Report on modularization and micro-credentialing based on MCE case studies analysis

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Executive Summary

This document is developed in the frame of MCE – Modularization of Continuing Education and Micro-credentials – project, as the output of Task 5.1 in Work Package 5.

Document structure and main elements:

After a general introduction about Micro-credentials, document contextualization and scope (Section 1), Section 2 of the document present the case studies collection template developed for this report. This section introduces criteria used for defining the template, based on E-SLP project results (https://e-slp.eadtu.eu/) and on the EC proposal for Council Recommendation on Micro-credentials[1]. The section presents the final template elaborated for the collection of the case studies from partner universities within the consortium.

Section 3 presents the results of the analysis of the data collected by 10 different Higher Education Institutions partner of MCE project (19 cases collected). The section highlights recurring characteristics of the short programs / micro-credentials / continuous professional development certificates provided by partner HEIs and the main elements of reflection that will inform the next Tasks in WP5 (design and implementation of the pilots).

Main insights of the case studies collection were then used to propose a set of 9 main dimensions to be identified and analysed in the pilot design and implementation. For each of them, Section 4 presents a general description, and provides elements for a more in-depth understanding in terms of options, or challenges, and specific references. The 9 identified dimensions are:

- #1 Design: Stakeholder Involvement
- #2 Design: Form of Collaboration
- #3 Design: Micro-credential Origin
- #4 Funding and Business Model
- #5 Implementation and delivery
- #6 Assessment Methodologies
- #7 Technology standards for certification
- #8 Standardization of micro-credentials-based Qualification Framework
- #9 Stakeholders' acceptance

In the same section, paragraph 4.2 proposes a new template for pilot proposals collection from HEIs in MCE consortium, as preparation of Task 5.2.

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[1] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0770&from=EN

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1. Introduction

Higher education modernization is an ongoing process in the European Union (EU), driven by the demand for innovation and flexibility in didactic offer, as well as the changing needs of students and the labour market. The EU has recognized the need for higher education institutions (HEIs) to adapt to these changes to remain competitive and meet the needs of society. One of the most significant changes that have occurred in recent years is the increasing demand for short programs. Short programs are typically less than one academic year in duration and offer specialized training in specific areas. These programs are in high demand as they allow students to quickly acquire new skills and knowledge, making them more competitive in the job market. Short programs are also popular with employers who are seeking employees with specific skill sets.

In response to this demand, HEIs have been encouraged to offer more flexible offerings, more condense. The European Commission has recognized the importance of short programs[2] and has called for the development of more flexible curricula, including the use of online and blended learning[3] [4]. In 2017, the European Commission launched the European Agenda for the Modernization of Higher Education, which calls for the development of new pedagogical approaches that meet the needs of the 21st-century student.

The European Commission has recognized the importance of innovation in didactic offer and has called for the development of new pedagogical approaches. The 2017 European Agenda for the Modernization of Higher Education[5] highlights the importance of the use of digital technologies in higher education, including the development of Massive Open Online Courses (MOOCs) and the integration of technology into the classroom. This Agenda also calls for the development of new approaches to assessment, including the use of e-portfolios and other innovative assessment methods.

In this context, micro-credentials have emerged as a powerful tool for innovating higher education offerings. These digital badges, certificates, or other forms of recognition are awarded for completing short courses, modules, or other condense learning experiences that are focused on a specific skill or competency.

An example of adoption of micro-credentials is by modularizing existing programmes. Traditional degree programmes can be broken down into smaller modules or courses that can be completed in a shorter period of time, being therefore more attractive for

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[2] A European approach to micro-credentials https://education.ec.europa.eu/education-levels/higher-education/micro-credentials

[3] Digital Education Action Plan 2021-2027 https://education.ec.europa.eu/focus-topics/digital-education/action-plan

[4] Communication from the Commission on A European Strategy for Universities https://education.ec.europa.eu/sites/default/files/2022-01/communication-european-strategy-for-universities-graphic-version.pdf

[5] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52017DC0247&from=EN

upskilling/reskilling processes for professionals and employees. Modularizing programs can also provide students with more flexibility in their learning. They can choose to take only the modules or courses that are relevant to their career goals, rather than having to complete an entire degree program. This can make higher education more accessible and in some cases affordable, especially for students who are working while studying.

Micro-credentials can also be used to create custom programmes that are tailored to the needs of the labour market. By working with employers and industry experts, HEIs can identify the skills and knowledge that are in high demand and design courses or modules that address those needs. Custom programs can also provide students with more relevant learning experiences, and can be designed to be more flexible, allowing students to complete the program at their own pace or choose the modules or courses that are most significant to their career goals.

Scope of the document

Task 5.1 of MCE project focused on analysing existing practices within partner universities, to:

- Understand current state of art, adopted frameworks, delivery and assessment models, target groups, formats;
- Identify and use standardized templates for course descriptions;
- Analyse collected data for understanding maturity level, shared practices and common weaknesses in order to orientate the pilot activity foreseen in Task 5.2;
- Identify recommendations/points of attention emerging from the data collected, suggesting aspects to focus on during the pilot design for each of the HEIs involved;
- Identify the research questions and contextualize protocols, targets and instruments for pilot evaluation;
- Propose a common template for the first steps in Task 5.2-pilots.

The next section (Section 2) of this document presents the case studies collection template developed for this report. This section introduces criteria used for defining the template, based on E-SLP project results (https://e-slp.eadtu.eu/) and on the EC proposal for Council Recommendation on Micro-credentials[6], and presents the final template elaborated for the collection of the case studies from partner universities within the consortium.

Section 3 presents the results of the analysis of the data collected by 10 different Higher Education Institutions partner of MCE project (19 cases collected). The section highlights recurring characteristics of the short programs / micro-credentials / continuous professional development certificates provided by partner HEIs and the main elements of reflection that will inform the next Tasks in WP5 (design and implementation of the pilots).

Finally, Section 4 proposes a set of 9 dimensions to be taken into consideration in the pilot design and implementation, foreseen as task 5.2. Those dimensions will be used both as

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[6] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0770&from=EN

guidelines in the pilot course proposition by the partner universities, highlighting the relevant elements presented as innovation challenges in the context of the participating HEIs; and as research variables to be analysed against pilot results. Pilot evaluation will also be focused on the 9th dimension proposed, regarding expectations, acceptance and perceived usefulness of the micro-credentials in three main target groups: students, professors and university managers. For the analysis of the final dimension, we propose the use of the Unified Theory of Acceptance and Use of Technology (UTAUT) model (usually used for the evaluation of the user acceptance of a specific technology, and here proposed for analysing the user acceptance of an innovative educational framework). Paragraph 4.2 proposes a new template for pilot proposals collection from HEIs in MCE consortium, as preparation of Task 5.2.

