International **R**eview of **R**esearch in **O**pen and **D**istributed **L**earning
Volume 25, Number 1

February – 2024

Open Education and Alternative Digital Credentials in Europe

Dai Griffiths, Daniel Burgos, and Stefania Aceto
Research Institute for Innovation & Technology in Education (UNIR iTED), Universidad Internacional de La Rioja (UNIR)

Abstract

Learners who learn from OER often cannot have their learning assessed or receive a credential. Open credentials offer a potential solution to this problem, combining badges or micro-credentials with competence frameworks and digital seals. This study identified the current situation of open credentials in post-secondary education in Europe, the main themes of the discourse, and the points of agreement and divergence surrounding them. The data comprised a corpus of transcriptions from 12 expert interviews and a focus group. Qualitative text analysis identified the principal themes. Findings included the following: (a) few assessments are available as open content; (b) linking OER and credentials requires detailed and expensive work on learning outcomes and assessment; (c) the aggregation of open credentials to create higher-level qualifications is a widely accepted ambition; (d) the European Union's infrastructure to support open credentials is appropriate and effective and can foster trust; (e) the outstanding challenges are organisational and practical, not technological; (f) assessment and content provisions should belong to separate organisational functions; and finally, (g) funding and support for open credentials in professional accreditation are essential for further progress.

Keywords: OER, assessment, micro-credentials, badges, competence, specifications, infrastructure, business model

Open Education and Alternative Digital Credentials in Europe

Over a decade ago, Mackintosh, McGreal, and Taylor identified the core problem for open educational resources (OER):

> Individuals are free to learn from OER and other digital learning materials hosted on the Internet. The core problem is that learners who access these digital learning materials on the web and acquire knowledge and skills either formally or informally, alone or in groups, cannot readily have their learning assessed and subsequently receive appropriate academic recognition for their efforts. (Mackintosh et al., 2011, p. 2)

This problem has been addressed through multiple initiatives to create or support open credentials, in both formal education and lifelong learning. These include (a) badges, (b) micro-credentials, (c) competence catalogues linked to OER, (d) interoperability specifications for credentials and micro-credentials, and (e) alliances of institutions to deliver massive open online courses (MOOCs). The expert interviews and focus group carried out in this study examined how such approaches were being applied and identified salient themes and concerns in the discourse.

Scope and Context of the Study

Schools are often unable to innovate in awards, curricula, or assessment. We therefore focus on post-secondary education, in which states delegate the award of credentials to institutions and professional bodies.

Competences have long been seen as a way to make recruitment processes more effective and as a possible solution to the shortcomings of education in preparing citizens for employment. The history of competence-based approaches is too extensive and complex to summarise here, but it extends back to at least the influential paper by McClelland (1973). For a recent review of the field, see Škrinjarić (2022). Of particular relevance to the present paper was the work of the European Commission over the past decade in developing the European Skills, Competences, Qualifications and Occupations (ESCO) classification (European Commission, 2022) and more recently the DigComp digital competence framework (Vuorikari et al., 2022). Competence frameworks have also been adopted at the national level in Europe, for example in Germany (Federal Ministry of Education and Research, 2011). Increasing volumes of data about educational achievement have led to proposals for automated comparison of the competences of potential employees with the requirements for particular job roles (e.g., Boiko et al., 2021).

Increased economic integration has led to a need for comparison and equivalence of competences across borders, especially in a closely integrated economy such as that of the European Union. The Bologna Declaration (European Ministers of Education, 1999) called for the adoption of a system of easily readable and comparable degrees, together with a system of credits. This led to the further development of the existing European Credit Transfer Accumulation System (ECTS; European Commission, 2015), followed by the European Qualifications Framework (EQF) in 2008, which was revised in 2017. The European Commission described the EQF as “a common reference framework that allows qualifications from different

countries to be compared easily." (European Commission, 2018, p. 2), and established the Europass service and tools to support it (see European Commission, n.d.).

