The Rise and Recognition of Micro-credentials

Stacking Modules and the Future of the Qualification

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Executive Summary

This paper revisits the current flexibilization of the education landscape (modular learning and stacking of learning units) and what the implications are for current good practice in recognition as promoted by the LRC. The purpose of this paper is twofold: to provide insight into the current state of play in the field of micro-credentials, and to give recommendations for the development of practices for their recognition.

Micro-credentials have been on the rise. They are generally expected to widen participation in higher education and to close skills gaps in the labour market. At present, many definitions and descriptions of micro-credentials are being used. In this paper, the definition proposed by the European Commission in 2021 will be adopted:

> *'Micro-credential' means the record of the learning outcomes that a learner has acquired following a small volume of learning. These learning outcomes have been assessed against transparent and clearly defined standards.*

States across the globe have been preparing themselves for the advancement of micro-credentials and are developing policies for their regulation. What most national policies on the recognition of micro-credentials have in common is an agreement that the size and workload of micro-credentials are shorter than that of regular degree programmes. Furthermore, many states have formulated clear notions on how micro-credentials relate to formal degrees and have decided on the kind of providers of micro-credentials that are acceptable for recognition. Because of these developments, it can be expected that micro-credentials are on the verge of becoming formal qualifications in their own right, linked to quality assurance and national qualification frameworks.

In this paper, a two-track approach is proposed for recognizing micro-credentials:

1. In principle, micro-credentials that are integrated into the Bologna Process can be recognized in line with the Lisbon Recognition Convention (LRC), the main convention for the international recognition of credentials in the European Higher Education Area (EHEA).
2. Micro-credentials that are offered by non-formal providers and that fall outside of the Bologna framework could still be recognized, making use of procedures for Recognition of Prior Learning (RPL). Good practices for recognizing micro-credentials will therefore go together with the implementation of strong, flexible and widely accessible RPL regimes. Existing legal frameworks for RPL could be used to develop procedures that are 'fit for purpose', meaning the process should not be overly burdensome for the recognition authority or for the learner.

Recognition practitioners could apply the methodology developed in the e-Valuate project[1] to recognize micro-credentials. The flexibility that this method calls for will in some cases facilitate a smoother and more time-efficient approach that stands between conventional recognition procedures and RPL procedures.

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1) E-Valuate Consortium (2019, September). *Practitioner's guide for recognition of e-learning: Introducing a step-by-step approach towards academic recognition of stand-alone e-learning.* Nuffic. https://www.nuffic.nl/sites/default/files/2020-08/practitioners-guide-for-recognition-of-e-learning.pdf

The subject of micro-credentials is discussed in three parts in this paper:

- *Part one: context.* This part provides the necessary background on micro-credentials and includes a chapter on the reasons why micro-credentials are on the rise, and a chapter with a selection of policy developments around the globe.
- *Part two: a two-track approach for recognition.* This part focusses on the possibilities for the recognition of micro-credentials and discusses a two-track approach for recognition.
- *Part three: stackability.* This part discusses the different ways in which micro-credentials can be stacked towards full qualifications and how stacking can be facilitated.

The visual below can be used by readers who are primarily interested in the recognition process for micro-credentials to navigate through this paper:

Micro-credential

E-Valuate method
· Flexible recognition approach for micro-credentials.

Chapter III

LRC procedure
· For micro-credentials that are integrated in the Bologna process.

Chapter III

RPL procedure
· For micro-credentials from informal providers.
· "Fit for purpose" procedures.
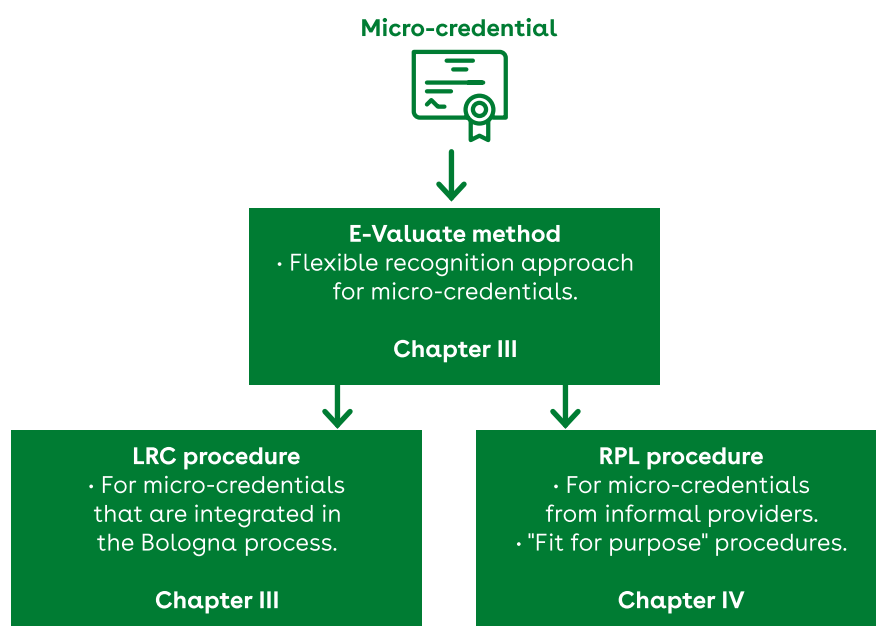
Chapter IV

Steps of the two-track recognition procedure for micro-credentials with references to the corresponding chapters of this paper.

In addition, specific attention will be brought to the various ways in which micro-credentials can be stacked towards full qualifications. For providers, designing options to 'pre-stack' micro-credentials within a coherent programme is encouraged, as this can facilitate time-efficient and smooth recognition.

Introduction

The rationale for writing this paper is rooted in the ongoing flexibilization of education, resulting in an increase of stand-alone modules of learning. Without a clear profile, seeking recognition of a stack of credits is at odds with current good practice in recognition which is based on coherent qualifications and the five elements in it. The STACQ project was established to revisit what a qualification is in light of the current changing education landscape and what the implications are for current good practice in recognition. Therefore, this paper will reflect on the impact of the flexibilization of higher education on recognition. While flexibilization comes in different forms, this paper will focus on modularization and the recognition of micro-credentials. Modularization of education can be broadly defined as the partition of a conventional degree pathway into short courses. Stackability of these courses into larger units is a characteristic of modular education. Completing a modular learning experience can lead to the award of a micro-credential. As will be discussed in the next chapter, micro-credentials are offered in the form of online learning (e.g. Massive Open Online Courses (MOOCs)), but can also be face-to-face or blended. In this paper, the terms 'modular education', 'short courses' and 'micro-credentials' will sometimes be used interchangeably, depending on the context.

Modular education has been attributed the potential to make education more inclusive, to overcome skills gaps in a rapidly changing global economy, and even to change the way we understand the nature of education and learning itself. The rise of modularization might change our future understanding of the qualification. What the precise impact will be in the coming years is yet to be seen, but modular learning is likely here to stay. For ENIC-NARIC recognition professionals, however, the subject of modularization no longer merely concerns a theoretical discussion. Micro-credentials in different shapes and forms have been hitting our desks, a trend which is expected to grow in the coming years. There is a practical need for guidelines, methods and policies to deal with their recognition. From this perspective, it is also important that ENIC-NARIC centres are well informed on the broader developments in the field of micro-credentials.

Aim of the paper

In this paper we will start with the existing legal framework of the Lisbon Recognition Convention and good practices developed in the ENIC-NARIC Networks. We will reflect on when and how micro-credentials can be recognized in line with the LRC and what alternatives are available if this is not possible, in order to align with new developments in the field of modular education.

The aim of this paper is to:

1. map developments in modular education;
2. present an analysis of different types of modular education and provide examples;
3. prompt wider reflection in the sector on what modular offerings of education mean for recognition.

Target groups

The paper is aimed at ENIC-NARIC centres, LRC Committee Bureau, Higher Education Institutions (HEIs), students, accreditation organizations, MOOC platforms and other (online) education providers, professional bodies, and policy makers.

About the STACQ paper

This position paper is produced as part of the 'Stacking Credits and the Future of the Qualification' project (STACQ), aiming to contribute to more effective policies for the recognition of modular learning in the EHEA. The STACQ consortium is composed of representatives from the ENIC-NARIC network: NARIC Ireland, NARIC Lithuania, NARIC Malta, NARIC the Netherlands, NARIC Sweden and UK ENIC. Other partners involved are the European Association for Distance Teaching Universities (EADTU), the European Consortium for Accreditation in higher education (ECA) and the Art of E-Learning. The STACQ project is coordinated by Nuffic and co-funded by the Erasmus+ Programme of the European Union. The first draft of this paper was sent as input for the European Commission's public consultation on micro-credentials. This draft was also presented to different stakeholders in an online work conference in November 2021. Representatives from the European Commission, the Council of Europe, EDEN, EQAR, ESU, EUA and the Thematic Peer Group B on the LRC participated in this conference. Furthermore, the ENIC-NARICs of Estonia, Poland, Ukraine, the Austrian Federal Ministry of Education, Science and Research, as well as the Danish Agency for Higher Education and Science, the Dutch Ministry of Education, Culture and Science and the Accreditation Organisation of the Netherlands and Flanders were represented. All participants have provided rich input on the original draft paper, which was integrated into this publication.

Part I: Context

Chapter 1 - Why modular education?

Modular education is often seen as a way of widening participation in higher education, both for professionals in need of upskilling or reskilling, and for disadvantaged groups that traditionally have limited access to higher education. At the same time, the rise of micro-credentials has not gone undisputed. Critics point out the potential risks with regard to the commercialization of education and the quality of new (online) education providers[2]. There are also concerns that the fragmentation of a cohesive degree pathway could undermine a more elemental purpose of higher education, which relates more to the traditional formative aspects of higher education than to the development of a particular set of skills. These formative aspects include an ongoing learning and mentoring process that ought to take place between academics and students, and embedding a wide range of scientific, intellectual and cultural competences.[3] In general, however, modular learning is seen as an innovative and perhaps even indispensable way to support skills development, lifelong learning and inclusion within the European Higher Education Area (EHEA) and the European Union. The flexibility offered by modular education allows prospective students greater choice of how to arrange their studies and gives them control over the content of a study programme, as well as the choice to attend studies online or on campus, and also the possibility of flexible entry and exit points[4]. By its flexible and short-term nature, modular education makes it possible for professionals and part-time students to combine their studies with work and care-taking responsibilities. Short courses can also contribute to economic development by offering the necessary flexibility to quickly adapt to contemporary labour market needs.