2. Methodology

Section 2 of the document present the case studies collection template developed for this report. This section introduces criteria used for defining the template, based on E-SLP project results (https://e-slp.eadtu.eu/) and on the EC proposal for Council Recommendation on Micro-credentials[7], and reports the final template elaborated for the collection of the case studies from partner universities within the consortium.

2.1. Template development

The main objective of Task 5.1 was to collect a variety of examples from MCE project's partner universities about existing practices in short programs / micro-credentials already in their didactic offer.

The objective of this data collection was twofold:

- mapping the state of the art at institution level in MCE consortium;
- understanding common needs, lesson learned and potential for improvement and synergies.

This collection served as a tool for self-reflection within the partner universities, and as an initial dataset for understanding differences among the approaches adopted by Higher Education institutions in the consortium. While all the partner universities already developed a didactic offer for continuous professional education in the form of short programs, there were differences in the structure of the didactic offer, in the design practices, in the delivery modes, in the assessment methodologies, and in the quality assurance.

Given these requirements, Task 5.1 developed a template for data collection. Two main sources of information were used for template design:

1. The experiences already done by most of the consortium partners in E-SLP project[8], and specifically in several activities of E-SLP focusing on defining an inventory of so called "short learning programs" in the partner universities' offers; in this context, several activities required the definition of progressively refined shared templates for a common definition of short learning program and for supporting pilot design and implementation of collaborative short learning programs;
2. The *Council Recommendation on a European approach to micro-credentials for lifelong learning and employability[9]*, proposing at Article 6 a "*Definition and Union Standard Elements to describe a micro-credential*". This definition provides a set of elements to be used in defining and describing a micro-credential:

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[7] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0770&from=EN

[8] https://e-slp.eadtu.eu/

[9] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0770&from=EN

Table 1 - Standard elements to describe a micro-credential

Mandatory elements:	Identification of the learner
	Title of the micro-credential
	Country/Region of the issuer
	Awarding body
	Date of issuing
	Learning outcomes
	Notional workload needed to achieve the learning outcomes (in ECTS credits, wherever possible)
	Level (and cycle, if applicable) of the learning experience leading to the micro-credential (EQF, QF-EHEA), if applicable
	Type of assessment
	Form of participation in the learning activity
	Type of quality assurance used to underpin the micro-credential
Optional elements, where relevant (non-exhaustive list)	Prerequisites needed to enrol in the learning activity
	Supervision and identity verification during assessment (unsupervised with no identity verification, supervised with no identity verification, supervised online, or onsite with identity verification)
	Grade achieved
	Integration/stackability options (standalone, independent micro-credential/integrated, stackable towards another credential)
	Further information

Elements coming from E-SLP project experience, and the proposed European standard were elaborated to generate a wider template able to inform the analysis with all the relevant elements needed for developing pilot dimensions and recommendation, driving the next phase of the project.

The template was structured in 4 main areas:

1. General Information, identifying the institution and the micro-credential/programme being reported;
2. Micro-credential design, focusing on learning outcomes, delivery modes and main characteristics of the programme;
3. Micro-credential implementation, collecting information about students who already completed the programme;
4. Accreditation and awarding, dealing with quality assurance and interactions with external stakeholders

Most of the items in section 1 and 2 and some in section 3 and 4 use the standard proposed by "A European approach to Micro-credentials - Output of the Micro-credentials Higher

education consultation group", published in December 2020 (Available here: https://education.ec.europa.eu/sites/default/files/document-library-docs/european-approach-micro-credentials-higher-education-consultation-group-output-final-report.pdf); this standard has been enriched with fields dealing with programmes implementation and evaluation for MCE case studies collection purpose.

While the name used across the template is "micro-credential", it is worth to note that just six out of ten among the MCE partner universities use "micro-credential" as a category in their didactic offer (as mapped by *D3.2 Analysing and mapping of current institutional qualifications for continuing education and professional development and micro-credentials in the partnership*).

The following table presents sections and items of the template administered for Task 5.1.

Table 2 - MCE Case collection template

Section 1 – General information
1.Higher Education Institution name 2.Country 3.Faculty/Department providing the micro-credential/short programme 4.Micro-credential/Programme title 5.Awarding body *(please specify if the micro-credential/programme is provided by your HEI, by multiple institutions, by other organizations)* 6.Students' workload needed to achieve the learning outcomes *(expressed in ECTS credits)* 7.Level (and cycle, if applicable) of the learning experience leading to the micro-credential *(EQF and/or national qualifications framework; Overarching Framework of Qualifications of the European Education Area)*
Section 2 - Micro-credential design details
8.Prerequisites needed to enrol in the micro-credential 9.Learning outcomes *(Please provide a description about course objectives and outcomes)* 10.Please define the amount of the online activities in the micro-credential *(the score will be multiplied by 10 to obtain the "online rate" of the micro-credential/programme)* *Select a number from 1 to 10* 11.Please define the amount of synchronous activities in the micro-credential *(the score will be multiplied by 10 to obtain the "synchronous activities rate" of the micro-credential/programme)*

Select a number from 1 to 10

12.Co-design
Has the course been designed together with professional organization / companies / industries / specific professional sector? Please provide details.

13.Origin of the Micro-credential/Short programme
Is the programme/micro-credential the result of the modularization of an existing program (in a Degree program, or from another Professional course, etc.)? Does the design started from scratch, based on the needs reported by an external organization (i.e.: a company, an association asking for higher education level training?), or source (a national or international report underlining the need of specific professional competences?)

14.Type of assessment
(testing, application of a skill, portfolio, recognition of prior learning, etc.)