A driver for alternatives to traditional credentials has been the 'skills gap' between increasing technological complexity and the capacity of citizens to carry out employment tasks (see, for example, Cornelius (2011), or Cappelli (2012) for a critical view). The European Commission (2016) noted that "40% of European employers have difficulty finding people with the skills they need to grow and innovate" (p. 2). Doubts have frequently been expressed about the capacity of traditional higher education (HE) courses, for example, to meet this challenge (Goulart et al., 2022). An early response was the use of open digital badges, defined by Fields (2015) as a digital signifier of accomplishments, skills, qualities, or experiences. These signifiers had embedded metadata that included the issuing organization, criteria for earning the badge, and evidence of the skill or knowledge acquired. The portability of the badges allowed badge earners to publicly share all learning experiences, whether acquired from formal or informal education settings, to social media sites like LinkedIn and Facebook.

More recently, the term micro-credential has become more prominent, but still corresponds to Fields' definition. Brown et al. (2021) have helpfully provided a summary of the various terms used to describe alternative digital credentials. The European Commission (2021) defined micro-credentials as "learning opportunities of smaller volume than for traditional qualifications [which] enable the targeted, flexible acquisition and recognition of knowledge, skills, and competence to meet new and emerging needs" (page 11). They added that "importantly, micro-credentials do not replace traditional qualifications. Instead, they can complement traditional qualifications and serve as a lifelong learning opportunity to all" (page 1). McGreal and Olcott (2022) offered a similar definition but add that micro-credentials "may or may not apply towards a higher credential" (page 3) suggesting that, *pace* the European Commission, there is indeed potential for micro-credentials to replace traditional qualifications.

Method

Semi-structured interviews of 45 to 65 minutes were conducted with experts, according to informed consent and data-processing arrangements that were approved by the UNIR Ethics Committee with the reference number PI049/2022. The interviewees were invited to edit their text, which all did except for one, which was then excluded. The first 10 interviews fed into the authoring of the ENCORE+ report "Credentialling learning in the European OER Ecosystem" (Griffiths et al., 2022). Then, two additional interviews were carried out. All interviewees were asked if they would like an edited transcript to be published, and eight took up this option (see UNIR, 2022). An online public focus group was also organised, with five interviewees plus one participant who had not been interviewed. The transcript was added to the body of text to be analysed. The resulting corpus contained 328,177 characters and is available to bona fide researchers via an application.

The objectives of the interviews were to identify and describe the:

- different ways in which knowledge obtained through OER is credentialled in OER repositories in Europe
- barriers to the certification of knowledge obtained through OER
- actions that could eliminate or mitigate the obstacles to the certification of knowledge obtained through OER

These objectives led to the following interview questions:

1. What is your involvement with OER repositories, now and in the past?
2. What credentialing approaches and methodologies for OER are you aware of? Relevant aspects include administrative processes, community actions, technological support, and mappings with curricula and competence structures.
3. What repositories do you know of which have considered implementing these approaches or methodologies (including your own work), and what were the results?
4. Which approaches or methodologies to credentialing learning through OER are, or could be, the most effective in providing a service to work-based learning and training as part of professional development?
5. What are the barriers to credentialing learning through OER that you have experienced or observed?
6. What practical solutions and mitigations to barriers to success have you identified and observed?
7. How can trust in the credentialing of learning through OER best be developed?
8. What are the most important actions that could be taken to enhance the effectiveness of credentialing learning though OER? Please think of some or all of the following:
    - learners
    - teachers
    - education and training providers
    - educational authorities and administrators
    - funders of research and innovation
9. Can credentialing through OER contribute to the sustainability of OER, and, if so, how?

Data Gathering

Interviewees were identified among the members of the ENCORE+ project or were recommended by those members, and 16 experts were invited. Given the large scale and range of activity in OER in Europe, it was not feasible to achieve a representative sample. However, an effort was made to include a range of countries and different professional roles. The 13 experts detailed in Table 1 provided their input, and the authors extend thanks to them all.