From a recognition perspective, however, micro-credentials are not a strictly new phenomenon. Recognition professionals have long been receiving certificates of stand-alone courses, examinations and other short learning experiences, both from formal and informal providers. Even though the term 'micro-credential' may not have been employed, the approach that recognition professionals have taken in evaluating such cases may be similar to the recognition pathways proposed in this paper. The recognition perspective is therefore pragmatic; it centers on the steps of an evaluation process that need to be taken once a micro-credential shows up in our workload. To this end, discussions about the exact differences between traditional academic courses, modular learning and micro-credentials are less relevant. The key issue that is at stake for the recognition professional is how these various short learning experiences can be evaluated in a fair and smooth manner.

1.1   The promise of micro-credentials in the EHEA

In the latest Rome communiqué, the 49 EHEA countries identified micro-credentials as a way to make the EHEA more innovative[5]. The promises of micro-credentials are also at the core of the European Approach to Micro-Credentials launched by the European Commission in 2020[6].

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2)   Greatrix, P. (2020). *Stack 'em high, sell 'em cheap – get your micro-credentials here*. Wonkhe. https://wonkhe.com/blogs/stack-em-high-sell-em-cheap/

3)   Ralston, S. J. (2020). Higher Education's Microcredentialing Craze: a Postdigital-Deweyan Critique. *Postdigital Science and Education*, 3(1), 83–101. https://doi.org/10.1007/s42438-020-00121-8

4)   French, S. (2015). *The Benefits and Challenges of Modular Higher Education Curricula*. The University of Melbourne. https://melbourne-cshe.unimelb.edu.au/resources/categories/occasional-papers/the-benefits-and-challenges-of-modular-higher-education-curricula

5)   European Higher Education Area. (2020). *Rome Ministerial Communiqué*. https://ehea.info/Upload/Rome_Ministerial_Communique.pdf

6)   European Commission. (2020, December). *Final Report: A European Approach to Micro-Credentials. Output of the Micro-Credentials Higher Education Consultation Group*. https://ec.europa.eu/education/sites/default/files/document-library-docs/european-approach-micro-credentials-higher-education-consultation-group-output-final-report.pdf. P 10.

A consultation with an international group of experts led to the proposal of a Council Recommendation on a European approach to micro-credentials for lifelong learning and employability in December 2021.[7] The Commission proposed the following definition:

> *'Micro-credential' means the record of the learning outcomes that a learner has acquired following a small volume of learning. These learning outcomes have been assessed against transparent and clearly defined standards. Courses leading to micro-credentials are designed to provide the learner with specific knowledge, skills and competences that respond to societal, personal, cultural or labour market needs. Micro-credentials are owned by the learner, can be shared and are portable. They may be standalone or combined into larger credentials. They are underpinned by quality assurance following agreed standards in the relevant sector or area of activity.*

In this definition, modular education is not exclusively reserved for higher education providers. In fact, providers of micro-credentials are meant to entail any actors (including employers, industry and civil society organizations) that design, deliver and issue micro-credentials for formal, informal and non-formal learning. In addition, the mode of delivery (on-site, online or in a blended format) can vary. This broad definition should eventually support the permeability between education sectors and between non-formal, informal and formal education and learning. Because it encompasses a wide variety of learning experiences, the definition aligns well with the pragmatism of the recognition perspective. Therefore, it forms a useful basis for the further discussions in this paper.

For the purposes of this paper, we will consider a broad range of courses, provided by a variety of course providers. Below are three examples of online micro-credentials, that would fit the definition above:

Coursera, a large provider of MOOCs, has launched MasterTrack certificates. In the MasterTrack programme, modules from accredited master's degrees are broken down into stand-alone modules allowing students to earn credentials in a flexible and interactive format. Credits attained during the MasterTrack programme allow for access to master's degrees from partner universities. Examples of MasterTrack certificates include *Data Science, Computer Science and Business* and *Design*. **https://www.coursera.org/mastertrack**

The Saylor Academy, a non-profit initiative, has been working since 2008 to offer free and open online courses to all who want to learn. They offer nearly 100 courses at the college and professional levels, each built by subject matter experts. All courses are free of cost. Courses include a diverse range of subjects and skills, from *Art History* to *Public Speaking* and *Pre-College English*. **https://www.saylor.org/**

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7) *EUR-Lex - 52021DC0770 - EUR-Lex.* (2021, December). Proposal for a COUNCIL RECOMMENDATION on a European Approach to Micro-Credentials for Lifelong Learning and Employability. https://eur-lex.europa.eu/legal-content/EN-NL/TXT/?from=EN&uri=CELEX%3A52021DC0770

An example of modular learning offered by employers is the micro-credential *Customer Experience Management*. The course is offered by the Salesforce company, in collaboration with the UK online learning platform FutureLearn. Coventry University London accepts the course for exemption of 15 UK credits. **https://www.futurelearn.com/microcredentials/customer-experience-success-salesforce**

1.2   The impact of COVID-19

The advancement of micro-credentials long predates the pandemic. But more recently, modular learning has been seen as an effective way to reskill and upskill people that have become unemployed due to the COVID-19 crisis. Hence, the European Commission argues that a larger uptake of micro-credentials could foster educational and economic innovation and contribute to a sustainable post-pandemic recovery[8]. The proposed Council Recommendation on micro-credentials also states that the role of micro-credentials should be explored as part of the implementation of the Recommendation on Effective Active Support to Employment following the COVID-19 crisis (EASE).

The experience with new formats of education provision that providers have gained during the pandemic may help to reach this goal. When all over the world university campuses had to close, they rapidly turned to online education provision. Online platforms like Coursera and edX supported universities by opening their MOOC libraries for free[9]. In this way, the pandemic has not only accelerated the movement towards digitalization of education but has also revealed the strengths and weaknesses in the current digital infrastructure and educational approaches. These lessons learned during the pandemic form the basis of the European Digital Education Action Plan 2021-2027, wherein micro-credentials are named as one of the solutions for a more ambitious approach towards digital education[10]. In parallel, the digital infrastructure of Europass has been installed to counter gaps in the labour market, which could also support the portability, sharing and storage of digital micro-credentials.[11]

Will this eventually lead to the further modularization and flexibilization of education? Although it is difficult to provide a definite answer, Anant Agarwal, CEO of edX, does not seem to doubt it. Already in 2017 during the US higher Education Innovation Summit, he predicted: 'education will become modular, omnichannel and lifelong'[12].

8) European Commission. (n.d.) *Final Report: A European Approach to Micro-Credentials*: 7. https://education.ec.europa.eu/levels/higher-education/european-approach-to-micro-credentials

9) Young, J. R. (2020, October 21). *Will the Pandemic Lead More Colleges to Offer Credit for MOOCs? Coursera is Pushing for It*. EdSurge. https://www.edsurge.com/news/2020-10-15-will-the-pandemic-lead-more-colleges-to-offer-credit-for-moocs-coursera-is-pushing-for-it

10) European Commission. (2020, September). Digital Education Action Plan 2021–2027. *Resetting Education and Training for the Digital Age*. https://ec.europa.eu/education/sites/default/files/document-library-docs/deap-communication-sept2020_en.pdf

11) European Commission. *Final Report: A European Approach to Micro-Credentials*: 8.

12) Young, J. R. (2018, December 27). *EdX Quietly Developing 'MicroBachelors' Program*. EdSurge. https://www.edsurge.com/news/2018-01-25-edx-quietly-developing-microbachelors-program

Chapter 2 - Policy developments: reflections from recognition

A lack of standardization of modular learning makes it more difficult to compare and use it for further learning or employment. To take full advantage of the outcomes of such learning, there is a need for transparent information provision as well as a clear vision on the way micro-credentials relate to formal (higher) education.

In this chapter we will give an overview of different regional approaches to modular learning, reflecting the different ways in which higher education is perceived. Where education is seen as a public good, much emphasis is placed on the humanistic norms and values to which modular learning can contribute. In Chapter I we already mentioned the importance of inclusion and lifelong learning within EHEA and EU. Where, on the other hand, micro-credentials are introduced into a highly marketized higher education context, such as in the UK or the US, we are likely to see a greater emphasis on competition between providers, and a focus on students getting 'value for money'.

In light of these differences, it is useful to provide an overview of how providers, professional associations and other organizations work to make the outcomes of modular learning more transparent and transferable. Do we see similarities or differences? And how do these initiatives support recognition?

2.1   A selection of regional approaches

Modular learning is increasingly becoming a policy focus. Policy makers, both at a regional and national level, often rely on previous initiatives by higher education institutions, providers, associations, and networks to improve transparency and standardization of such awards[13].

In *Europe*, micro-credentials have been incorporated into the political agenda throughout various initiatives, such as the European Skills Agenda and the Digital Education Plan[14]. As previously mentioned, efforts are being made to establish a common European approach to micro-credentials. The need for such a common approach had also been expressed by organisations such as the European Universities Initiative and the European Association of Institutions in Higher Education (EURASHE). Possible connections of micro-credentials to the Bologna tools are explored in the MICROBOL project[15], and links to the labour market are investigated by organisations like CEDEFOP and the European MOOC Consortium – Labour Market[16]. In December 2021 a Council Recommendation on a European Approach to micro-credentials for lifelong learning en employability was proposed. In this proposal, Member States are recommended to:

- apply a common EU definition, standards and key principles for the design, issuance and portability of micro-credentials;
- develop the ecosystem for micro-credentials;
- deliver on the potential of micro-credentials to support lifelong learning and employability.

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13) For a European initiative: see the Common Microcredential Framework (CMF). Konings, L. (n.d.). *CMF awarded programmes - European MOOC Consortium*. EADTU. https://emc.eadtu.eu/cmf-awarded-programmes

14) European Commission. (n.d.) *Digital Education Action Plan 2021–2027*. https://education.ec.europa.eu/focus-topics/digital/education-action-plan

15) *MICROBOL. (n.d.). MICROBOL – Micro-Credentials Linked to the Bologna Key Commitments*. https://microcredentials.eu/about-2/microbol//

16) E.g., CEDEFOP (2021, November). *Conference on microcredentials*. https://www.cedefop.europa.eu/en/events/conference-microcredentials; Henderikx, P. et al., (2020, February). European MOOC Consortium - *Report of the peer learning activity: MOOCs and online learning opportunities for the labour market*. Brussels, House of the Dutch Provinces. https://emc.eadtu.eu/images/publications_and_outputs/EMC-LM_PLA__report_final.pdf

The proposal for a Council Recommendation on micro-credentials is meant to be adopted in parallel with the Commission's proposal for a Council Recommendation on Individual Learning Accounts, which proposes Member States set up personal accounts with training entitlements for all adults of working age.