15.Duration of the Micro-credentials
 (designed duration in weeks)

16.Course scheduling/syllabus
(proposed duration, fixed duration, part-time, flexibility, average completion duration)

Section 3: Micro-credential implementation

17.Specify the number of students who has already attended/completed the micro-credential/programme

18.Supervision and identity verification during assessment
(unsupervised with no identity verification, supervised with no identity verification, supervised online or onsite with identity verification)

19.Completion rate
(in %)

20.Students' opinions
(students' opinions collection modality if present, satisfaction rate %, share of positive answers collected from participants)

21.Employers/External stakeholders' opinions
(stakeholders' satisfaction collection modality, satisfaction rate%, share of positive answers collected from external stakeholder, if any)

Section 4: Accreditation and awarding

22.Is there an internal, institutional accreditation for this micro-credential/programme?
(Ex-ante / Ex post QA processes within the HEI providing the course)
Yes
No

23.If you have answered yes to the previous question, please provide details about the internal accreditation process *(ex-ante? ex post? duration of the process? periodicity?) and the HEI bodies involved in it (Faculty council, Academic Senate, BoD, QA body)*

24.Is the micro-credential/programme accredited by an External agency/accreditation institution?
Yes
No

25.If you have answered yes to the previous question, please provide details about the external accreditation process *(ex-ante? ex post? duration of the process? periodicity?) and the HEI bodies involved in it (Faculty council, Academic Senate, BoD, QA body)*

26.Cooperation with companies providing professional qualification
(Please provide details in the case)
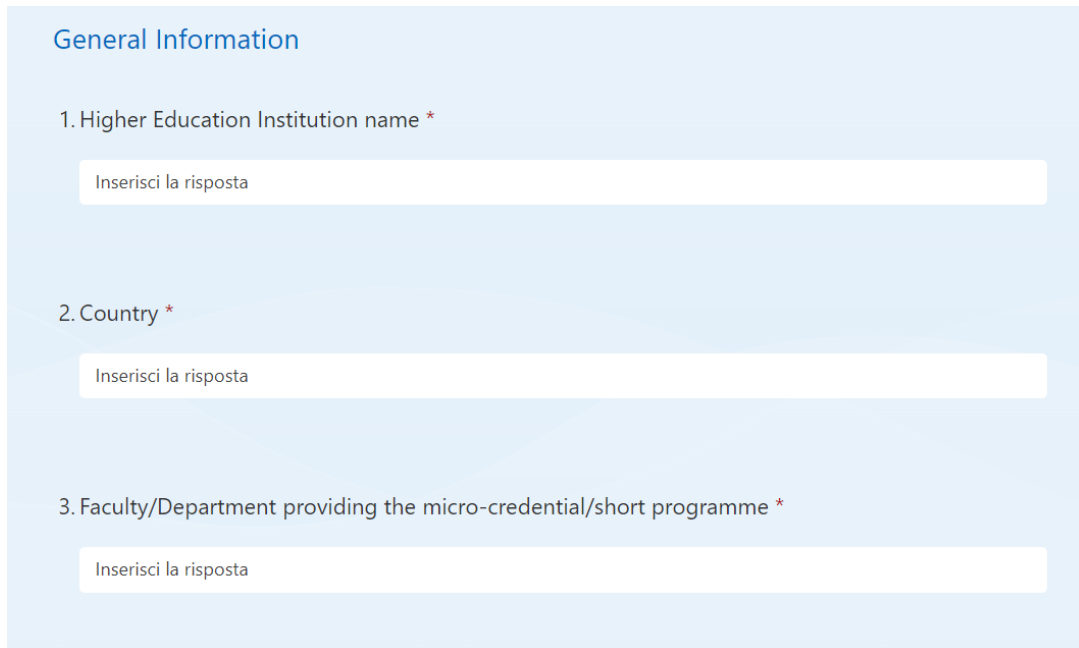
27.Professional certificate associated to the title
(If yes, please provide details)

28.Stackability options
standalone, independent micro-credential / integrated, stackable towards another credential / recognition in formal degree programs / etc.)

2.2. Administration

As already reported, case studies collection focuses on already existing initiative in MCE project partner institutions, delivering Higher Education micro-credentials/short programmes.

Each Higher Education Institution participating in MCE project was requested to report 2 cases of micro-credentials/short programmes, using the template presented in section 2.1 of this document, developed as an online survey using the MS Teams-based private area set up for MCE project by the coordinator.

Figure 1 - An excerpt from the online form developed for case studies collection

Data collected was automatically stored in the same cloud-based area, in the form of an Excel spreadsheet.

An overall of 19 cases from 10 partner institutions was collected.

The next Section presents the results of the analysis performed on the data collected.

3. Results

As mentioned before, Section 3 presents the results of the analysis of the data collected by 10 different Higher Education Institutions partner of MCE project (19 cases collected). The section highlights recurring characteristics of the short programs / micro-credentials / continuous professional development certificates provided by partner HEIs and the main elements of reflection that will inform the next Tasks in WP5 (design and implementation of the pilots). The following paragraph presents the main results per each section of the template used for the data collection.

3.1. Section 1 - General information

1.1 Higher education Institution part of our sample:

10 are the HEIs in MCE and they are all part of this case studies collection. These are:

- FernUniversität in Hagen (Germany)- FernUni
- Kaunas University of Technology (Lithuania)- KTU
- Universidade Aberta (Portugal)- UAb
- Open Universiteit (The Netherlands)_ OUNL
- U. Telematica Internazionale UNINETTUNNO (Italy)- Uninettuno
- National University of Distance Education(Spain)- UNED
- Katholieke Universiteit Leuven (Belgium)- KU Leuven
- Universitat Oberta de Catalunya (Spain)- UOC
- Hellenic Open University (Greece)- HOU
- Open University of Cyprus (Cyprus)- OUC

1.2 Faculty department providing the micro-credential short program.

The faculties and departments involved are from:

1. **Humanities**, i.e., Educational Sciences and Lifelong Learning dept;
2. **Techno-Businesses**, i.e., Business and Economics, Economics and Management, Management Sciences, Science and Technology;
3. **Informatics**, i.e., Computer Science Engineering, Multimedia computing and telecommunications
4. **Engineering**, i.e., Bioscience, Engineering, Engineering and Medicine, Civil Engineering and Architecture.

1.3 Micro-credential program title

The micro-credential programmes reported are related to different disciplines, and this is represented in their titles collected, detailed below:

1. Project management
2. Thinking: Guide for manager
3. Business digital transformation
4. Marketing, e- Business and e-commerce

5. Computational intelligence and decision making
6. Digital and distance education
7. Digitally competent educators
8. Cloud Technology Professional.
9. Learning programming with Python 3
10. Embedded system design and microcontroller applications for the internet of things
11. Health education expertise
12. Micro-degree health innovation management
13. Innovation in Education
14. Integrated Teaching Methodology: learning content, educational methods and instigation.
15. Introduction to organization and management of education
16. Back-end developer
17. Urban sociology
18. Environmental Sciences
19. Malting and Brewing Sciences

1.4 Awarding body

73,68% (11 out of 19) of the above-mentioned micro-credentials is awarded by their respective university, if the assessment and validation procedure is completed successfully by the students. In 26,32% (7 out of the 19 cases) the certificate/award/title is provided by more than one institution.