Table 1

Interviewees

Name	Sector	Organization	Country
Christine Jacqmot*	Academic	Université Catholique de Louvain	Belgium
Colin de la Higuera	Academic	Université de Nantes	France
Deborah Arnold	Sectoral organisation	AUNEGE	France
Don Olcott Jr.	Consultant	HJ Associates	Romania
Ebba Ossiannilsson	Sectoral organisation	ICDE International Council for Open and Distance Education, OER Advocacy Committee	Sweden
Gema Santos-Hermosa	Academic	University of Barcelona	Spain
Graham Attwell**	Consultant	Pontydysgu	Wales, UK
Ildiko Mazar	Industry	NTT DATA	Spain
Lorna Campbell	Academic	University of Edinburgh	Scotland, UK
Phil Barker	Consultant	Cetis LLP	Scotland, UK
Timothy Read	Academic	UNED	Spain
Ulf Ehlers	Academic	Baden-Wurttemberg State University	Germany
Yves Deville*	Academic	Université Catholique de Louvain	Belgium

Note: * Interviewed together; ** Only in the focus group discussion.

Analysis

The open-source QualCoder application was used to analyse the corpus of interviews. Although qualitative text analysis often seeks to identify an underlying conceptual structure or essence, this was not our purpose;

rather, the software resolved the practical problem of classifying and managing the many points made in a large corpus. The texts were coded, allowing multiple codes for the same section of text. The frequencies with which the codes were applied are shown in Table 2 to provide an indication of the content of the corpus, but they are not presented as statistical evidence.

Table 2

Codes Applied to the Corpus and Their Frequency

Code	Frequency	Code	Frequency
business model	52	sustainability	14
barrier	47	credentialing	13
assessment	42	learning outcomes	12
actions	35	verification	11
recruitment	28	badges	10
standards and specifications	26	MOOC	9
technology and infrastructure	23	competence	7
policy	19	community	3
aggregation	16	need	3
trust	15	quality	3
micro-credentials	14	courseware	2

The codes were clustered into themes; Table 3 shows the codes related to each theme and the total frequency of the codes for each theme.

Table 3

Themes, Codes, and Frequency

Theme	Codes	Total frequency in theme
Strategy	policy, barriers, action	101
Business models	business model, sustainability, need	69
Recruitment	recruitment	28
Assessment	assessment, learning outcomes, competence	61
Stackability	aggregation	16

Open credentials	credentialing, micro-credentials, badges, MOOC, courseware	48
Specifications (including competence frameworks)	standards and specifications	26
Trust	technology and infrastructure, trust, verification, quality, community	65

Reports were exported for these themes, containing all the coded text, organised by code and then by respondent. The reports were then examined to explore in greater detail the themes that had been identified. In order to distinguish a thread relating the different aspects to each other, the discussion here does not follow the order of frequency.

Discussion

Open Credentials

There was a consensus that it did not make sense to directly link OER with credentials, and no examples were found of repositories which issued credentials for the use of their resources. As Arnold (32–41) said:

> It's easier to see how you would deliver or issue a micro-credential for recognition of the use of an OER within a course. But I wouldn't say that you could . . . issue a micro-credential for the OER itself.

Similarly, Deville (125–127) emphasised that issuing a credential required the agency of individuals and/or institutions: quizzes or exam questions could also be open content, but this was not the assessment part. The assessment part is that someone organizes and chooses the assessment, and then decides if the student succeeds or fails. Santos-Hermosa (72–86) suggested it was simplest to use OER as part of an existing accredited course so they can be in parallel with other kinds of resources while the assessment remained the same. Such use of OER was seen as valuable but hardly met the original ambitions of the OER movement, for example the call in the Cape Town Open Education Declaration, 2007, for a "global revolution in teaching and learning" (Cape Town Open Declaration, 2017, page 25).

As Barker (78–80) commented, badges can be entirely self-asserted. "You can issue yourself with a badge that says 'I say that I know how to speak Spanish and you can test me on that if you want.' It's an assertion that you're making." Similarly, as Arnold (66–70) said:

> The whole badging movement is very much community-based, giving community recognition: "I will recognize you for this." It's very horizontal, very democratic. The micro-credentialing movement is more institutionalized. It is more the private training companies and higher education

> institutions that are looking at how they can break down their big whole degree offers into micro-credentials.