In the *United States*, government funding has been allocated to develop alternative credentials alongside those included in the formal education system[17]. To ensure the quality of such awards, the Council for Higher Education Accreditation (CHEA) has developed a set of recommendations for reviewing the quality of shorter learning experiences[18]. As is the case in other regions, there is no common standardised terminology. From the field there are various bottom-up initiatives to increase transparency and common understanding of micro-credentials; an example is the non-profit organisation Credential Engine[19]. But there are also calls for developing a database with information on short credentials at a state level[20].

New Zealand has incorporated micro-credentials as part of its regulated education. It has established specific requirements for workload, purpose, assessment standards, regular quality reviews, etc. The New Zealand Qualifications Authority (NZQA) reviews and approves applications to offer micro-credentials against specific quality standards. An approved micro-credential carries a certain number of credits at a specific level and is included in the register.[21]

Australia reviewed its qualification framework (AQF) in 2019 for the potential of including shorter credentials into the levels and decided not to include them as a separate type of qualification for now. However, it set out guidance on quality assurance of shorter credentials through requirements for a credit bearing credential, established mechanisms for alignment of micro-credentials to specific level of AQF bands, and set out a future course of action.[22]

Some countries have developed credit banks, which allow for crediting various forms of learning as well as combining and accumulating these credits into a formal qualification. This system exists in the *Republic of Korea* (the Academic Credit Bank System) and *Hong Kong*, where it is aligned with the Hong Kong qualification framework. In *China*, there are similar regional initiatives, such as the Shanghai Academy Credit Transfer and Accumulation Bank for Lifelong Education[23]. These credit banks support lifelong learning and have a lot of potential for crediting and stacking micro-credentials.

In *India*, the government launched the Study Webs of Active Learning for Young Aspiring Minds (SWAYAM) MOOC platform in 2016, and created a new regulation for the recognition of MOOCs which allowed for 'accredited Indian higher education institutions and their affiliates to review all

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17) DVP - PRAXIS. (2019). *Impacts of Key Community College Strategies on Non-Degree Credential Completion by Adult Learners*. https://www.luminafoundation.org/wp-content/uploads/2019/11/impacts-of-key-community-college-strategies-on-non-degree-credential-completion-by-adult-learners.pdf

18) Van der Hijden, P. (2019). *Digitization of Credentials: Quality of Shorter-Term Educational Experiences*. CHEA/CIQG Publication Series. https://www.chea.org/sites/default/files/pdf/The-Quality-of-Shorter-Term-Educational-Experiences.pdf

19) Credential Engine. (2021, February 10). *Making ALL Credentials Transparent & Revealing the Marketplace of Credentials*. https://credentialengine.org/

20) Van Noy, M., McKay, H., & Michael, S. (2019, July). *Non-Degree Credential Quality: A Conceptual Framework to Guide Measurement*. Rutgers School of Management and Labor Relations. https://smlr.rutgers.edu/sites/smlr/files/Images/Centers/rutgerseerc_ndcquality_framework_full_paper_final.pdf

21) New Zealand Qualifications Authority. (n.d.). *Micro-credentials* https://www.nzqa.govt.nz/providers-partners/approval-accreditation-and-registration/micro-credentials

22) Department of Education. (2019, October). *Review of the Australian Qualifications Framework Final Report 2019*. Australian Qualifications Framework. https://www.dese.gov.au/higher-education-reviews-and-consultations/resources/review-australian-qualifications-framework-final-report-2019

23) Shanghai Open University. (n.d.). *Shanghai Academy Credit Transfer and Accumulation Bank for Lifelong Education*. https://global.sou.edu.cn/academics/shanghai-academy-credit-transfer-and-accumulation-bank-for-lifelong-education/

MOOCs posted on the platform and decide which ones they would like to offer (and recognize)'.[24] Courses are offered free of charge and institutions are allowed to recognize up to 20 percent of courses offered by SWAYAM per semester in their undergraduate programmes. The initiative could set a precedent for further regulation of micro-credentials in India.

2.2 Relevance for recognition

Clearly, state policy changes and reforms are important to ensure common acceptance of micro-credentials at the level of the national qualification framework. Modular learning includes varied and diversified types of learning. Agreeing on a common understanding of micro-credentials is a first step towards increasing the transparency of such awards. The definitions provided by governments or non-governmental actors differ, but most of them have similar defining elements. These include the size of an award, its relationship to formal programmes and qualifications within the national education system and the types of providers that are allowed to offer micro-credentials.

- Size: Many definitions and descriptions attempt to identify the range of workload (in credits or hours) to be associated with micro-credentials. There is a common agreement that they should be shorter than any regular degree programme, but how short would depend on national systems. NZQA provides a specific acceptable range of credits for micro-credentials in New Zealand (5 to 40 credits), while the European Commission's report 'A European Approach to Micro-Credentials' notes that micro-credentials could range from a 'minimum of 1 ECTS credit with an upper limit of 'less than a full degree''.

- Relation to formal qualifications: Most descriptions of what constitutes a micro-credential outline its relationship to formal programmes and/or qualifications. The definition used for the review of the AQF states that this learning can be 'additional, alternate, complementary to or a formal component of a formal qualification'[25]. Not all systems and initiatives rely on such wide definitions. For example, the Recommendation of the German Rectors Conference (HRK) on micro-degrees and badges primarily focuses on micro-degrees as components of study programmes: 'the fundamental idea underlying micro-degrees is that topics covered by study programmes can be broken down into micro-components and reassembled'[26]. The description provided by New Zealand specifically describes micro-credentials as complementing the formal education system, not duplicating it noting that they are 'skill development opportunities not currently catered for in the regulated tertiary education system'[27]. Many definitions place focus on learning outcomes in this way shifting the focus from the form to the outcome.

24) Vincent-Lancrin, S. (2016, December 8). *Open higher education: What are we talking about? Background paper 1*. OECD Centre for Educational Research and Innovation (CERI) and Laureate International Universities (LIU) International seminar 'Opening higher education: what the future might bring', Berlin.

25) Oliver, B. (2019, August). *Making micro-credentials work for learners, employers and providers*. Deakin University. https://dteach.deakin.edu.au/wp-content/uploads/sites/103/2019/08/Making-micro-credentials-work-Oliver-Deakin-2019-full-report.pdf

26) HRK. (2020, November 24). Recommendation by the 29th General Assembly of the German Rectors˝ Conference (HRK) on 24 November 2020. *Micro-degrees and badges as formats of supplementary digital credentials*. (2020, November). https://www.hrk.de/fileadmin/redaktion/hrk/02-Dokumente/02-01-Beschluesse/Empfehlung_Micro-Degrees_und_Badges_HRK_MV_24112020_EN.pdf

27) New Zealand Qualifications Authority. (n.d.) *Micro-credentials* https://www.nzqa.govt.nz/providers-partners/approval-accreditation-and-registration/micro-credentials

- <u>Providers:</u> Providers for micro-credentials can vary greatly ranging from higher education institutions to Vocational Education and Training (VET), professional organisations, private companies, etc. In some countries, policy developments are focused on micro-credentials awarded by recognized education providers. NZQA approves micro-credentials offered by tertiary education organizations, but they can partner with employers, industry, and other organizations. This is not the case with all definitions. Nonetheless, many initiatives and policy developments do differentiate between micro-credentials delivered by higher education institutions, which are already subject to quality assurance, and those offered by other providers.

Due to the aforementioned developments, some micro-credentials are on the verge of becoming formalized awards linked to qualification frameworks and being quality assured. This will allow easy and efficient recognition through standardized procedures. In other cases, increased standardization should at least lead to simplified Recognition of Prior Learning procedures.

Part II: A two-track approach for recognition

Chapter 3 - Recognition of micro-credentials

3.1 Academic recognition for micro-credentials

Traditionally, academic recognition concerns the assessment of foreign qualifications or periods of study abroad, for an individual's admission to a study programme or for exemption from parts of a study programme at an accredited higher education institution. In the European Higher Education Area (EHEA), academic recognition is regulated by the Lisbon Recognition Convention (LRC). The LRC outlines the main principles for fast and fair recognition of foreign qualifications. For the recognition of micro-credentials, a two-track approach is proposed in this paper, whereby micro-credentials are either recognized through a procedure in line with the LRC, or through Recognition of Prior Learning (RPL).

3.2 The e-Valuate methodology

Being aware of all the potential benefits of modular learning, partners in the ENIC-NARIC networks have been collaborating on its recognition since 2016. In two consecutive projects, named 'Paradigms' and 'e-Valuate', a methodology for the recognition of modular learning was developed. Whereas the focus of these projects was on online learning, the findings can easily be transferred to modular learning in general, be it online, blended or face-to-face. In early 2020, the 'Practitioner's guide for recognition of e-learning'[28] was published upon conclusion of the e-Valuate project. This guide aims to familiarize recognition professionals with modular (online) learning and helps them to make an informed recognition decision within reasonable time limits. For the STACQ project, this methodology has been converted to develop the online application 'Micro-Evaluator', that guides the user through the recognition process. The application can be freely accessed by recognition professionals or anyone interested in the recognition of micro-credentials.

The methodology is based on the following seven criteria: 1. Quality of the course 2. Verification of the certificate 3. Level of the course 4. Learning outcomes 5. Workload 6. The way study results are tested 7. Identification of the participant. Not coincidentally, the first five points also form the basis for recognition of traditional qualifications[29]. The way study results are tested and the way the identification of a participant is verified are both specifically relevant for modular (online) learning.

To further facilitate the recognition process, different levels of robustness are described for each criterion. Below we include two examples, to assess the quality and the level of a course[30]:

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28) E-Valuate Consortium (2019, September). *Practitioner's guide for recognition of e-learning: Introducing a step-by-step approach towards academic recognition of stand-alone e-learning*. Nuffic. https://www.nuffic.nl/sites/default/files/2020-08/practitioners-guide-for-recognition-of-e-learning.pdf

29) For more information on the 5 elements of a qualification in relation to recognition, see: Nuffic. (2020). *The European Recognition Manual for Higher Education Institutions*. https://www.nuffic.nl/sites/default/files/2020-08/the-european-recognition-manual-for-higher-education-institutions%20%281%29.pdf.

