisel (2013, p.28) concludes that badges ‘are mainly used today to encourage participants to interact on forums, but could have a growing importance in the process of reward for work done over the years.’ In fact, most of the MOOCs currently available on the FUN platform appear to offer unverified completion certificates (which have the same status as unverified badges in Table 1 above): one such example is ‘From Manager to Leader 2.0’¹². (Short name ‘Leader’: R1; A1.)

Table 3: Open education initiatives in sample that award level 1 recognition

These are summarised in Table 3.

Name of course (translated into English where applicable)	Code in figure 1	Formality of recognition	Robustness of assessment
Creating Courses in Moodle (CARNet)	Moodle	1	1
The Technological Functionality of the Internet (openHPI)	Internet	1	1
From Manager to Leader 2.0 (FUN)	Leader	1	1

¹¹ <http://www.france-universite-numerique.fr/moocs.html>

¹² <https://www.france-universite-numerique>

moo.fr/courses/CNAM/01002S02/Trimestre_1_2015/about

Examples of Level 2 recognition initiatives (authenticated certificates; no credits)

Since Coursera courses offer ‘verified certificates’ to students who complete a course on the Signature Track, the Coursera MOOCs by European providers that offer this option fall under Level 2 in the formality of recognition hierarchy. The University of London was an early MOOC adopter on the Coursera platform. During one of the iterations of the ‘English Common Law: Structure and Principles’ MOOC, the course leader received several emails of thanks from students, some of which included mention of how they were using their verified certificate to gain credits from other universities. Unfortunately for the purposes of this study, however, the email correspondence with those students and the related data has been deleted in keeping with data protection requirements (Lockley 2014). Nevertheless, this anecdotal evidence indicates that even a relatively low level of formal recognition offered by a MOOC provider may lead to more substantial recognition by other institutions.

The Copenhagen Business School in Denmark offers a MOOC on ‘Social Entrepreneurship’ via Coursera which also awards a Coursera verified certificate. (Short name ‘SocEnt’: R2; A2.)

A French commercial provider, the First Finance Institute, has established a ‘Business MOOC platform’ which claims to have over 50,000 members. Authenticated certificates are awarded for exams taken at Pearson centres around the world. The MOOCs are offered free of charge for the first four weeks, after which students are invited to continue for ‘an optional week 5’ for a small fee (\$29 for students and \$59 for professionals) – which includes the assessment and certification (First Business MOOC 2014). The certificate does not confer academic credit; nevertheless according to the organisation’s website, some students say they will add their MOOC experience to their CVs. An example of an upcoming MOOC on this platform is the ‘Wall Street MOOC’. (Short name ‘Wall’: R2; A4)

Table 4: Open education initiatives in sample that award level 2 recognition

These are summarised in Table 4.

Name of course	Code in figure 1	Formality of recognition	Robustness of assessment
English Common Law: Structure and Principles (University of London)	Law	2	2
Social Entrepreneurship (Copenhagen Business School)	SocEnt	2	2
Wall Street MOOC (FFI)	Wall	2	4

Examples of Level 3 recognition initiatives (authenticated certificates; fewer than 5 ECTS credits; exemption from entrance exam)

Many of the European MOOC-providing institutions that are promoting their offerings under the umbrella of the OpenUpEd portal¹³ award formal certificates, which they describe on their website as ‘official credits that can count towards obtaining a degree (i.e., ECTS).’¹⁴

Università Telematica Internazionale, UNINETTUNO, in Italy, provides the vast majority of the courses listed on the OpenUpEd portal (104 out of 160), covering a very wide range of subjects. All include self-evaluation exercises and peer to peer reviewing of exercises, and a ‘Students Activities Tracking’ system that generates graphics, reports and statistics on learners’ activities. Learners may opt to take a final examination at UNINETTUNO headquarters or at designated national and international centres. Learners who want to get ECTS credits for these MOOCs need to enrol in the corresponding course offered by this university. Then, a tutor is assigned to the enrolled student, whose learning activities are also recorded. A final exam is administered to the MOOC participants, and those enrolled students who pass the exam are awarded ECTS credits. An example is the MOOC ‘Measurement Theory’, which leads to 2 ECTS credits. (Short name ‘Measure’: R3; A1.)

¹³ <http://www.openuped.eu>

¹⁴ <http://www.openuped.eu/mooc-features/recognition-options>

Another example from the OpenUpEd portal comes from the Portuguese Open University (Universidade Aberta), which offers a MOOC on climate change in which students have the following recognition options: ‘1) Certificate of course completion through a peer assessment process. 2) Paid formal credit (4 ECTS), if required by participants in a period of up to 3 months after the course, pending subsequent formal assessment of the work in the course and a face-to-face exam.’¹⁵ (Short name ‘Climate’: For candidates who take the exam, the values are R3; A4.)