Most of the respondents emphasised MOOCs as vehicles for credentialing learning achieved through OER. For example, when asked for examples of credentialing learning from OER, Mazar (75) said "the things that immediately spring to mind are more MOOC platforms than OER repositories," while Read (182) gave the example that "in Madrid, the six or seven big players, their MOOC initiatives do successfully give certificates." However, MOOCs were, implicitly or explicitly, seen as a type of micro-credential. For example, Arnold (75) noted that "where we have seen micro-credentials taking off is for the recognition of MOOCs." The emphasis on MOOCs was stronger among interviewees from universities, whereas those in consultancy roles, in industry or in sectoral organisations spoke more of micro-credentials and badges.

Pedagogic Issues

If recognition of learning achieved through OER needs to occur through a validating institution, then the link between the institution and the OER inevitably involves assessment. Although not mentioned in any question, assessment was discussed repeatedly and by all but one of the interviewees, principally concerning how it should be paid for and documented. There was very little evidence in the corpus of assessment materials that were open content, and Campbell (139) was typical in attesting that "other than MOOCs, we don't really have individual open resources with assessment items embedded inside them." Mazar (198–200) ascribed this to a lack of capacity: "OERs take ages to develop then for the poor OER creator; to add more hours into the creation by coming up with an assessment and a credential, that's just too much extra effort for very little return." However, Deville and Jacqmot (388–391) argued that the underlying reason that credentialing learning from OER is problematic is

> because the marginal cost is zero for the openness and it's nonzero for credits. We want a learning pathway to be as open as possible, but as soon as we are dealing with assessment, then it cannot be fully open. It is just technically impossible.

In a traditional university it is usual that the same team designs both the course and the assessment of that course. This cannot be assumed for the assessment of learning from OER, which are designed (at least in principle) for reuse in different contexts. A process is therefore required to ensure that the assessment is appropriate for OER. Jacqmot (140–153) argued that consequently there needs to be a very strong alignment of learning outcomes between the OER and the assessment, with a rubric defining the learning outcomes corresponding to different levels of ability. She added that this is more often the case in the United States than in francophone or Latin education. Any format of learning outcome could answer this need, if accepted by both parties, but nine of the twelve interviewees discussed learning outcomes in terms of competence. The interviewees recognised the power of competence-based approaches, and the challenges in adopting them. For example, Olcott (449–451) stressed that "it's NOT easy when you have to sit down and you have to identify all those competencies and minimum skill levels and performance levels: it is a laborious and detailed process that requires very talented assessment people."

Similarly, de la Higuera (425–427), while supporting a competence-based approach, described the process as "tremendously tedious and difficult," adding that "you have to again realign evaluation or assessment or accreditation with these competences, which is what I don't think is being done." Legal issues are an additional challenge, and Campbell (323–324) stressed that it is important for colleagues "to understand how open education resources can be used and understand the licensing and the copyright implications."

Stackability

Competences, claimed through micro-credentials, can be combined to create a profile which meets the requirements for a higher-level credential or job role. All the interviewees accepted this as part of the rationale behind micro-credentials. For example, Ehlers (32–35) said:

> There is a vision . . . that micro-credentials . . . would in the future allow a very autonomous and self-organized way through learning opportunities that can then be coupled to each other and stacked on each other and then again, maybe also validated by an institution.

Mazar (154) believed that stacking could "make credentialing more sensible" for OER providers. However, Ehlers (35–36) believed that stacking "is still very experimental and does not exist for a broad user group." He diagnosed the problem in Germany as the lack of a qualification framework. Olcott (74–76) also argued that "if you want to stack these micro-credentials onto, let's say, a credit certificate, then you're going to have convert it within some context so that it fits within that qualifications framework." Barker (125–126) believed that "for many people, it would be very advantageous if they could learn in a way that suited their particular circumstances." However, Barker (109–113) was concerned that "universities do a great job of aggregating together lots of different things that need to be learned in order to master a subject. There's a risk of losing the expertise that's required to build learning pathways." Barker's point was supported by Cameron and Rideout (2022), who showed how self-directed learning gives students responsibilities for which they may not be prepared.