30) e-Valuate Consortium. (2019, September). *Practitioner's guide for recognition of e-learning: Introducing a step-by-step approach towards academic recognition of stand-alone e-learning*. Nuffic. https://www.nuffic.nl/en/subjects/recognition-projects/e-valuate

Robustness of level description

Level	Descriptors
0	Level unknown (e.g. the level is not Indicated on the course certificate and cannot be discerned through the course description).
1	Little information about the level available (e .. g. the level indicated on the course certificate is platform-specific).
2	Relevant information about the level available (e.g. the level is platform-specific, but additional information on prerequisite requirements, learning outcomes and further opportunities is available and allows for comparison with NQF level).
3	No doubt about the level (e.g. NQF level indicated on the course certificate and/or clear information about ECTS).

Robustness of quality in e-learning

Level	Descriptors
0	No quality Indicators (e.g. weak course provider sto.tus, course not recognized by others, no internal or external QA, no/negative student reviews).
1	Weak quality Indicators (e.g. positive student reviews. Course provider not accredited, but alternative forms of recognition/QA available).
2	Substantial quality indicators (e.g. course provided by accredited institution and eligible for credit transfer. But no Information on internal or external QA mechanisms).
3	Strong quality indicators (e.g. course provided by accredited Institution, e-learning integrated In internal and external QA mechanisms).

Robustness of level description

If all seven evaluation criteria have a high level of robustness, the course can be recognized in line with the LRC. It should be noted, however, that the e-Valuate methodology encourages a flexible approach towards recognition. Depending on the purpose of the evaluation, recognition authorities could determine that some criteria are more important than others. For example, if appropriate quality assurance is guaranteed, it may not always be necessary to have robust information on all the learning outcomes of a course. In this respect, the flexibility that the e-Valuate methodology calls for could facilitate a middle ground between comprehensive recognition procedures for formal degrees and RPL procedures. Adopting such an approach could enable a more efficient recognition process for courses that are only partially integrated into the Bologna Process, which otherwise may have to be directed to RPL procedures.

3.3   Partial automatic recognition

When micro-credentials are fully integrated into the Bologna Process, one could consider if they should be recognized automatically. While proponents could argue this is a necessary step towards efficient and fair recognition, automatic recognition of micro-credentials may be difficult to achieve. The core principle of automatic recognition involves a system-based-recognition of quality-assured comparable degrees ('a bachelor is a bachelor'). Since a micro-credential does not carry any formal, independent value in the sense that for example a bachelor's degree does, it would be difficult to imagine what automatic recognition would

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31) E-Valuate Consortium (2019, September). *Practitioner's guide for recognition of e-learning: Introducing a step-by-step approach towards academic recognition of stand-alone e-learning.* Nuffic. https://www.nuffic.nl/sites/default/files/2020-08/practitioners-guide-for-recognition-of-e-learning.pdf

entail at a system level (i.e. at the level of the national qualification framework). However, as HEIs are continuously obtaining more experience with recognizing micro-credentials, they could consider (partially) automating their recognition procedures for courses that they frequently encounter.

3.4   The role of course providers: keep relevant information accessible

Whereas recognition professionals indicate that they are open and willing to recognize new forms of modular learning, their work is complicated by the fact that relevant information about the quality and content of courses is often missing. To stay with the example of the level description above: even if a course is offered by an accredited higher education institution, there often is no reference to the level of the course on the course certificate. Relevant online information tends to change or disappear once the content of the course changes or the course is no longer on offer.

As a result, it is difficult and time consuming to gather the necessary information about the seven criteria mentioned above. In addition, the lack of information requires recognition experts to accept a degree of uncertainty. In many cases, this will be a reason not to recognize a credential, for example because the legal framework or institutional regulations discourage this kind of flexibility.

If modular learning is to open up new and further learning opportunities for students, learning providers (including higher education institutions, MOOC platforms and alternative education providers) should take the necessary measures to facilitate academic recognition. In the e-Valuate project, three recommendations were formulated to further standardize modular learning and to support transparency and information provision on the quality and content of courses[32]:

> ### Source: 'Academic recognition of e-learning. Recommendations for online learning providers'.
>
> Recommendation 1:
> **Ensure that information about course content and learning outcomes remains freely accessible and does not disappear when the course is revised or no longer offered. Consider how to contribute to rapid information provision.** *Examples of good practice include the use of unique course numbering systems, making it possible to quickly find the right course description. Online badges can also offer a solution, if a link to additional information on course content and learning outcomes is included.*
>
> Recommendation 2:
> **To facilitate academic recognition of modular learning, use existing Bologna tools such as NQF, ECTS, and diploma or e-learning certificate supplements to provide additional information about the learning outcomes of a course.** *Note that for course providers that operate outside formal education structures, it is not always possible to use the Bologna tools because of legal restrictions. In that case it is advisable, where possible and legally accepted, to make an indirect reference to the Bologna tools.*

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32) Nuffic. (2019, September). *Academic recognition of e-learning. Recommendations for online learning providers.*
     https://www.nuffic.nl/sites/default/files/2020-08/academic-recognition-of-e-learning.pdf

Recommendation 3:

Make the quality assurance of modular learning part of internal quality assurance procedures at higher education institutions. Make sure that national quality assurance agencies can include modular learning in their external review procedures of higher education institutions. *Note that course providers that operate outside formal education structures may have their own quality standards. In most cases, these independent procedures do not comply with the national standards for academic recognition. Nevertheless, transparency about the procedures at hand can sometimes be useful, by providing information on the quality standards used and the way in which the quality of courses is monitored.*

Thus, transparent information provision, where possible making use of internationally agreed Bologna standards, can greatly enhance fast and fair recognition of modular learning in line with the Lisbon Recognition Convention. In the following chapter we will reflect on how to support academic recognition of micro-credentials that are less standardized.

Chapter 4 - Recognition of Prior Learning

In some cases, policy developments are focused on micro-credentials offered solely by higher education institutions. Strict adherence to certain requirements might impede the innovative character of such awards. Since there are many other providers of such learning, mechanisms should be established to improve transparency and recognition of all types of micro-credentials.

When there is a course for which a recognition procedure in line with the LRC cannot be applied, recognition authorities may refer to Recognition of Prior Learning (RPL). RPL is also known as PLA (Prior Learning Assessment) or PLAR (Prior Learning Assessment and Recognition) in some regions.

4.1 What is RPL?

In this paper the ECTS users' guide definition of RPL will be used, which relates to non-formal and informal learning. RPL is:

> *the process through which an institution certifies that the learning outcomes achieved and assessed in another context (non-formal or informal learning) satisfy (some or all) requirements of a particular programme, its component or qualification.*[33]

RPL has been used as a tool for the validation of prior non-formal and informal learning for many years. RPL procedures usually consist of four phases: the identification, documentation, assessment and certification of learning outcomes acquired through informal or non-formal learning. The European Council recommended that Member States should have arrangements in place for the validation of non-formal and informal learning no later than 2018.[34] Even though most Member States have made significant efforts to install RPL regimes, there is still much progress to be made. As of 2020, the European Commission concluded that 'provision is still far from being comprehensive in most EU Member States which tend to prioritise validation in relation to certain areas, subjects, sectors or occupations, and not others, thus limiting opportunities for the widest possible access to validation'.[35] This evaluation also called for specific development of links between validation and micro-credentials. In the 2021 Council Recommendation on a European approach to micro-credentials, it is emphasized that Member States should support the development of micro-credentials within non-formal and informal learning settings. Furthermore, Member States should seek to adapt their RPL procedures to allow for the awarding of micro-credentials.[36]

Below, we give examples of two different regional approaches to RPL within the EHEA.

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33) European Commission (2015) *ECTS Users' Guide*. (2015).
https://op.europa.eu/en/publication-detail/-/publication/da7467e6-8450-11e5-b8b7-01aa75ed71a1

34) Council of the European Union. (2012). Recommendation 2012/C 398/01: *Council Recommendation of 20 December 2012 on the validation of non-formal and informal learning.*
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32012H1222%2801%29

35) European Commission. (2020). *Study supporting the evaluation of the Council Recommendation of 20 December 2012 on the validation of non-formal and informal learning.*
https://ec.europa.eu/social/main.jsp?catId=738&langId=en&pubId=8306&furtherPubs=yes

36) *EUR-Lex - 52021DC0770 - EUR-Lex*. Proposal for a COUNCIL RECOMMENDATION on a European Approach to Micro-Credentials for Lifelong Learning and Employability.

4.2   Regional differences: France and Scotland

At present, there is a great variety in the way RPL procedures are put into practice, depending on the societal context and its purpose. For instance, in France the individual's right to an RPL procedure, or *Validation des Acquis de L'Expérience (VAE)*, is protected by national law. The validation process is rigorous and aims to certify all learning outcomes of a candidate's experience. Candidates are enabled to obtain whole or parts of a qualification, covering levels 2 to 8 of the EQF. Qualifications are directly issued by a HEI. A standard VAE procedure is estimated to take between 20 and 24 hours.[37] There have been recent efforts to broaden access to VAE procedures. For example, eligibility has been expanded from those with three years to one year of experience.[38] As the procedure relies heavily on the validation of professional experience, candidates cannot formally apply for VAE solely on the basis of learning acquired through short, open courses such as MOOCs or self-directed study via Open Educational Resources (OER).[39] As procedures vary across HEIs, however, some institutions will take such courses into consideration.[40]

On the other hand, in Scotland, there is no common legislation on RPL for either access or credit.[41] Instead, work is built on a general consensus and cooperation between a number of different actors. This informal Scottish model aims at highlighting and discussing issues of relevance to all stakeholders in recognition of prior learning. The model, which was developed by the Quality Assurance Agency for Higher Education (QAA) and Scottish universities, has a strong link to the Scottish Credit and Qualifications Framework (SCQF) and the intention is that the SCQF will enhance the possibility for and increase the amount of recognition of prior informal and non-formal learning and support lifelong learning. At present, the SCQF recognizes more than 850 learning programmes other than mainstream qualifications. The Scottish model thus emphasizes the importance of RPL but also acknowledges the fact that this is a challenge to many universities in Scotland. For this reason, the model aims at increasing RPL in the higher education sector, and at identifying obstacles to recognition by providing support and good examples. Furthermore, the aim is to increase knowledge about recognition processes among teachers, administrative staff, and students.