1.5 ECTS credit number

The results about students' workload needed to achieve the learning outcomes (expressed in ECTS credits) is situated in a range between a minimum of 1.5 ECTS and a maximum of 45 ECTS credits depending on the different higher education institution.

1.6 Level and (cycle, if applicable) of the learning experience leading to the micro-credential

The results demonstrate that the level on 11 cases is on 7 EQF of the learning experience leading to the micro-credential, 3 cases at 6 EQF, 1 case at 5 EQF, 2 of the cases have no specification with reference to European or national frameworks and 2 cases with national reference.

Section 2 - Micro-credential design details

2.1 Prerequisites needed to enrol in the micro-credential

The majority (15 out of 19) of the short learning opportunities investigated in this study require students to meet a series of prerequisites before enrolling. The other four do not require pre-requisites for enrolment.

2.2 Learning outcomes

Starting from the learning outcomes reported by the sample, they have been categorised in the following categories:

- **ICT and digital Technology** (i.e. programming- Python; AI; machine learning methods, digital competences; MATLAB, Back-end Developer, Embedded system design and microcontroller applications)
- **Health** (i.e. Innovation health management, health education)
- **Environmental science**s (i.e. Climate change)
- **Managemen**t (i.e decision making system, business; e-commerce projects, business digital transformation)
- **Sociology** (i.e. Urban sociology)
- **Educational innovation** (i.e. pedagogical practice in DE contexts, pedagogical strategies, blended learning, quality of educational innovations, educational organisations, Integrated Teaching Methodology: Learning content, educational methods, organization and management of education)
- **Others** (i.e. Malting and brewing industry)

2.3 Online activities

The average of online activities registered in the 19 micro-credentials is 8.5h, ass represented in the Figure 2, below.
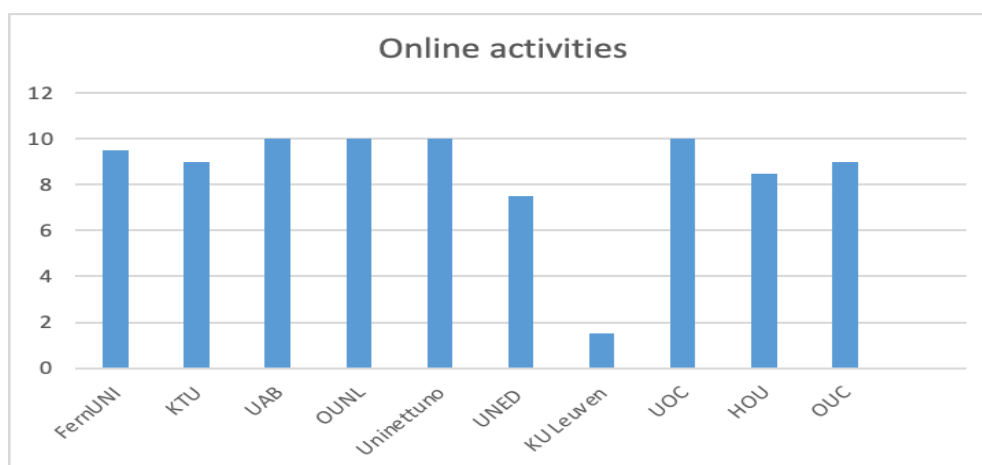
Figure 2 - Amount of the online activities in the micro-credential for case studies collection

2.4 Origin

In seven of 19 short learning experience offerings start from the modularization of existing programmes. The majority of the cases collected, 12/19 the design of the micro-credentials started from scratch (using international cooperation programs, i.e. Erasmus, in other by addressing the needs collected from market /societal / stakeholders).

2.5 Synchronous activities in the short programme

The average amount of the synchronous activities, looking at all the 19 cases collected is 18,94%.

2.6 Co-design

11 of the collected cases have been designed in collaboration with other institutions.

2.7 Type of assessment

The type of assessment adopted in short courses collected is multiple. The main alternatives are the following:

- Portfolio;
- Laboratory exams;
- Final exams (performed written or orally);
- Online assessment;
- Collaborative project;
- Interactive exercise (i.e multiple choice questions with automatic feedback)
- Assignment through platform;
- Oral presentation;
- Peer assessment;
- Report;
- Practical assignment; (i.e. using the language Python)
- Problem solving;
- Written essay
- Weekly assignment (i.e., group work; discussion forum, e-mail portfolio)
- Application of a skill;
- Testing.

2.8 Duration of the micro-credentials

The duration of the micro-credential varies between one week to one academic year, for delaits check the figure 3, below
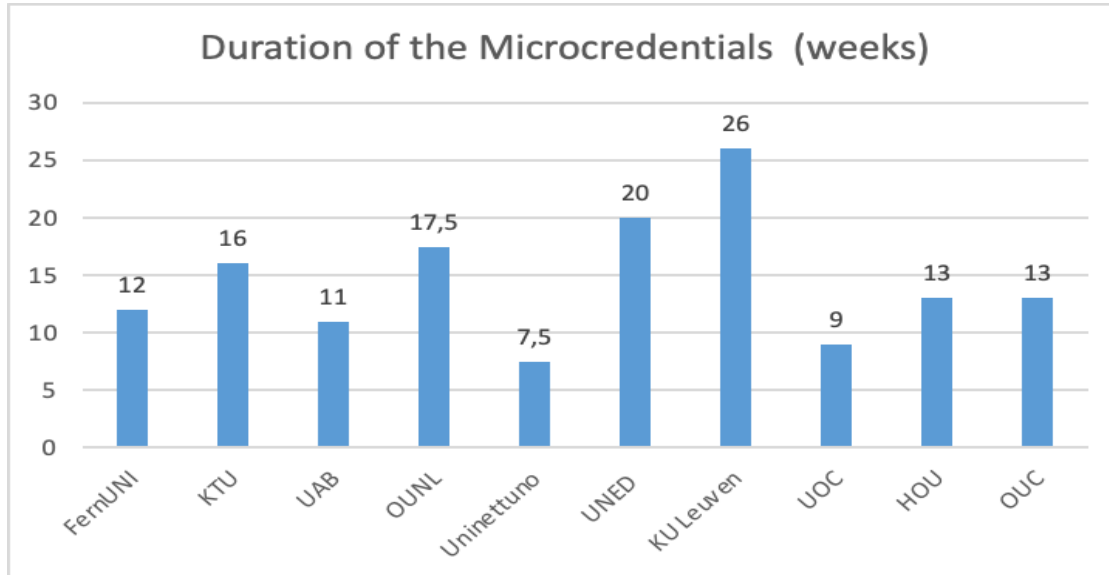
Figure 3 - Duration of the microcredentilals for case studies collection

2.9 Course scheduling/syllabus

The majority of the cases collected, 15 of the 19 follows a fixed schedule, while 4 out of 19 allow a flexible schedule.