The few successful examples of stacking which the interviewees reported did not use overarching frameworks. Rather, as Olcott (126-127) explained, they adopted the approach exemplified by OERu (see Mackintosh, 2017), to "bring a lot of different players together and come up with unique agreements that allow us to use this with greater transparency and more seamlessly." Ossiannilsson (110–111) praised OERu for enabling students to "choose courses from all those places within the Consortia and then . . . go to, for example, Athabasca, to say: 'Please issue my degree.'" Her assessment was that "it is working very, very well. However, I think it should have an even larger outreach, because not many know about it outside this community" (136–137).

Deville (Deville and Jacqmot, 252–262) reported on EVE, a similar ongoing initiative with 10 universities worldwide:

> Universities shared their own MOOCs for credit. . . . We had some dozen students from different universities. . . . The difficulties were mostly administrative, because each university has its own

> regulations for registering students. Timing was very difficult to handle (start and end dates of a semester, date of exams).

Moreover

> people are not always open to adding the new courses from outside. 'Come on, they need to follow my class, not someone else's class,' they say. It's a difficulty, so we have to convince faculties that opening their program to other universities is a good option. (267–270)

The agreements required for initiatives such as OERu and EVE have much in common with the recognition of prior learning. Ehlers (228–234) argued that this was much further advanced in North America than in Germany, even though Germany has a well-developed competence-based and publicly funded education system:

> Recognition of prior learning in Germany is, I think, institutionally quite underdeveloped. . . . In the US . . . they said 'The people who come to us can take tests and assessments, and we find out what they can do already. Then the curriculum they study for their next job profile, or their next qualification profile, only contains those things which they don't have yet.' This kind of idea in Germany is not very popular.

There was no evidence that the situation was different elsewhere in Europe, which implied a lack of existing practice on which stacking can be built.

Technical Issues

Specifications and Competences Catalogues

The interviewees were largely positive about the standards work done to support competences, competence frameworks, and micro-credentials, particularly as carried out by the European Commission. For example, Mazar (41–47) said:

> Now we have lots of other global and European standards and initiatives such as ESCO; the European Classification of Skills Competencies, Qualifications and Occupations; JRC's European Digital Competence Framework; the national and the European Qualifications Frameworks; UNESCO frameworks such as the ISCED fields of education the ISCED levels . . . these standards can greatly support the transparency and portability of digitally signed verifiable credentials.

Similarly, Deville (Deville and Jacqmot, 128–129) singled out the European Commission's contribution to "the very important component, which is an electronic seal, the digital equivalent of an institution's rubber stamp." Read (117–118) said "The European Commission has been doing an amazing job with Europass" while Ehlers (399–403) said "we need a framework to translate the different educational levels, and we have that through the European qualification frameworks. . . . We have the ECTS, we now have the definition of micro-credentials." Barker (144) emphasised the work of the World Wide Web Consortium on "how verifiable credentials can be used to represent educational qualifications, educational credentials."

Nevertheless, Ehlers (284–285) noted that despite this work, at the national level "there is no infrastructure of recognition. There are many qualification frameworks, but there's nothing which has the status of serving as a reference, which is legally proven or guaranteed."

In a similar vein, Barker identified the problem that representations of competences for different professions in different countries vary from country to country in their cultures and technical standards, adding that "it's about meta-models rather than models now, about how you map what's represented in Standard A into what's represented in Standard B" (Barker, 271–273). Other interviewees had more fundamental concerns that too great an insistence on specifications and standards might constrain practice. Olcott (129–132) argued that:

> Europe is trying to go down the road with micro-credentials of coming up with one great big flavour that works for everyone. I think they're making a mistake. I think you'll have to make it so broad that it just won't be flexible enough to deal with the diversity within each of the countries.

Similarly, Deville (354) doubted the need to develop a specification for learning pathways. "If we develop a protocol for this, that could kill many initiatives. I would like to let these pathways be organized, and I think evolution will drive the organisation."

Trust and Technology

Lack of trust in credentials was identified as a major barrier, with de la Higuera (288) saying that "the system has now come to a point where nobody trusts anybody." There was a consensus that two approaches could lay the foundation to address this. First, the evidence for learning must be explicit, and the standards described in the previous section can support this. Olcott (89–90) proposed that trust could be built "by engaging all key stakeholders in the creation and implementation of competency levels and skills certification criteria." Similarly, Deville (383–385) argued that:

> The trust should be in the credit system. I don't care where the learning outcomes have been obtained, I just want them to be there. Of course, it's nice to have an effective OER and learning pathway and so on, but the trust must be in the assessment for the credit.