In Finland, the University of Helsinki’s Department of Computer Science runs courses in which students are required to produce programming code that is automatically assessed using the institution’s TestMyCode (TMC) testing system. This made the tasks easily adaptable to a MOOC format, and MOOCs on programming have been running since 2012 (University of Helsinki Department of Computer Science, nd). Of the 417 participants of the first cohort, 38 were subsequently accepted into the Computer Science department and the department is considering using attendance on the MOOC as an alternative to passing an entrance exam (Vairimaa, 2013, pp.3-6). (Short name ‘Coding’: R3; A1.)

Table 5: Open education initiatives in sample that award level 3 recognition

These are summarised in Table 5.

Name of course	Code in figure 1	Formality of recognition	Robustness of assessment
Climate Change (Open University Portugal)	Climate	3	4
Measurement Theory (UNINETTUNO)	Measure	3	2
Coding (University of Helsinki)	Coding	3	1

¹⁵ <http://www.openuped.eu/courses/details/1/10>

Examples of Level 4 recognition initiatives (equivalent forms of formal recognition to those used in formal education)

Many of the initiatives that award formal recognition at the highest level tend to offer a range of recognition options for students. In some cases, providing institutions offer special recognition privileges for students who are enrolled in their fee-bearing programmes, and in others, open learners are given the option to pay a fee for assessment and credits.

In Cyprus, the University of Nicosia recently engaged in MOOC provision (MassiveOpenOnlineCourse.com 2014). *Introduction to Digital Currencies*¹⁶ was offered in mid-2014 and was taught by an expert on the concept of the Bitcoin. This MOOC contributes 10 ECTS credits of a total of 90 ECTS credits for the Master of Science in Digital Currency that is being developed at this university (University of Nicosia 2014). Each module of ten ECTS credits costs the student 1,470 Euro, apart from the first module, which is offered for free as a MOOC. The formal recognition option is available only to students enrolled on the university's MSc, while members of the public can achieve badges and completion certificates. (Short name 'Currencies': R4; A4.) For enrolled students, the values are R4; A4.)

Vytantas Magnus University in Lithuania provides a non-MOOC example in this category, in that teachers undergoing initial teacher training can have their use of OER included with their theoretical and practical achievements when applying for RPL (Cedefop 2007). This enables them to achieve exemption from certain courses, thereby reducing the duration of their formal training period. This is a particularly interesting example because of the lack of any formal assessment associated with OER. It is the process of recognition of prior learning that creates a layer of robust assessment and enables recognition for the learner. (Short name 'TeacherOER': R4; A4.)

In Ireland, a draft policy document has been drawn up by the Institute of Technology Sligo (IT Sligo), which includes the intention to include non-formal open learning within their RPL procedures. IT Sligo is a member of the OER universitas (OERu)¹⁷, a global consortium of post-secondary institutions aiming to collaboratively provide courses leading to full credentialisation for learners at minimal cost. IT Sligo academics are currently developing modules in electronics and engineering for the

OERu, and will be piloting the new RPL policy and procedures in these modules, including determining RPL on the basis of challenge exams (Institiuid Teicneolaiochta, Sligeach, 2014). Learners will be charged a 'minimal' fee to cover the cost of the assessment. Procedures for running the challenge examinations are being formulated and it is likely that online proctoring will be used (Clinch 2014). (Short name 'Challenge': R4; A3.)

Table 6: Open education initiatives in sample that award level 4 recognition

These are summarised in Table 6.

Name of course or initiative	Code in Figure 1	Formality of recognition	Robustness of assessment
Introduction to Digital Currencies (University of Nicosia)	Currencies	4	4
Recognition of OER in Teacher Training (Vytantas Magnus University)	TeacherOER	4	4
IT Sligo's plans for challenge examinations	Challenge	4	3

The assessment–recognition matrix

In order to compare and contrast the recognition opportunities for non-formal open learning described above, we will map them onto a matrix with formality of recognition on the vertical axis and robustness of assessment on the horizontal axis. Each of these axes has a spectrum of values from zero to four, represented by the descriptors in Tables 1 and 2. When the initiatives described above are mapped onto the matrix, the following picture emerges:

¹⁶ <http://digitalcurrency.unic.ac.cy/free-introductory-mooc>

¹⁷ <http://oeru.org/>

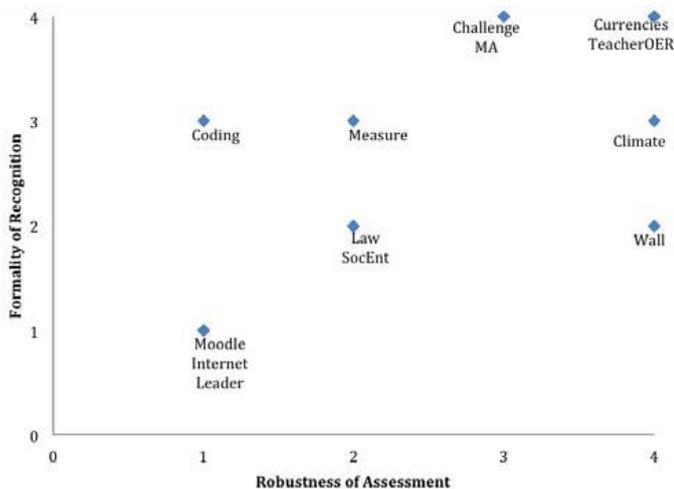


Figure 1: The OpenCred Assessment-Recognition Matrix

4. Discussion

The ‘Currencies’ MOOC and the ‘Moodle’ MOOC show an expected pattern, where the level of formality of recognition is commensurate with the level of robustness of assessment. Similarly, the results for the ‘Climate’ MOOC are unsurprising, in that a very robust form of assessment (onsite examination) leads to a relatively high form of recognition (4 ECTS credits). In fact, in almost all the cases, formality of recognition is closely linked to the robustness of assessment, the levels being identical or differing from the other by only one point (indicated by the diagonal lines superimposed on the matrix in Figure 2).

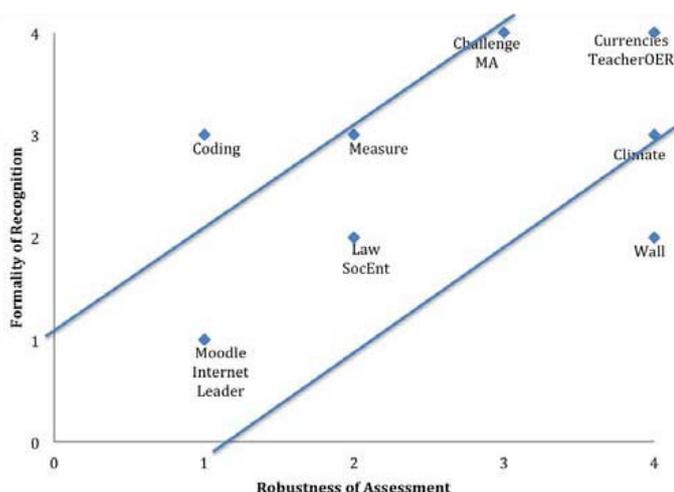


Figure 2, showing which open learning initiatives differ by more than one value within the parameters of robustness of assessment and formality of recognition

Only two cases fall outside of this relationship in which the level of formality of recognition is commensurate with the level of robustness of assessment. In the case of the ‘Coding’ MOOC, 3 ECTS credits are awarded for a relatively non-robust form of assessment (multiple-choice questions). In this case, however, it appears that the institution has developed a sophisticated automated marking system for the purposes of checking programming code (TestMyCode), which gives them the confidence to issue this relatively formal award. The opposite anomaly is evident in the case of the Wall Street MOOC (‘Wall’), where a very robust form of assessment, an on-site examination, receives no formal academic credit. Since the MOOC does not cover the full scope of content that is covered on the corresponding certificate course offered at this institution, learners who want recognition will need to pay the fees and enrol on the full course. The MOOC therefore seems to be functioning as a ‘taster’ for the full course. The institution’s rationale for offering an examination is not clear – perhaps it is to enable learners to self-evaluate their readiness for the full course.

It is also worth noting that the ‘TeacherOER’ initiative, which scores the highest possible points for both formality of recognition and robustness of assessment on the basis of RPL procedures, is typical of many OER and MOOC provisions used in support of continuous professional development (CPD) or in-service training. In many CPD programmes, staff are relied upon to accurately report their learning to their employer (Open Education Special Interest Group 2014, p.25). Similar situations occur where professional bodies require their members to undertake a certain amount of training per year (Open Education Special Interest Group 2014, p.28). Usually, CPD takes place within a closed environment and with a favourable ratio between assessors and candidates, and this makes it difficult to replicate at scale in open education. Nevertheless, the flexibility of open education means it is an ideal way of helping candidates and their employers meet the necessary requirements.