37) Bohlinger S. (2017) Comparing Recognition of Prior Learning (RPL) across Countries. In: Mulder M. (eds) *Competence-based Vocational and Professional Education. Technical and Vocational Education and Training: Issues, Concerns and Prospects*, vol 23. Springer, Cham. P. 596.

38) Ministère du Travail. (2016). *L'avant projet de la loi El Khomri réforme la Validation des acquis de (. . .) - Le portail de la validation des acquis de l'expérience.* Le portail de la validation des acquis de l'expérience Le portail de la validation des acquis de l'expérience. http://www.vae.gouv.fr/actualites/les-amendements-sur-la-validation-des-acquis-de-l-experience-examines-a-l-assemblee.html

39) From 2019 until December 2021, an experiment ran to certify elements of a qualification in 'blocs de compétences'. This partial form of VAE is meant to further increase the inclusiveness of the validation process by targeting those for whom a VAE process to gain a full qualification is too burdensome. The experiment is meant to relieve bottlenecks in sectors with pressing labour shortages. See: Légifrance (2019, November) *Arrêté du 21 novembre 2019 fixant le cahier des charges de l'expérimentation visant des actions de validation des acquis de l'expérience ayant pour objet l'acquisition d'un ou plusieurs blocs de compétences..* https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000039424719

40) European Centre for the Development of Vocational Training. (2016). *Validation and open educational resources (OER). Thematic report for the 2016 update of the European inventory on validation.* https://www.cedefop.europa.eu/files/4149_en.pdf

41) E.g., Scottish Credit and Qualifications Framework. (n.d.). *Guide to RPL*. https://scqf.org.uk/guide-to-rpl/

An example of good practice: Glasgow Caledonian University

Glasgow Caledonian University (GCU) is one of the universities in Scotland where recognition of prior learning is done in a thorough and systematic way. The basis for the recognition processes are the principles of the regional model and a fair and generous attitude to RPL, at both undergraduate and graduate level. The university's ambition to be an accessible provider of higher education both nationally and internationally is also important and contributes to the development of flexible admissions processes and programmes for all applicants regardless of their background.

The application of RPL for access is the responsibility of GCU's admissions office. For graduate level admission, the office cooperates with the academic department in question. Applications for RPL for credit are dealt with at department level and the applicant contacts a study counsellor directly. When recognized, informal and non-formal learning has the same standing and the same value as learning acquired in formal higher education.

GCU makes a distinction between Recognition of Prior informal Learning (RPiL) – a procedure for validating informal learning that has not previously been assessed and credit-rated – and Recognition of Prior Certificated Learning (RPCL). The latter concerns forms of learning that have been previously assessed and certified, and which will be taken into consideration with regard to recognition for academic purposes as credit transfer. The adoption of a separate procedure for certified learning could form a beneficial pathway for those seeking academic recognition for micro-credentials outside of formal education structures.

https://www.gcu.ac.uk/study/postgraduate/rpl/

SEEC

An example of innovative RPL pathways can be found in SEEC, a membership consortium of universities and HE providers in the UK. SEEC has published the comprehensive Credit Level Descriptors, which are used as a reference to 'benchmark, contextualise and credit-rate' formal, non-formal and informal learning. Various case studies have been conducted using the SEEC descriptors to design flexible RPL processes at various HEIs, from accreditation of work-based learning for nurses to an accelerated degree route whereby up to two-thirds of an undergraduate degree is arranged to be gained through RPL. The process is based on existing, but little used regulations on RPL, and is designed to be 'scalable and transferable across HE disciplinary contexts'.

SEEC describes its purpose as 'to advance education for the public benefit by developing credit accumulation and transfer and promoting lifelong learning, at the higher education level'.

https://seec.org.uk/about-us/

4.3   The need for 'fit for purpose' RPL procedures

Naturally, recognition of micro-credentials through RPL is best facilitated when institutional frameworks around RPL are strong and procedures are broadly accessible. Good practices for recognizing micro-credentials must therefore be developed together with implementing the European Council's recommendation on the validation of non-formal and informal learning. As RPL regimes are often designed to meet context-specific societal demands, however, some regimes are better adapted to recognizing micro-credentials than others. For example, the VAE system in France has been very effective as it has facilitated tens of thousands of people on a yearly basis to gain full qualifications since its introduction in 2002.[42] However, due to its strong emphasis on professional experience and heavy centralization of procedures, it is likely to be less suitable for validating learning obtained through micro-credentials. For the recognition of micro-credentials, RPL should be fit for purpose. This means the procedure should not be overly burdensome on the recognition authority and on the learner in order to ease access to higher education. It is important to balance the time involved in the recognition of a course with the results for the applicant. It should be emphasized that RPL procedures for recognizing micro-credentials do not *need* to be overly burdensome for the recognition authority. In many cases micro-credentials are standardized and only a few elements are missing to implement a recognition procedure that is in line with the LRC. It is recommended to adapt existing regulatory frameworks to create recognition pathways for micro-credentials in ways that diverge from more comprehensive 'broad spectrum' RPL procedures when necessary. This could be best achieved in a context where RPL procedures are flexible, and where there is space for mutual learning between multiple stakeholders in order to adapt the process when needed. RPL models such as in Scotland, which are less regulated and based on collaboration between universities and other actors, would lend themselves to developing such 'simplified' RPL procedures. There are also lessons to be learned from less formal initiatives such as the case studies of SEEC, which use existing regulations to design innovative RPL pathways that can be scalable and transferrable across disciplinary contexts in HE.

4.4   What can course providers outside of higher education do?

HEIs can align to the Bologna tools. For other providers, this is not always a possibility because of legal restrictions, or not even desirable from an innovation perspective. To facilitate academic recognition of their micro-credentials through RPL, VET, employers and other providers of informal education should keep in mind that transparent and clear information provision on course content and learning outcomes is a precondition. As elaborated on in the previous chapter, recognition is greatly facilitated if the course provider gives information on the workload, the level of a course and the way it is quality assured, even if this is not done by making use of the Bologna standards that are generally accepted in higher education.

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42) European Commission. (2022, January 27). *Validation of Non-formal and Informal Learning*. (2018, December 28). Eurydice - European Commission. https://eacea.ec.europa.eu/national-policies/eurydice/france/validation-non-formal-and-informal-learning_en

Part III: Stackability

Chapter 5 - Stackability

One of the key characteristics that is commonly ascribed to micro-credentials is their 'stackability', meaning they can be combined to achieve larger qualifications or modules of learning. However, because of a variety of reasons that will be discussed below, in most cases micro-credentials cannot be automatically stacked towards a full degree. For this reason, the question of stacking remains salient within the discussion of micro-credentials, especially from a recognition perspective. This chapter will analyze the different ways in which micro-credentials can be stacked, when recognition takes place, and how recognition can be facilitated. Various examples of stacking will be discussed to reveal the diversity of pathways for stacking that are currently in existence.

5.1   How are modules 'stacked'?

Micro-credentials can be stacked in various directions: 'vertically' in order to build on the level of achievement, 'horizontally' to broaden knowledge and skills across a similar level, or in a 'value-added' fashion, adding specialist skills alongside existing qualifications[43]. This can lead to combinations of micro-credentials into smaller 'sets' of learning, or micro-credentials may be stacked to form part of a larger qualification.

Currently, learners who intend to stack their micro-credentials and have them recognized by a HEI may encounter a variety of obstacles, including the following:

- For HEIs, there is difficulty in recognizing a collection of micro-credentials of diverse content and structure. For instance, transferring credit between different course providers is difficult if the definitions of the type of learning are not well aligned. Even within the same provider, it may not be clear which modules can be combined to create a larger qualification. If many disparate topics are covered, there may be some modules that do not 'stack' well with others to work towards a particular qualification in a specified academic discipline.
- Institutions often have regulations regarding a maximum number of credits that can be accepted by transfer from other institutions. Currently this maximum number of transferrable credits often forms the main barrier to the concept of a 'patchwork degree' made up of credits from a range of different providers. For these reasons, the stacking of micro-credentials towards a full degree rarely takes place at HEIs at present.[44]
- Other institutional barriers could include restrictions on the recognition of multi-provider micro-credentials, and limits on the period of time that may pass between the issuing of a micro-credential and admission to a study programme.

43) E.g., Williamson, J., & Pittinsky, M. (2016, May 23). *Making Credentials Matter*. Inside Higher Ed. https://www.insidehighered.com/views/2016/05/23/understanding-differences-what-credentials-are-being-stacked-and-why-essay; Quigley, J. (2021, January 12). *What Are Stacked Credentials?* Accredible. https://www.accredible.com/blog/what-are-stacked-credentials/
44) European Commission. (n.d.). *Final Report: A European Approach to Micro-Credentials:* 54.

An example of 'vertical stacking' towards a full qualification can be found in the online platform OERu.

According to OERu founder, Wayne Mackintosh, 'The OERu was established as an international, social innovation partnership to widen access to more affordable education for learners, especially in developing countries, who would otherwise not have access to higher education. It's a non-profit foundation with a charitable mission to provide more affordable ways to credible educational credentials'. [45]

The OERu describes an approach to stacking micro-credentials provided by a range of partner institutions within the OERu consortium, which enables the learner to combine the offerings in the field of business, including parts of their 'EduBit' series, to achieve full qualifications. After completing a series of courses, learners will receive a 'Certificate Higher Education Business', awarded by the University of the Highlands and Islands.
https://course.oeru.org/ient102/assessment/about-stackable-micro-credentials/

5.2   Stackability and recognition

With regard to the stacking of micro-credentials, academic recognition most often takes place in the following contexts:

- If micro-credentials are relevant within the framework of a specific study programme, they can be recognized. This can be done by offering the possibility to exempt a student from part of a study programme. This procedure is referred to as stacking.
- Stacking micro-credentials leads to the formation of larger units and could eventually make up a complete qualification such as a bachelor's or a master's degree.