Mazar (265–273) highlighted the documentation of assessment methods. "Not all assessments are equal. . . . If the assessment is well enough described to show the credential viewer or verifier how trustworthy and believable the credential is, that would definitely support trust."

Second, the identity of the issuing institution must be verifiable, and this is one of the functions of the digital infrastructure for micro-credentials. The interviewees were largely positive about the technical infrastructure developed by the European Commission for this purpose, including Europass and eSeals, which Read referred to as a "before and after in the question of the certification of open education, micro-credentials, digital micro-credentials, etc." Mazar (50) stressed the importance of the legally binding eIDAS European standard for e-signatures, and Arnold (302–307) explained how

> the ECCOE project is based on the European Commission solution for European digital credentials for learning, and so the whole argument of our trust there is based on it coming from the European Commission, so it is trustworthy. But all these different trust mechanisms have built-in authentication checks, validation checks, and transparency. 'This credential has been issued by so and so, for this reason, it has been stamped here and it is valid and it hasn't been tampered with.'

However, none of the interviewees mentioned any other emerging technologies that might transform practice, or the need for them. Barker (253–257), whose work has a strong technical focus, said "the technologies are there. What's required is the . . . capacity to use the technologies. That doesn't mean the technologies don't still need developing but they will be developed as soon as there is the capacity to use them."

Similarly, Olcott (221) argued that digital transformation "is not about technology, it's about business models." De la Higuera (473–474) commented that "people are looking for technical solutions. It's not about technical solutions, not for the moment." As a full professor who specialises in artificial intelligence (AI), he was sceptical about the hopes for AI to provide automated assessment of learning obtained through OER and emphasised its tendency to embed existing poor practices. "If anything, AI proves that we're evaluating syntax and shallow semantics" (de la Higuera, 383–384).

On the same topic of making the most of existing technologies, Campbell (212–213) said that in Edinburgh University there is no OER repository because "we view the Web as our repository, and our strategy is to put resources where other people can most usefully find them."

Deville (401–405) took the opposite position, arguing that:

> We were able to convince people to contribute because it was a university repository. If we had only proposed putting the OERs on some European repository, I don't know if we would get the same motivation. Having clear visibility for individual contributions is important. But on the other hand, it's very important to be seen by the whole world, which means that our repository must be also integrated within larger repositories through harvesting.

Olcott (178–17) also favoured the use of repositories, but for a different reason, arguing that repositories enable institutions to maintain "the functions of good management and leadership" needed to run micro-credentials. Similar issues arose concerning MOOCs, which can either be hosted by the institution using their own learning management system or outsourced to one of the MOOC providers.

Business Issues

Recruitment

For learners, it is clearly important that their credentials, and the skills and knowledge which they document, are recognised by employers, and the interviewees recognised that this is a strong argument for competence-based education as a means for empowering learners through OER-based micro-credentials.

However, interviewees disagreed on the degree to which this approach could provide a basis for automated or semi-automated recruitment. For example, Mazar (239–247) was enthusiastic:

> There are so many applications for any job that human resource management systems will have to use some kind of algorithm to scan curriculum vitae and credentials for the candidate's suitability for the vacancy. If the data is structured enough and available in a digital machine-readable format, that would probably support the credential holder to prove their fitness for the vacancy. . . . I'm quite convinced that, sooner or later, this . . . would benefit citizens who have digital credentials.

In contrast, de la Higuera (183–187) was sceptical about this prospect:

> I can't see how I am going to be convinced by somebody who's going to arrive and say, 'Well, you know, I've had this, this and this and this certified by all these blobs.' I will give that person a chance. I would say: 'You've done a lot. Come into my office, let's talk about it,' and I would try to pinpoint some of those pieces of knowledge that you should have gathered through that.