Section 3 - Micro-credential implementation

3.1 Student attendance and completion rate

In the 19 cases analysed, the amount of students who attended the micro-credential varies between 3 and 520.

About the percentage of completion rate, the data collected show that varies depending on each year. On this occasion goes from 19 to 100%. Although the majority being around 45-90%.

3.2 Supervision and identity verification assessment

The results about the kind of supervision and identification verification assessment resulting the micro-credentials (MCs) collection are the following:

- 3 MCs unsupervised with identity verification.
- 7 MCs supervised online with identity verification.
- 6 MCs supervised onsite with identity verification.
- 3 MCs supervised without identity verification.

At least one of the institutions has both supervised online or onsite with identity verification and another requires supervision only on final exams.

3.3 Student´s opinion

The students' feedback/evaluation is not always tracked. Among the 19 cases collected, four MC track the students' opinion. Among these four, the students' satisfaction is very high as reported below:

- "'Students' opinions is surveyed in each module. Opinions are very positive; we only have a complete analysis of edition 1 of the SLP: the overall level of satisfaction was 86%" (UAB).
- "Intervision interviews with the participants show that the program meets the expectations and that they also receive sufficient support. But it is also indicated that it is very difficult to find a 'work-life' balance" (KU Leuven)
- "Not everyone fills out the evaluation, those who did were positive" (OUNL).

3.4 Employers/ External stakeholders' opinions

The majority of HEIs do not have information on labour market stakeholders (i.e. employer) opinion. 3 of the 19 cases are waiting for stakeholder´s opinions due to the fact that they are a newly offered programmes. 4 of 19 cases bring some information (i.e. oral expressions, continued interaction, discussions).

Section 4 - Awarding

4.1 Internal accreditation process

In the survey was investigate the accreditation process of the short offering/micro-credential and the majority of our cases collected, 13 of 19 has internal, institutional, accreditation for their micro-credentials.
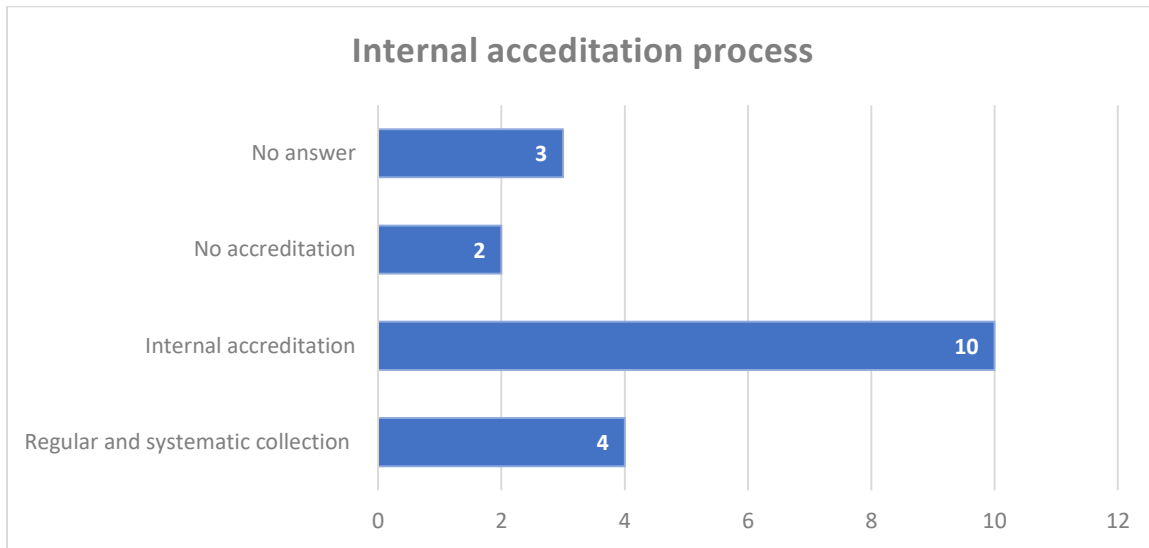
Figure 4 - Internal accreditation process for case studies collection

4.2 Accreditation institution Micro-credential program accredited by external agency

The results point that 4 out of the 19 cases collected (26,3% of the sample) is accredited by external agencies, while the majority 15 out of the 19 cases (73% of the sample) receives internal accreditation. Below are reported some examples of these external accreditations' bodies listed by the MCE's partners:

- "Master Program accredited through AQAS (independent and professional agency for external quality assurance in the field of higher education): Application documents in written form as well as on-site inspection by group of experts/reviewers" (FernUNI).
- "The course is recognised by the Conselho Científico-Pedagógico da Formação Contínua (Scientific-Pedagogical Council for Continuing Education). There is no formal external accreditation process in Portugal either by the QAA or by the Ministry of Higher Education" (UAB).
- "Only module 3 (for which the UA is responsible) has external accreditation. The course is recognised by the Scientific-Pedagogical Council for Continuing Education of Teachers" (UAB).
- "The Programmed in Educational Leadership and Policy overall has been externally evaluated and accredited by the Cypriot Agency for Quality Assurance and Accreditation" (OUC).

4.4 Cooperation with companies

The data collection demonstrates that 4 of the 19 cases has cooperation with companies, other 10 out of 19 cases do not have this kind of cooperation (about the other 5 MCs no-answers were provided on this matter).

4.5 Professional certificate associated to the title

9 the cases reported that students do not have a professional certificate associated to the title at the end of the MC, against 6 that provide a professional certificate associated to the title at the end of the MCs (for the rest of the sample was not provided info on this matter).

4.6 Stackability options

The data collection about the stackability options points that there are different approaches used in the different programs, even by the same Higher Education Institution.