In order to stack micro-credentials, recognition of the learning outcomes is key. As explained in Chapter III, micro-credentials that comply with **Bologna standards** can be recognized in line with the LRC. This greatly facilitates the work of the recognizing body and makes the outcomes of the recognition process more transparent and predictable to the learner. One example is from the University of Lincoln, which has clear quality assurance guidelines on the credits assigned to stackable micro-credentials in relation to the learning outcomes, content and assessment methods of the course.[46]

At the University of Lincoln, micro-credentials are offered at Level 7 of the UK Framework for Higher Education Qualifications (EQF Level 7) and may attract 5 or 10 credits (with 10 notional learning hours per credit). For credit-bearing, stackable micro-credentials, the guidance states that 'A specification detailing content, learning outcomes and assessment methods must be approved' for these credentials, and that assessment methods should align to the institution's Assessment Framework.
https://cpb-eu-w2.wpmucdn.com/blogs.lincoln.ac.uk/dist/a/2784/files/2020/09/02a-QAM-Short-Courses-and-Microcredentials-Approved-AAC-04-09-20-c.a.-1.pdf

45) Mackintosh, W. (2020, June 10). *International credit transfer for OERu micro-courses now an option for global learners*. OERU. https://oeru.org/news/international-credit-transfer-for-oeru-micro-courses-now-an-option-for-global-learners/
46) University of Lincoln. (2020, September). *Quality Assurance Manual. Approval – Short Courses and Microcredentials.* https://cpb-eu-w2.wpmucdn.com/blogs.lincoln.ac.uk/dist/a/2784/files/2020/09/02a-QAM-Short-Courses-and-Microcredentials-Approved-AAC-04-09-20-c.a.-1.pdf

The Common Microcredential Framework (CMF) also offers an efficient and reliable pathway for stacking. Initiated by the European MOOC Consortium in 2019, the CMF aims to counter the great diversity and inconsistencies in the current offerings of micro-credentials. The CMF primarily focusses on MOOC platforms, that can voluntarily align themselves to the CMF guidelines and specifications for quality assurance. These include a notional workload of between 4-6 ECTS and a levelling at 6-8 of the EQF. Stackability towards degree programmes is one of the aims of the CMF. The standards proposed by the European MOOC consortium also aim to make micro-credentials more readable and enhance the trust in courses. The image below presents an institutional qualification structure for continuing and professional education.[47] This structure offers a framework institutions can adopt to align the characteristics of qualifications, from a single learning unit (of less than 1 ECTS), to a full degree.

Fig. Outline of possible micro-credential awards, based on existing continuing education programmes

From learning unit to degree programme	Volume of learning (ECTS)	Qualification Level	Award
Learning unit/micro-learning unit	Less than 1 ECTS	Undergraduate EQF level 5, 6 Postgraduate EQF level 7, 8	a badge/proof of attendance (can be part of a course or stackable to a course)
A single course A microcredential course A single MOOC with credits	Number of ECTS credits awarded to the course	Undergraduate EQF level 5, 6 Postgraduate EQF level 7, 8	ECTS course credits (stackable to a programme)
CMF- microcredential programme CMF MOOC pathway	4-6 ECTS	Undergraduate EQF level 5, 6 Postgraduate EQF level 7, 8	CMF microcredential gradeo (stackable in a microcredential programme or a degree programme)
Microcredentlal programme Microdegree programme MOOC-based programme	20-40 ECTS	Undergraduate EQF level 5, 6 Postgraduate EQF level 7, 8	undergraduate/ postgraduate certificate microdegree specialisation certificate expert certificate certified professional programme focus diploma MlcroMaster nanodegree diploma (stackable to a degree programme)
Degree programme (bachelor/master/ doctorate)	180 ECTS 60-90-120 ECTS 240 (180) ECTS	Undergraduate EQF level 5, 6 Postgraduate EQF level 7, 8	short cycle graduate bachelor/master degree doctorate degree

As discussed in Chapter IV, micro-credentials that do not comply with the Bologna standards can in some situations still be recognized by making use of RPL procedures.

47) EADTU (2021, December). *Policy Recommendations adopted in the closing EMC-LM Policy Forum.* European Mooc Consortium - Labour Market.
https://emc.eadtu.eu/images/Policy_Recommendations_adopted_in_the_closing_EMC-LM_Policy_Forum.pdf

5.3 The benefits of 'pre-stacked' packages

When credits have been obtained from various education providers, formal and/or informal, without being part of a cohesive programme, this will not automatically lead to a formal qualification[48]. In other words: a collection of credits is not (automatically) a bachelor's or master's qualification. In order to decide if a micro-credential or a set of micro-credentials can be stacked into a specific study programme, the HEI should assess if the learning outcomes of the micro-credentials align with their courses and can be used for admission or exemption. This requires a case-by-case approach and the outcomes of such assessments may differ across micro-credentials and study programmes. For instance, a micro-credential in medieval history obtained elsewhere may not be 'stackable' in a bachelor programme in Biology at University X, but it may well be accepted for a bachelor's programme in European History at the same university. However, adopting such a case-by-case approach could be overly burdensome for HEIs, especially when applicants have obtained a wide variety of micro-credentials.

'Horizontal stacking' of micro-credentials, whereby knowledge and skills are broadened within a single field of expertise, could aid the recognition process. A horizontally stacked collection may correspond with the profile of the study programme the learner seeks admission to. In some cases, reference could even be made to the profile of a particular year of the study programme. In this regard, the recognition of micro-credentials will be greatly facilitated when possibilities for 'pre-stacking' are already embedded in the design of a programme. HEIs can evaluate such a pre-stacked collection of micro-credentials as a single learning experience and can refer to the five elements of a qualification in their evaluation. When designing a programme of pre-stacked micro-credentials, providers can incorporate transparent information on its profile. This will facilitate recognition at a programme level, and will promote full integration of the collection of micro-credentials within a degree programme of the HEI.

Pre-stacked packages of micro-credentials are increasingly developed by HEIs, which serves to integrate micro-credentials into the design of their study programmes. The Delft University of Technology provides a pre-stacked programme that is open to the public:

TU Delft - Micromaster in Solar Energy Engineering

The DelftX MicroMaster Program in Solar Energy Engineering is a standalone certification programme offered by DelftX. The credential consists of four intensive online courses and final exams. It is connected to two master's programmes: Sustainable Energy Technology and Electrical Engineering, track Electrical Power Engineering.

For these master's programmes, the regular admission procedures apply, but students who wish to be exempted from any courses are required to send a formal waiver request. Campus courses that can be waived (up to 16-18 credits and depending on students' Individual Exam Programme) are courses that are equivalent to the solar energy courses of the MSc programme in question.
https://www.tudelft.nl/en/education/programmes/masters/micromasters/solar-energy-engineering

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48) Nuffic. (2020, February). *The European Recognition Manual for Higher Education Institutions. Third Edition:* 53. https://www.nuffic.nl/en/publications/the-european-recognition-manual-for-higher-education-institutions

Regular study programmes offered by HEIs can also be structured towards flexible programmes when they are broken down into stand-alone units that can be stacked. For example, in the Flemish Community of Belgium, a degree can be completed in full or students can chose to take specific courses and obtain a certificate[49]. This is also the case in Sweden, where higher education is organised in a course-based rather than in a programme-based approach. With few exceptions, following a pre-arranged programme leading to a first- and second-cycle degree is recommended rather than mandatory, and students enjoy great flexibility in choosing to design their own programme. To promote lifelong learning, most courses can be attended as free-standing courses and many courses are offered online.[50] This allows students to obtain specific targeted competences and, if necessary, use those competences to build towards a degree.

5.4   Non-coherent stacking

Even though a modular design will make stacking of micro-credentials easier in most cases, there are also examples of stackable programmes that do not have a coherent profile in their design. One can find offerings of very *generic* study programmes that allow for a large extent of freedom in individual study choice. Such a generic study programme would culminate in a degree at system level. An example of such a generic programme is 'the open degree' offered by the Open University in the UK:

> The Open University in the UK offers an Open degree at the level of BA/BSC (Honours). Free from the restriction of a subject-specific specialism, students can set the direction of their individual learning by choosing modules from over 16 subject areas. 'You'll create a bespoke qualification that reflects your interests, or helps you stand out in the competitive job market.'
> **https://www.open.ac.uk/courses/combined-studies/degrees/open-degree-qd**

5.5   Information provision for students

For students it is important to have access to clear and transparent information on the recognition procedures for micro-credentials that are employed by an HEI. HEIs should communicate about which elements in micro-credentials will enhance recognition, such as integration within the Bologna framework or pre-stacked packages of micro-credentials with a consistent profile. Policies regarding stacking towards a full degree should also be disclosed, and reference should be made to possibilities for RPL. The LRC subsidary text Guidelines for National Online Information Systems can be consulted to develop transparent information provision on recognition procedures for micro-credentials[51].

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49) Godonoga, A., Michaela, M., & IIEP - UNESCO. (2020). *SDG 4 - Policies for flexible learning pathways in higher education: taking stock of good practices internationally.* http://www.iiep.unesco.org/en/publication/sdg-4-policies-flexible-learning-pathways-higher-education-taking-stock-good-practices

50) UKÄ Swedish Higher Education Authority. (2020). *Higher Education Institutions in Sweden. 2020 Status Report.* https://english.uka.se/download/18.7b31ebea172ea978184158b1/1598456063682/20-0102%20UKA%CC%88%202020%20Status%20Report.pdf

51) THE COMMITTEE OF THE CONVENTION ON THE REOGNITION OF QUALIFICATIONS CONCERNING HIGHER EDUCATION IN THE EUROPEAN REGION, & U.N.E.S.C.O. (2019, June). *Guidelines For National Online Information Systems.*

Conclusion and recommendations

This paper examined the rise of micro-credentials and the implications for recognition. Micro-credentials and the widespread affirmation of their benefits has given the subject a prominent place in national education policy and strategy across the globe.

To recognize micro-credentials, recognition professionals are advised to consider a **two-track approach**:

1. The first track concerns micro-credentials that fall within the Bologna framework. These courses can be recognized in line with the LRC in the same way as credit transfer. For this purpose, it is important that clear and transparent information on course content and learning outcomes is made available by the course provider. Micro-credentials should also be quality assured in line with the standards and guidelines (ESG)[52] for quality assurance in the European Higher Education Area, refer to a level on the EQF or EHEA QF, and specify the workload in terms of ECTS. They can be recognized using the e-Valuate methodology. Currently modular course offerings, even when provided by accredited HEIs, often fall outside the scope of these Bologna-related frameworks. In light of the ambitions stipulated in the Bologna Rome communiqué and in the EC 'Common Microcredential Framework' – as well as in many regions across the globe, this may change in the near future. European universities will be the frontrunners in this development.