In addition to the open learning recognition initiatives described earlier, a data point has been added to the matrix for a ‘traditional online MA module’ (the point labelled MA, which is shared with the data point for IT Sligo’s ‘Challenge’ exams). This is to show that the most robust form of assessment, physical, onsite examinations, is not very common in traditional, closed, online programmes offered by many European universities. These programmes often only require students to submit assignments, and there is limited or no checking of the students’

identity; nevertheless, full academic credentials are awarded to successful students. It may be that the relatively low student-staff ratio, combined with the typical requirement that students participate in forums and other online tasks throughout the term helps staff to notice instances of cheating. However, one possible consequence of the evolution of open, online courses with relatively rigorous assessment options is that mainstream online courses may come under pressure to upgrade the rigour of their assessments.

5. Conclusions

The matrix was created to help clarify the distinctions between different levels of assessment and recognition. The descriptors and values assigned are open to debate, but in itself prompting this debate seems to be a useful exercise, as this forces an analysis of the various merits of, for example, badging, certification and more formal awards. In discussing this with academics, it has also proven useful as a tool for them to use in analysing their institutions' assessment and recognition practices.

Further to this, the development of the matrix provides the basis for a series of observations concerning open educational courses. The first of these arises from the process through which the open educational courses were selected for inclusion in the matrix. Many were excluded because they did not contain sufficient information about assessment requirements or recognition options. Even upon enrolling on several selected MOOCs, we found that much of this information was still not available.

The matrix also indicates that, in the main, robustness of assessment and recognition of learning are very closely linked for the majority of open learning initiatives. This raises a contradiction in the argument that MOOCs represent an opportunity for more accessible and inclusive educational provision. Formal recognition requires robust assessment, and robust assessment requires tutors to review performance and students to have their identities validated. This all requires financing. To the extent that these costs have to be passed on to learners, or learners have to be enrolled on one of the providing institution's mainstream programmes to receive recognition, MOOCs become that much less open and less inclusive. The challenge for institutions is to overcome this low cost / high value incompatibility in the most cost-effective way.

The matrix is also revealing in what it does not include. In the interests of space, we excluded all cases with a 'zero' level of

recognition. This may give the false impression that most open learning initiatives do have some form of recognition, but in reality, a substantial number of initiatives were found which offered no recognition at all. This may reflect the perception for many stakeholders that online education is a poor second to face-to-face education. As one learner interviewed for the study stated:

*No-one takes an online exam seriously. If employers see my certificate and it says I did it online, they do not know that the online exam was proctored and my identity was confirmed and so on. But if they know that I went to the University ... and took an exam, that is much more serious. Then they know that I have learnt something important.*¹⁸

For the formal recognition of open learning to be more easily accepted, a wider awareness-raising process may need to be implemented by employers and traditional educational institutions.

The matrix may be useful in identifying where paths to resolving the low cost/ high value incompatibility lie. One path identified through this study (and there may be others) is in the use of open education in CPD. Where self-reporting is accepted as a valid form of assessment for CPD, open learning can meet the needs of both learners and employers, in that it is flexible, wide-ranging in scope, and (generally) free.

As context is key to considering the interplay between assessment and recognition, further work is needed in extending the review of open courses to those outside of Europe as well as exploring additional characteristics of open learning for inclusion in the framework – for example, how 'open' is open, and what forms of learning take place within them? This may enable more precise modelling of different types and contexts of open education to inform developers and learners about what options are available for constructing courses, and which examples already exist and, perhaps (considering the cost / value incompatibility), those that can exist.

6. Glossary

Formal learning: Learning that occurs in an organised and structured context (e.g. in an education or training institution or on the job) and is explicitly designated as learning (in terms of objectives, time or resources). Formal learning is intentional

¹⁸ Andreas Schumm, learner on the 'Data Structures and Algorithms' MOOC by the University of Osnabrueck

from the learner's point of view. It typically leads to validation and certification (CEDEFOP 2009).

Informal learning: Learning resulting from daily activities related to work, family or leisure. It is not organised or structured in terms of objectives, time or learning support. Informal learning is mostly unintentional from the learner's perspective (CEDEFOP 2009).

Non-formal learning: Learning which is embedded in planned activities not always explicitly designated as learning (in terms of learning objectives, learning time or learning support), but which contain an important learning element. Non-formal learning is intentional from the learner's point of view (CEDEFOP 2009).

Open learning: Open learning is an innovative movement in education that emerged in the 1970s and evolved into fields of practice and study. The term refers generally to activities that either enhance learning opportunities within formal education systems or broaden learning opportunities beyond formal education systems (D'Antoni 2009, cited in Wikipedia).

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