Table 3 - Micro-credentials cases collected against three main stackability options identified

Micro-credential/Program title	Independent / Standalone	Stackable (Other microcredentials /short programs)	Recognition (Formal degree programs)
1. Project management	X		
2. Design Thinking: A Guide for Managers		X	X
3. Business digital transformation			X
4. Marketing, e- Business and e-commerce			X
5. Computational intelligence and decision making			X
6. Digital and distance education	X		
7. Digitally competent educators	X		X
8. Cloud Technology Professional			X
9. Learn programming with Python 3	X		
10. Embedded system design and microcontroller applications for the internet of things			X
11. Health education expertise	X		
12. Micro-degree health innovation management		X	X
13. Innovation in Education		X	X
14. Integrated Teaching Methodology: learning content, educational methods and instigation	X		
15. Introduction to organization and management of education	X		
16. Back-end developer			X
17. Urban sociology			X
18. Environmental Sciences		X	
19. Malting and Brewing Sciences	X		
Total	8	5	11

As shown in Table 3, while all micro-credentials are designed to be "standalone" programs[10], 8 out of 19 (42%) were designed to be completely independent and non-stackable. In the other cases, they were designed for being recognized in formal programs (11 out of 19 - 57, 89%), and/or to be stackable in larger credentials / short programmes (5 out of 19, 26,31%).

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[10] While some cases used the word "standalone" and other "independent", "standalone/independent" are presented as synonyms in the range of stackability options in "A European Approach to Micro-credentials" (https://education.ec.europa.eu/sites/default/files/2022-01/micro-credentials%20brochure%20updated.pdf) as in the Annex to the Proposal for a Council Recommendation on a European approach to microcredentials for lifelong learning and employability {SWD(2021) EN 367 final} EN (https://education.ec.europa.eu/sites/default/files/2022-01/annex%201%20to%20the%20proposal%20on%20micro-credentials.pdf). UNESCO's "Towards a common definition of micro-credentials" (2022) uses "standalone" as a fundamental characteristic in the proposed definition of micro-credential, while micro-credentials "**may also** contribute to or complement other micro-credentials or macro-credentials, including through recognition of prior learning". Therefore, we will use "independent" as a stackability option in the next activities and documents, while being standalone will be considered a characteristic of all micro-credentials.

4. Insights for the pilots' implementation

Starting from the results of the case studies collection, this section proposes a set of 9 main dimensions to be analysed in the pilot design and implementation. For each of them, this section presents a general description, and provides elements for a more in-depth understanding in terms of options, or challenges, and specific references. The 9 identified dimensions are:

- #1 Design: Stakeholder Involvement
- #2 Design: Form of Collaboration
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- #5 Implementation and delivery
- #6 Assessment Methodologies
- #7 Technology standards for certification
- #8 Standardization of micro-credentials-based Qualification Framework
- #9 Stakeholders' acceptance

Those dimensions will be used both as guidelines in the pilot course proposition by the partner universities, highlighting the relevant elements presented as innovation challenges in the context of the participating HEIs; and as research variables to be analysed against pilot results. Pilot evaluation will also be focused on the 9th dimension proposed, regarding expectations, acceptance and perceived usefulness of the micro-credentials in three main target groups: students, professors and university managers.

Paragraph 4.2 proposes a new template for pilot proposals collection from HEIs in MCE consortium, as preparation of Task 5.2.

4.1. Pilot dimensions

This section presents the main elements to be considered in pilot design, implementation and evaluation in the frame of the MCE project (T5.2). They could act both as (1) a guide for identifying and designing the pilot programmes/micro-credentials for pilot institution in the project, and (2) as vademecum driving the pilot evaluation.

The proposed dimensions are the results of a) the elements emerging from the case studies collection presented in Section 2 and 3 of this document; b) the lessons learned from the E-SLP project (https://e-slp.eadtu.eu/); and the work carried out within MCE's Work Packages 2 and 3, specifically and from the systematic literature review on the learners perspective (D2.1) and Analysing and mapping of current institutional qualifications for continuing education and professional development and micro-credentials in the partnership (D3.2).

Each dimension of this guide for the pilots implementation is presented with:

1- a title;
2- a description;

3- , an overview of the options and challenges;

4- - where available - references to actual implementation in Higher education context.

#1 Design: Stakeholder Involvement

Description
Level of the stakeholder/s involvement in the design process. Stakeholders may include faculty members, labour market actors (i.e., enterprises/companies and industry representatives), potential students, policymakers. Direct stakeholder involvement refers to the active participation of stakeholders in the design process, such as through interviews, focus groups, or co-design sessions. Indirect stakeholder involvement, on the other hand, refers to the use of reports or market analysis to inform the design process.
Options
Direct stakeholder/s involvement can provide several benefits to the design process, such as ensuring that the needs and preferences of stakeholders, including enterprises/companies and potential students, are considered in the design of micro-credentials. By involving stakeholders directly in the design process, HEIs can also build buy-in and financial support for the development and implementation of the micro-credential program. Direct stakeholder involvement can also help to identify potential challenges and barriers to the implementation of micro-credentials and develop strategies to address them.   Indirect stakeholder involvement can also provide benefits to the design process. For example, market analysis can help to identify emerging trends and areas of demand in the labour market that can inform the design of micro-credentials. Reports on best practices in micro-credential design and implementation can also provide valuable insights for HEIs looking to pilot micro-credentials.
Challenges
Indirect stakeholder involvement may also have limitations. Without direct input from stakeholders, the design of micro-credentials may not fully meet the needs and preferences of learners and employers. Additionally, indirect stakeholder involvement may not capture the nuances and complexities of stakeholder perspectives that can only be gleaned through direct interaction.   On the other hand, direct involvement of stakeholders can assure effectiveness in the design but comes with costs in terms of time of analysis and design phase, effort for developing analysis protocol and for administering the research, impacting on the overall cost of the micro-credential implementation.
References
Rossiter, D. and Tynan, B. (2019) *Designing & Implementing Micro-Credentials: A Guide for Practitioners*. Commonwealth of Learning. URL: https://oasis.col.org/colserver/api/core/bitstreams/770ff842-9a5e-424b-a253-0757fa539086/content   AA.VV. (2019) *Exploring Micro-Credentials With Stakeholders: A Conversation Guide.* Midwest Comprehensive Center and Great Lakes Comprehensive Center at the American Institutes for Research. URL: https://www.ctc.ca.gov/docs/default-source/commission/agendas/2020-08/2020-08-4i-mc-conversation-guide-508.pdf?sfvrsn=4b652eb1_2