- Certain features will enhance the stackability of courses: the course must be recognizable. Again, this will be made easier when the course has been made compliant with the Bologna tools. The course should furthermore fit into the profile of the larger programme within which it is sought to be integrated. Whether or not the course fits the profile of the larger study programme can be assessed by HEIs on a case-by-case basis. However, integration will be made easier when the module is designed to be stackable and to have a coherent profile.
- There are also programmes where random stacking of credits is possible, leading to a generic or 'open degree'. However, these will not lead to a specialized qualification.
- Institutional regulations concerning the maximum number of transferrable credits from other institutions might need to be reviewed.

2. The second track concerns Recognition of Prior Learning. For the recognition of courses that cannot or do not aim to be compliant with the Bologna framework, we can learn from experiences with RPL. When much of the information on the course is more or less standardized (as is often the situation with modules that are offered by informal education providers, or by formal HEIs but outside of their formal curricula), an RPL procedure that is fit for purpose is preferable. In relation to RPL, the following points should be noted:

- It is important to balance the time involved in recognition of a course with the results for the applicant. Recognition professionals can review RPL practices in their respective countries to establish whether simplified 'fit for purpose' procedures are already in place. If not, existing regulatory frameworks can be analyzed to assess whether they contain the flexibility to design such procedures.

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52) *Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG)*. (2015). https://www.enqa.eu/wp-content/uploads/2015/11/ESG_2015.pdf

- On the part of the course provider, transparent and clear information provision on course content and learning outcomes is a precondition. In addition, recognition is greatly facilitated if the course provider gives information on the workload, the level of a course and the quality assurance, even if this is not done by making use of the Bologna standards that are generally accepted in higher education.

In general, the LRC offers a strong international legal framework for of micro-credentials. In addition, many practical tools are developed. However, adjustment in policy and in some cases in national legal frameworks may be needed specifically to develop fit for purpose RPL procedures for the recognition of micro-credentials.

Recommendations for recognition professionals

1. Develop a 'two-track approach' for recognition. Use the e-Valuate method to assess whether to employ a recognition procedure in line with the LRC or an RPL procedure. The online Micro-Evaluator application can support this process.
2. Develop fit for purpose RPL procedures to recognize micro-credentials from informal providers in a time-efficient way. Investigate if there are existing initiatives of such RPL 'light' procedures in your country that are scalable and transferable across sectors which could serve as example. Furthermore, explore how these procedures can be adapted to facilitate the stacking of micro-credentials.
3. Consider partially automating recognition procedures for micro-credentials that are frequently encountered at your institution, or that are offered by trusted providers.
4. Make sure the information about your recognition procedures for micro-credentials is easily accessible for learners and other stakeholders, in line with the LRC subsidiary text 'Guidelines for National Online Information Systems'. Clarify which elements in micro-credentials will enhance recognition (e.g., integration within the Bologna framework, pre-stacked packages of micro-credentials with a distinct profile).
5. Connect with relevant platforms and stakeholders to share good practices regarding the recognition of micro-credentials, RPL procedures and stacking.

ANNEX: Key take-aways from the STACQ conference

Further considerations for policy makers and researchers

As noted in the introduction, the first draft of this paper was presented to various stakeholders during an online conference in November 2021. The rich input that was collected during the conference partially fell outside of the scope of this paper, which focuses on the perspective of recognition. However, the discussions may be helpful to researchers and policymakers who aspire to move the field of micro-credentials forward. This annex contains five key take-aways from the STACQ conference:

Communication and coordination between different stakeholders

- There is a need for a coordinated approach to serve the four main groups of stakeholders of micro-credentials: the learners, the HEIs, the providers and the employers. A key step in such an approach would be to install a system with standardized metadata on micro-credentials that all stakeholders could access and use.
- In the debate about the advantages of micro-credentials there is often a focus on the learner and the labour market. But the potential benefits for HEIs, especially with regard to stacking, must be conveyed more clearly. To facilitate easy stacking, there should also be a response to the systemic barriers that HEIs may face. Some countries, for example, have a funding structure that is based on compensation per issued ECTS instead of per issued degree. Such a structure will discourage HEIs from allowing for the stacking of credits from other providers.
- The current discourse on micro-credentials emphasizes subject-specific learning outcomes, which is a key element for recognition. However, there should also be consideration of the soft skills and any other outcomes that are gained through micro-credentials.

Need for further research

- There is a need for more empirical research on the reception of the 'open degree', which offers students full freedom to design their own study programme. Such research must provide a better picture of the opportunities that students can find with their open degree, and the obstacles they may encounter.
- A SWOT analysis would help to reveal the complexity of the opportunities, costs and sustainability of micro-credentials within a wider societal context. By exploring both the risks and benefits of micro-credentials, a SWOT analysis could also provide an evidence-informed response to many of the current critiques of micro-credentials.

Suggestions for further reading

During the course of the STACQ project, many recommendations for further reading were made by the project partners and participants of the conference. With this addendum we aim to make these suggestions available for interested readers:

About stackable micro-credentials. (n.d.). IENT102. https://course.oeru.org/ient102/assessment/about-stackable-micro-credentials/

Bothwell, E. (2016). Berkeley to accept University of the People graduates. *Times Higher Education*. https://www.timeshighereducation.com/news/berkeley-accept-university-people-graduates

Bothwell, E. (2018). Online university trades student credits in high-debt era. *Times Higher Education*. https://www.timeshighereducation.com/news/online-university-trades-student-credits-high-debt-era

Buchem, I., Konert, J., Carlino, C., Casanova, G., Rajagopal, K., Firssova, O., & Andone, D. (2018). Designing a Collaborative Learning Hub for Virtual Mobility Skills. In Z. Panayiotis & A. Ioannou (Eds.), *Learning and Collaboration Technologies. Design, Development and Technological Innovation* (Vol. 10924, pp. 350–375). Springer International Publishing. https://doi.org/10.1007/978-3-319-91743-6

Brown, M., Mhichíl, M. N. G., Lochlainn, C. M., Pirkkalainen, H., & Wessels, O. (2021). *Paving the Road for the Micro-credentials Movement: ECIU University White Paper on Micro-credentials*. ECIU University. https://assets-global.website-files.com/551e54eb6a58b73c12c54a18/600e9e7dff949351b6937d73_ECIU_micro-credentials-paper.pdf

Butcher, J., & Marr, L. (2020). Bend Me, Shape Me: Flexible Pedagogies to Widen Participation and Deliver on Social Justice. *Flexibility and Pedagogy in Higher Education*, 11–21. https://doi.org/10.1163/9789004438118_002

Calonge, D. S., & Shah, M. A. (2016). MOOCs, Graduate Skills Gaps, and Employability: A Qualitative Systematic Review of the Literature. *The International Review of Research in Open and Distributed Learning*, *17*(5). https://doi.org/10.19173/irrodl.v17i5.2675

Camilleri, F., Anthony (2015, March). Implications of Open Education for the Maltese Educational System (With a Special Emphasis on MOOCs). Retrieved February 05, 2021 from https://multinclude.eu/wp-content/uploads/2015/09/Implications-of-open-education-for-the-maltese-educational-system-with-a-special-emphasis-on-moocs-1.pdf

Castaño-Muñoz, J., Kalz, M., Kreijns, K., & Punie, Y. (2018). Who is taking MOOCs for teachers' professional development on the use of ICT? A cross-sectional study from Spain. *Technology, Pedagogy and Education*, *00*(00), 1–18. https://doi.org/10.1080/1475939X.2018.1528997

Cedefop. (2015). *European Guidelines for Validating Non-Formal and Informal Learning*. Publications Office of the European Union. https://doi.org/10.2801/008370

Cirlan, E., & Loukkola, T. (2020, November 18). Where next for universities and micro-credentials? *University World News*. https://www.universityworldnews.com/post.php?story=20201118105242280

Delgado Kloos, C., & Alario Hoyos, C. (2020). Key Aspects for the Implementation of Virtual Mobility. *2020 IEEE Learning With MOOCS (LWMOOCS)*, 53–57. **https://doi.org/10.1109/LWMOOCS50143.2020.9234380**

Dillahunt, T., Wang, Z., & Teasley, S. D. (2014). Democratizing higher education: Exploring MOOC use among those who cannot afford a formal education. *International Review of Research in Open and Distance Learning*, *15*(5), 177–196. **https://doi.org/10.19173/irrodl.v15i5.1841**

EADTU (European Association of Distance Teaching Universities). (2019, April 30). *Press Release: The European MOOC Consortium (EMC) launches a Common Microcredential Framework (CMF) to create portable credentials for lifelong learners*. EADTU: Open Education and MOOCs. **https://eadtu.eu/documents/News/Press_release_European_MOOC_Consortium_launches_a_Common_Microcredential_Framework.pdf**

EADTU (European Association of Distance Teaching Universities. Henderikx, P., & Ubachs, G. (2019). *Innovative Models for Collaboration and Student Mobility in Europe. Results of EADTU's Task Force and Peer Learning Activity on Virtual Mobility*. **https://eadtu.eu/documents/Innovative_Models_for_Collaboration_and_Student_Mobility_in_Europe.pdf**

European MOOC Consortium - Labour Market. (2020). *Compendium on good practices in assessment and recognition of MOOCs for the EU labour market*. **https://emc.eadtu.eu/images/publications_and_outputs/EMC-LM_Compendium_on_good_practices_final.pdf**

European Short Learning Programmes. Outcomes. (2021). EADTU. **https://e-slp.eadtu.eu/outcomes**

e-Valuate Consortium. (2019a). *Academic recognition of e-learning: Recommendations for online learning providers*. Nuffic. **https://www.nuffic.nl/en/subjects/recognition-projects/e-valuate**

e-Valuate Consortium. (2019b). *Practitioner's guide for recognition of e-learning: Introducing a step-by-step approach towards academic recognition of stand-alone e-learning*. Nuffic. **https://www.nuffic.nl/en/subjects/recognition-projects/e-valuate**

e-Valuate Consortium. (2020). *Students' guide to e-learning*. Nuffic. **https://www.nuffic.nl/en/subjects/recognition-projects/e-valuate**

Friesen, N., Wihak, C., Grech, A., & Camilleri, A. F. (2017). *Blockchain in Education—European Commission*. **https://doi.org/10.2760/60649**

FutureLearn. (2021). *Higher Education 4.0: Certifying your Future—Online Course* [MOOC]. FutureLearn. **https://www.futurelearn.com/courses/higher-education-certifying-your-future**

Harris, J., Wihak, C., & Van Kleef, J. (Eds.). (2014). *Handbook of the Recognition of Prior Learning: Research into practice*. Leicester, UK: NIACE.