Business Models

As noted above, in learning with OER it cannot be assumed that the same teams or institutions will be responsible for pedagogic materials, their design, and for assessments. This has implications for institutions' business processes, which led some interviewees to argue strongly that the two functions should be separated, while others gave no counter examples. Campbell described how

> alongside the OER service, where I work, in Edinburgh we have another service altogether called the online course production service. They are the team that build our MOOCs and free short online courses. Both services work together to ensure the majority of these courses are designed to be open by default.

Deville (385–391) stressed that

> we are very explicit on a clear separation between the platform where we provide open material, and any kind of system to do the assessment and to give credits. This should not be mixed, essentially because the marginal cost is zero for the openness and it's nonzero for credits, so it should be organized in a totally different way. We want a learning pathway to be as open as possible, but as soon as we are dealing with assessment, then it cannot be fully open. It is just technically impossible.

Deville and Jacqmot shared their work on forms of collaboration between institutions (Jacqmot et al., 2020), which articulated institutions' operations in open education into four quadrants: (a) the provision of content, (b) learning pathways, (c) interactions with teachers or peers, and (d) assessment. As Deville (369–376) discussed, the marginal cost is zero for quadrants (a) and (b) and non-zero for (c) and (d), consequently resulting in contrasting economic conditions. Various collaboration models can be derived delegating different quadrants, usually cumulatively ascending from (a) to (d). Olcott (103–104) stressed that for progress to be made "you must bring the key stakeholders to the table. Unless everyone agrees on

what constitutes quality and competencies that demonstrated minimum skill levels . . . consensus building is first and foremost." However, Jacqmot (140–163) warned that unbundling educational services is no simple matter:

> On both sides, on the side of assessment and on the side of OER, we have to define very precisely the learning outcomes that are developed. . . . I'm not sure it's obvious how to tackle the outcomes when you are conceiving and producing the OER and the assessment in different parts of the world, and if we can hope that those two will be aligned.

Read (356–360) suggested that a friend-of-a-friend model might be a solution to dealing with this complexity:

> If for example, institution A respects institution B and the quality of their courses, and institution B respects institution C and the quality of their courses, then automatically institution A would accept courses from institution C. . . . When you move up to large agglomerations of educational organizations then you begin to see, maybe, light at the end of tunnel.

The interviewees all acknowledged that the alignment of learning materials with competence requirements, as well as the creation of learning paths and activities to assess learning achievement required funding, as do any teaching activities. Different models were proposed for this.

First, students can pay for courses. Olcott (436–452) argued that when working with OER it was reasonable for universities to charge for the design of courses, creation of learning paths for training and non-credit courses, and particularly for assessment. The cost of micro-credentials remains unclear. "In very technical areas they won't be cheap. . . . It is a laborious and detailed process that requires very talented assessment people" (Olcott 441–451). Arnold (392–394) agreed that charging for assessment was to be expected, adding that "for some things you actually pay . . . 500 pounds to get the credential, because there's a formal exam involved, or . . . identity verification of the person." Read agreed, but cautioned that care should be taken when charging for access to MOOC content. Deville (308–311) argued that unless the sector can "demonstrate the added value of teachers' interactions with students," there is a danger that education will become dominated by online providers who "will just provide materials and credits, all the data will be recorded, and everything will be 'free.'" Similarly, de la Higuera (172–173) identified the danger of offers to "click on a few buttons and then you get a micro-credential." Such concerns about undermining the quality of existing educational procedures inevitably constitute a brake on institutions and teachers working with micro-credentials in connection with OER.

Second, institutions could decide to subsidise some open credentials because, as Deville argued "if you want to sell something, you have to show the client that what you are selling really has value" (297-298). This approach could generate a stream of future students. It could also align with a university's mission. For example, Campbell (467–468) described how "Edinburgh University's current mission and vision statement is about sharing knowledge to make the world a better place."

Third, there was a strong consensus that there is a need for support from European states and the European Commission. As Read (172–173) argued: "if they want to have open education, open certification, etc., then they have to give us funds to make it possible." Similarly, Mazar (226–227) called for more national or European funding because "I don't think, realistically speaking, any institution would voluntarily sign up to put more effort into credentialing on a small scale." Support can also take the form of regulation that makes the publishing of open credentials more financially viable. As Santos-Hermosa argued (216–217), the state can ensure that open credentials are useful for professional accreditation, and this requires educators to engage with national quality agencies and with professional associations, a point also made by Olcott (85–86). Read gave the example of Portugal, where the government is providing funding to the Universidade Aberta, which is "trying to use digital micro-credentials and open education as a transverse mechanism for certifying everything. We're talking about firemen, policemen, everybody" (133-134). Read also saw companies as a possible source of funding, although he was alone among the interviewees in identifying this as an option.