#2 Design: Form of Collaboration

Description
Strictly related to Dimension #1, this dimension refers to the collaboration of universities with companies and stakeholders at national or international levels to design micro-credentials that address the needs of the labour market. This collaboration can take many forms, such as joint projects, funding programmes, or partnerships between academia, industry, and target associations.
Options
National and international collaborations offer several benefits for the design of micro-credentials. Collaborating with companies and stakeholders can help universities to identify emerging trends and areas of demand in the labour market. By working with industry partners, HEIs can ensure that their micro-credentials are relevant, up-to-date, and meet the needs of employers. Collaboration can also ensure that micro-credentials are aligned with national and international standards and regulations, making them more valuable and transferable. Collaboration can also help to share resources, expertise, and best practices between universities, companies, and other stakeholders. By pooling their resources, HEIs can develop high-quality micro-credentials that may not have been possible otherwise. Collaboration can also help to build networks and partnerships that can provide ongoing support and expertise for the design and implementation of micro-credentials. One example of national/international collaboration for the design of micro-credentials is projects funded at national or European levels, such as through the Erasmus+ program. These funding programs support the development of continuous professional development programs through collaboration between academia, industries, and target associations. These projects often involve the design of micro-credentials that are specifically tailored to the needs of the labour market and designed to meet the standards and regulations of the funding organization.
Challenges
These collaborations require a significant investment of time, resources, and expertise from all parties involved. Differences in organizational culture, values, and priorities can also pose challenges for effective collaboration.
References
Maina, M.F., Guàrdia Ortiz, L., Mancini, F. et al. (2022) *A micro-credentialing methodology for improved recognition of HE employability skills.* Int J Educ Technol High Educ 19, 10. https://doi.org/10.1186/s41239-021-00315-5

#3 Design: Micro-credential Origin

Description
This dimension refers to the creation of the micro-credential, which can take various forms, such as modularization of an existing course, a new design, or a hybrid approach that combines both.
Options

Modularization involves breaking down an existing course from a larger program into smaller units, each with its own learning objectives and assessments. These smaller units can then be combined to create a micro-credential that is tailored to the needs of learners and employers. For example, an existing course on digital marketing may be modularized into smaller units on social media marketing, search engine optimization, and online advertising, which can then be combined to create a micro-credential in digital marketing. A new design approach involves creating a micro-credential from scratch, which may involve developing entirely new content, assessments, and learning objectives. This approach allows HEIs to design micro-credentials that are specifically tailored to the needs of the labour market and meet emerging trends in specific industries or professions. For example, a HEI may design a micro-credential in sustainable energy management that covers topics such as renewable energy, energy efficiency, and sustainable business practices.

A hybrid approach involves combining existing courses or modules with new content and assessments to create a micro-credential that meets the needs of learners and employers. For example, a HEI may take existing courses on financial accounting, corporate finance, and financial statement analysis and combine them with new modules on financial risk management and investment analysis to create a micro-credential in financial management.

Challenges

Each approach has its own benefits and challenges. Modularization allows HEIs to leverage existing content and expertise to create micro-credentials quickly and efficiently. However, modularization may not allow for sufficient customization to meet the specific needs of learners and employers. New design approaches provide HEIs with the flexibility to create micro-credentials that are specifically tailored to the needs of the labour market; this approach may be time-consuming and require significant resources and expertise. Hybrid approaches provide HEIs with the best of both worlds, leveraging existing content while allowing for customization to meet specific needs; at the same time, hybrid approaches may require careful planning and design to ensure that the micro-credential is cohesive and meets the needs of learners and employers.

References

Wills, C., Xie, Y. (2016). *Toward a Comprehensive Theoretical Framework for Designing Digital Badges*. In: Ifenthaler, D., Bellin-Mularski, N., Mah, DK. (eds) Foundation of Digital Badges and Micro-Credentials. Springer, Cham. https://doi.org/10.1007/978-3-319-15425-1_14

Rossiter, D. and Tynan, B. (2019) *Designing & Implementing Micro-Credentials: A Guide for Practitioners*. Commonwealth of Learning. URL: https://oasis.col.org/colserver/api/core/bitstreams/770ff842-9a5e-424b-a253-0757fa539086/content

Fedock, B., Kebritchi, M., Sanders, R., Holland, A. (2016). *Digital Badges and Micro-credentials: Digital Age Classroom Practices, Design Strategies, and Issues*. In: Ifenthaler, D., Bellin-Mularski, N., Mah, DK. (eds) Foundation of Digital Badges and Micro-Credentials. Springer, Cham. DOI: 10.1007/978-3-319-15425-1_15

#4 Funding and Business Model

Description

This dimension addresses how HEIs can design, develop, and implement non-publicly funded micro-credentials, and how to engage professors in non-standard programs through incentive models.

Options
Micro-credentials may not be eligible for public funding, and HEIs must find alternative sources of funding for their design, development, and implementation.
One option for funding micro-credentials is external funding, such as grants from private foundations, industry partners, or government agencies. HEIs can also leverage corporate training budgets or employer tuition reimbursement programs to fund micro-credentials. In addition, HEIs can explore revenue-sharing models, where industry partners and other stakeholders pay for the development and delivery of micro-credentials, and HEIs receive a share of the revenue generated by the program.
Business planning is another critical aspect of the funding and business model for micro-credentials. HEIs must identify the market demand for micro-credentials, assess the competition, and develop a pricing strategy that reflects the value of the micro-credential. HEIs must also consider the cost of developing and delivering micro-credentials and identify ways to reduce these costs while maintaining the quality of the program.
Engaging professors in non-standard programs through incentive models is also important for the success of micro-credentials. HEIs must incentivize professors to participate in the development and delivery of micro-credentials, which may require a different skill set than traditional degree programs. One approach to incentivizing professors is to offer them compensation for their participation, such as additional pay, reduced teaching loads, or professional development opportunities. HEIs can also recognize the contribution of professors to micro-credentials by including them in the governance and decision-making processes related to the program.

Challenges
Modularization allows HEIs to leverage existing content and expertise to create micro-credentials quickly and efficiently. However, modularization may not allow for sufficient customization to meet the specific needs of learners and employers. New design approaches provide HEIs with the flexibility to create micro-credentials that are specifically tailored to the needs of the labour market; this approach may be time-consuming and require significant resources and expertise. Hybrid approaches provide HEIs with the best of both worlds, leveraging existing content while allowing for customization to meet specific needs; at the same time, hybrid approaches may require careful planning and design to ensure that the micro-credential is cohesive and meets the needs of learners and employers.