Hilton III, J., Murphy, L., & Ritter, D. (2014). From Open Educational Resources to College Credit: The Approaches of Saylor Academy. *Open Praxis*, *6*(4), 365–374. **http://dx.doi.org/10.5944/openpraxis.6.4.140**

Hoffman, M., & Olmsted, R. (2016). Credentials for Open Learning: Scalability and Validity. In P. Blessinger & T. Bliss (Eds.), *Open Education: International Perspectives in Higher Education*. OpenBook Publishers. **http://www.openbookpublishers.com/product/531/open-education-international-perspectives-in-higher-education**

ICDE Working Group. (2019). *Report of the ICDE Working Group on the Present and Future of Alternative Digital Credentials (ADCs)*. ICDE. **https://www.icde.org/publications-and-resources**

Inclusive and connected higher education. (2020, February 1). Education and Training - European Commission. **https://ec.europa.eu/education/policies/higher-education/inclusive-and-connected-higher-education_en**

Jobe, W. (2014). No University Credit, No Problem ? *2014 IEEE Frontiers in Education Conference (FIE) Proceedings*. **http://ieeexplore.ieee.org/document/7044389/**

Kato, S., Galán-Muros, V., & Weko, T. (2020). *The emergence of alternative credentials* (OECD Working Papers). OECD Publishing. **https://www.oecd-ilibrary.org/education/the-emergence-of-alternative-credentials_b741f39e-en**

Kiers, J. (2016). MOOCs and their Effect on the Institution: Experiences in Course Design, Delivery and Evaluation; Research; Faculty Development; Unbundling and Credits for MOOCs. *Foro de Educación*, *14*(21), 133–149. **https://doi.org/10.14516/fde.2016.014.021.007**

Knoth, S., Lorenz, A., & Rampelt, F. (2018). Make MOOCs count for higher education: Approaches to awarding ECTS Credits for learning in open online courses. In W. Van Valkenburg & R. Schuwer (Eds.), *OE Global 2018* (pp. 1–5). TU Delft. **https://repository.tudelft.nl/islandora/object/uuid:0e73c6a2-de84-48c0-99b9-6059c8152212**

Koenig, R. (2020, January 8). With 'MicroBachelors' Program, EdX Tries Again to Sell MOOCs For Undergraduate Credit—EdSurge News. *EdSurge*. **https://www.edsurge.com/news/2020-01-08-with-microbachelors-program-edx-tries-again-to-sell-moocs-for-undergraduate-credit**

Kopp, M., & Ebner, M. (2016). Certification of MOOCs – Advantages, Challenges and Practical Experiences. *Revista Espanola de Pedagogia*, *75*(266), 83–100. **https://doi.org/10.22550/REP75-1-2017-05**

Kursun, E. (2016). Does Formal Credit Work for MOOC-Like Learning Environments? *International Review of Research in Open and Distributed Learning*, *17*(3), 75–91. **http://www.irrodl.org/index.php/irrodl/article/view/2403**

Law, P. (2015). Recognising informal elearning with digital badging: Evidence for a sustainable business model. *Open Praxis*, *7* (4), 299–310. **http://dx.doi.org/10.5944/openpraxis.7.4.247**

Lokhoff, J. (2020, May 16). *The challenges of digitising student data*. University World News. **https://www.universityworldnews.com/post.php?story=20200511152937975**

Mackintosh, W., Peachey, V., Dyck, M., Looney, M., & Goode, C. (2020). The OERu Rubik's Cube: Fitting the Pieces Together for Transnational Micro-credentialing. *Proceedings of the 2019 ICDE World Conference on Online Learning*, *1*, 569–579. **https://doi.org/10.5281/zenodo.3804014**

Mazrekaj, D., & Witte, K. (2019, August 13). The effect of modular education on school dropout. Retrieved February 03, 2021, from https://bera-journals.onlinelibrary.wiley.com/doi/abs/10.1002/berj.3569

MICROBOL. (2020, September). *European project MICROBOL. Micro-credentials linked to the Bologna Key Commitments. Desk research report*. https://microcredentials.eu/wp-content/uploads/sites/20/2020/09/MICROBOL-Desk-Research-Report.pdf

MicroHe. (2019, December). *Challenges and Opportunities of Micro-Credentials in Europe. Briefing Paper on the Award, Recognition, Portability and Accreditation of Micro-Credentials: an Investigation through Interviews with Key Stakeholders & Decision Makers*. https://microcredentials.eu/wp-content/uploads/sites/20/2019/12/WP3-Interviews-with-Key-Stakeholders-Decision-Makers-Overall-Summary-Report.pdf

Misra, P. K. (2018). MOOCs for Teacher Professional Development: Reflections and Suggested Actions. *Open Praxis*, *10* (1), 67. https://doi.org/10.5944/openpraxis.10.1.780

Mørland, T., Arne, S., & Snildal, A. (2020, May 14). Norway is first to join new Global Recognition Convention. *University World News*. https://www.universityworldnews.com/post.php?story=20200514140938511

National Institute for Digital Learning. (2020). *Micro-credential Observatory | NIDL*. Dublin City University. https://www.dcu.ie/nidl/micro-credential-observatory

Niedermeier, H. (2018, February 19). Quality Assurance of MOOC-based curricula: A project report from Kiron [Blog]. *#ALTC Blog*. https://altc.alt.ac.uk/blog/2018/02/quality-assurance-of-mooc-based-curricula-a-project-report-from-kiron/

Nuffic. (2018). *Oops a MOOC! Dealing with eclectic learning in credential evaluation: Policy Paper #2* (February). Nuffic. https://www.nuffic.nl/en/publications/oops-mooc/

O'Malley, B. (2019). *The Ambition Behind European Universities Networks* (p. 3). Washington: Council for Higher Education Accreditation. https://eric.ed.gov/?q=source%3A%22Council+for+Higher+Education+Accreditation%22&id=ED597905

O'Sullivan, T. (2020, July 6). *Lessons from 'MOOCs for credit'—Turning non-formal learning into formal credit*. Open Impact Conference, Kampala, Uganda. http://business-school.open.ac.uk/sites/business-school.open.ac.uk/files/files/Events/oic-papers/PAPER-ID-13(1).pdf

Paton, R. M., Fluck, A. E., & Scanlan, J. D. (2018). Engagement and retention in VET MOOCs and online courses: A systematic review of literature from 2013 to 2017. *Computers & Education*, *125*, 191–201. https://doi.org/10.1016/j.compedu.2018.06.013

Penprase, B. E. (2020). Online Education in STEM. In B. E. Penprase (Ed.), *STEM Education for the 21st Century* (pp. 69–92). Springer International Publishing. https://doi.org/10.1007/978-3-030-41633-1_5

Poirer, D., & Mackintosh, W. (2020, June 10). International credit transfer for OERu micro-courses now an option for global learners – OER Foundation. https://oerfoundation.org/2020/06/10/international-credit-transfer-for-oeru-micro-courses-now-an-option-for-global-learners/

Reushle, S., Antonio, A., & Keppell, M. (2016). *Open learning and formal credentialing in higher education: Curriculum models and institutional policies* (S. Reushle, A. Antonio, & M. Keppell, Eds.). IGI Global. **http://www.igi-global.com/book/open-learning-formal-credentialing-higher/129622?f=e-book**

Robson, L., & Curry, G. (2020). Student motivations and choices in a 'pick and mix' curriculum module at the Open University, UK. *INTED2020 Proceedings*, pp. 972–977. **http://oro.open.ac.uk/69090/**

Robson, J. (2022, 18 januari). *Micro-credentials: Reshaping adult education and training.* The OECD Forum Network. **https://www.oecd-forum.org/posts/micro-credentials-the-new-frontier-of-adult-education-and-training?utm_source=newsletter_mailer&utm_medium=email&utm_campaign=newsletter**

Roy, S., & Clark, D. (2018). Digital badges, do they live up to the hype? *British Journal of Educational Technology*, *00*(0), 1–18. **https://doi.org/10.1111/bjet.12709**

Ruinard, E., & McNamara, J. (2016). Conceptualising Recognition of Prior Learning Processes in the Age of Open Learning. In S. Reushle, A. Antonio, & M. Keppell (Eds.), *Open Learning and Formal Credentialing in Higher Education: Curriculum Models and Institutional Policies* (pp. 1–17). IGI Global.

Saçan, E., & Schuwer, R. (2018, June 26). Changing Minds by Using Open Data [Blog]. Open Education Working Group. **http://education.okfn.org/changing-minds-by-using-open-data/**

Supporting growth and jobs: An agenda for the modernisation of Europe's higher education systems. (2011). Luxembourg: Publications Office of the European Union.

Tanrısever, S., & Erişen, Y. (2009, March 18). The evaluation of modular education programmes developed for the 'modernization of vocational and technical education project'. Retrieved February 03, 2021, from **https://www.sciencedirect.com/science/article/pii/S187704280900247X**

Verstelle, M., Schreuder, M., & Jelgerhuis, H. (2014). Recognition of MOOCs in the Education Sector. *2014 Open Education Trend Report*, *March*, 24–25. **https://www.surf.nl/en/knowledge-and-innovation/knowledge-base/2014/2014-open-education-trend-report.html**

Weller, M., Orr, D., & Farrow, R. (2018). *Models for online, open, flexible and technology enhanced higher education across the globe – a comparative analysis*. International Council for Open and Distance Education. **https://www.icde.org/publications-and-resources**

Williams, J. (2016). Quality assurance and quality enhancement: Is there a relationship? *Quality in Higher Education*, *22*(2), 97–102. **https://doi.org/10.1080/13538322.2016.1227207**

Witthaus, G., Inamorato dos Santos, A., Childs, M., Tannhäuser, A.-C., Conole, G., Nkuyubwatsi, B., & Punie, Y. (2016). *Validation of Non-formal MOOC-based Learning An Analysis of Assessment and Recognition Practices in Europe (OpenCred)*. European Commission. **https://doi.org/10.2791/809371**