Conclusions

These findings are based on in-depth data gathered from a relatively small number of respondents, and the results have strengths and weaknesses corresponding to this approach. We have identified themes in the discourse concerning open credentials and identified the principal issues and points of agreement and divergence. We believe that even with the small number of respondents, their expertise and high profile in the field as well as the data collection depth provide a good guide to the current state of the discourse in post-secondary education in Europe. On the other hand, no claim has been made for the relative importance of the themes nor their impact on the ground, nor were divergent opinions resolved. The principal themes and findings are summarised below. Our recommendation is simple: first, policy makers, ministries of education, and institutions should pay attention to these expert views when formulating policies and actions concerning open credentials; second, our findings should be treated as an agenda for further research with methods which can confirm or falsify our findings through more detailed case studies.

The Relationship Between OER and Alternative Open Credentials

There was a clear consensus in the interviews that any recognition of learning achieved through OER which would be of value to the learner would need to be explicitly linked to a validating institution. The mechanism for achieving this validation was discussed in terms of micro-credentials, which subsume the certification of learning achievement in MOOCs. Unlike micro-credentials, badges were seen in terms of certifications of completion or non-validated claims of learning achievement, despite the overlapping definitions of the two terms.

Assessment

Very little evidence was found of assessment materials as open content in OER. It was proposed that this is due to the additional work of preparing assessments and the institutional need to split assessment (non-zero marginal cost) from OER creation (zero marginal cost). This split also requires the careful formulation

of learning objectives (often as competences) and close alignment of learning objectives in the OER, assessment, and rubrics.

Stackability

The interviews were all consistent with the statement by McGreal and Olcott (2022) that micro-credentials "may or may not apply towards a higher credential" (page 3) as opposed to the position of the European Commission (2021) that they "do not replace traditional qualifications" (page 1). However, in practice this is hard to achieve, and there are few examples of micro-credentials that are stackable across institutions. A higher level of recognition of prior learning in Europe would provide a platform for the development of stackability.

Specifications and Competence Catalogues

There was a positive perception of the quality and value of the standards and infrastructure to support competences, competence frameworks, and micro-credentials, particularly those developed by the European Commission. Practical problems remain in integrating competence frameworks, and there was a minority view that a single framework for Europe may be too restrictive. There was no call for further standardisation, for example of learning paths.

Trust

Two approaches to building trust were widely supported. First, the evidence for the learning must be explicit, and competence frameworks are a widely supported route towards this. Second, the technical infrastructure developed by the European Commission to verify the identity of the issuing institution (Europass and eSeals) was seen as a very valuable step forward. However, despite the welcome given to this infrastructure, all interviewees situated current challenges as organisational and practical, not technological.

Recruitment

All interviewees saw open micro-credentials as valuable evidence which could be examined at interviews, but they were split between those who were enthusiastic or sceptical about automated recruitment on such a basis.

Business Models

There was a consensus that the design of learning materials and of assessment should be separate organisational functions if the vision of open micro-credentials is to be realised. Expertise and funding are required to align learning materials, competence requirements, learning paths, and activities to assess learning achievement. Student payment for assessment and awards (but not for access to learning materials) was seen as acceptable and inevitable, and the fees may sometimes be substantial. Some institutions may choose to subsidise some open credentials to create a pool of students who may join other courses. There was a strong consensus that support from the European Commission and member states is essential to open micro-credentials, both in providing funding and in ensuring that open credentials are valid for professional accreditation.

Acknowledgements

This research was partially funded by the ENCORE+ project under the Erasmus + Programme supported by the European Union (Grant agreement number 621586-EPP-1-2020-1-NO-EPPKA2-KA), and by the Research Institute for Innovation & Technology in Education (UNIR iTED) at Universidad Internacional de La Rioja (UNIR).

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