References
Wheelahan L., Moodie, G. (2021) *Analysing micro-credentials in higher education: a Bernsteinian analysis*, Journal of Curriculum Studies, 53:2, 212-228, DOI: 10.1080/00220272.2021.1887358 Lazarewicz, K. (2021) Micro-Credentials: The New Enrollment Funnel for Tomorrow's University. Wiley University Services, URL: https://universityservices.wiley.com/stackable-credentials/

Varadarajan, S., Koh, J.H.L. & Daniel, B.K. (2023) *A systematic review of the opportunities and challenges of micro-credentials for multiple stakeholders: learners, employers, higher education institutions and government*. Int J Educ Technol High Educ 20, 13. DOI: 10.1186/s41239-023-00381-x

#5 Implementation and delivery

Description
This dimension addresses the actual course delivery and the decisions that need to be made in the design phase, such as the mix of synchronous and asynchronous activities, whether the micro-credential will be fully online or in a blended learning format, and the level of flexibility provided to students.
Options
This dimension can be structured in a subset of decisions to be taken in the design phase impacting on the delivery mode of the micro-credential.

The first decision is whether the micro-credential will be delivered synchronously or asynchronously. Synchronous activities involve real-time interaction between students and instructors, while asynchronous activities do not. Synchronous activities can include live video sessions, group discussions, or online office hours, while asynchronous activities can include recorded lectures, self-paced assignments, or discussion forums.

Another aspect about the implementation focusses on the delivery format: fully online or in a blended learning format. Online delivery provides students with the flexibility to access the course materials and activities from anywhere and at any time. Blended learning, on the other hand, combines online and face-to-face components, providing students with the benefits of both formats. Blended learning can include online lectures, activities, and assessments, combined with in-person seminars, workshops, or labs.
Finally, implementation should consider the level of flexibility provided to students in the implementation methodology. Flexibility refers to the extent to which students can customize their learning experience to meet their individual needs and preferences. For example, flexibility can include the ability to choose the pace of learning, the order in which activities are completed, or the choice of assessments. Flexibility can also include the ability to customize the micro-credential to meet the specific needs of a learner's career or educational goals. |
| **Challenges** |
| From the implementing institution point of view, the implementation modality impacts on the scalability of the proposed micro-credential (the more asynchronous, online, unsupervised, the more scalable the micro-credential will be); on the other hand, blended modality and asynchronous activities can be attractive for the target group. Synchronous activities can provide students with real-time feedback, interaction, and support from instructors and peers, but can also be challenging for internationalization, because of students with different time zones or schedules. Online delivery can provide students with flexibility and accessibility but can also require a high level of self-discipline and time- |

management skills. Blended learning can provide students with the benefits of both formats but can also require significant resources and expertise to design and implement effectively.
References
Gish-Lieberman, J.J., Tawfik, A. & Gatewood, J. (2021) *Micro-Credentials and Badges in Education: a Historical Overview*. TechTrends **65**, 5–7 https://doi.org/10.1007/s11528-020-00567-4 University of Colorado Denver's graduate program in Information and Learning Technologies (ILT) uses badges for certification of competences/skills within courses, and developed a wither approach at program level: Wilson, B.G., Gasell, C., Ozyer, A., Scrogan, L. (2016). *Adopting Digital Badges in Higher Education: Scoping the Territory*. In: Ifenthaler, D., Bellin-Mularski, N., Mah, DK. (eds) Foundation of Digital Badges and Micro-Credentials. Springer, Cham. Doi:10.1007/978-3-319-15425-1_9

#6 Assessment Methodologies

Description
This dimension addresses the *in-itinere* and final assessment of micro-credentials, including the main indicators, such as supervision, online/offline assessment, evaluation tool, and criteria.
Options
Supervision can include in-person or online proctoring, where a proctor monitors the assessment to prevent cheating. Alternatively, micro-credentials can use other methods, such as peer assessment, self-assessment, or automated assessment, that can provide similar levels of support and feedback without the need for direct supervision. Online assessment allows students to complete assessments from anywhere and at any time, providing greater flexibility and accessibility. Online assessments can include a variety of formats, such as multiple-choice questions, short answer questions, essays, or projects. Offline assessment requires students to complete assessments in person, either on-campus or at proctored testing centres. Offline assessments can include similar formats as online assessments but may also include practical or performance-based assessments, such as lab work, simulations, or presentations. Evaluation tools refer to the methods used to measure student learning, such as rubrics, checklists, or rating scales. Evaluation criteria refer to the standards used to evaluate student performance, such as mastery of learning objectives, application of knowledge, or critical thinking skills. Evaluation tools and criteria must be aligned with the learning objectives and assessments of the micro-credential and must provide a valid and reliable measure of student learning.
References
Bigelow, A., Colleen B. et al. (2022) *ECAMPUSONTARIO'S Micro-Credential Toolkit*. Ontario Online Learning Consortium (eCampusOntario) URL: https://ecampusontario.pressbooks.pub/microcredentialtoolkit/chapter/assessments/

Oliver, B. (2021) *A conversation starter: Towards a common definition of micro-credentials.* UNESCO URL: https://cdn.aigroup.com.au/Workforce_Development/CET/DRAFT_UNESCO_REPORT_MICROCREDENTIALS_13%20sept_21_FR.pdf

Cain, A., Tubino, L., Krishnan, S. (2020). *Using Technology to Enable a Shift from Marks to Outcomes-Based Assessment.* In: Bearman, M., Dawson, P., Ajjawi, R., Tai, J., Boud, D. (eds) Re-imagining University Assessment in a Digital World. The Enabling Power of Assessment, vol 7. Springer, Cham. DOI: 10.1007/978-3-030-41956-1_16

#7 Technology standards for assigning, recognizing, distributing, and checking micro-credentials

Description
This dimension aims at investigating which kinds of technologies can be used for assigning, recognizing, distributing, and checking micro-credentials. In particular, HEIs need to consider the use of digital badges and blockchain certification to ensure the interoperability and credibility of micro-credentials across different platforms and contexts. Furthermore, HEIs can use micro-credentials in conjunction with ePortfolios, digital collections of work that showcase an individual's skills and achievements to demonstrate an individual's abilities.

Options
Digital badges are a type of digital credential that can be used to recognize and verify learning achievements. Digital badges are designed to be portable, shareable, and verifiable, and can be used to represent a wide range of learning achievements, from small skills to complete degrees. Digital badges can include a variety of metadata, such as the issuer, the earner, the criteria, and the evidence, which can be used to verify the authenticity and relevance of the credential. Blockchain technology has emerged as a promising solution for the certification and verification of micro-credentials. Blockchain is a distributed ledger technology that enables secure and transparent record-keeping and transactions without the need for intermediaries. By using blockchain technology, micro-credentials can be securely and immutably stored and verified, ensuring their credibility and validity. *Existing initiatives* The **European Learning Model (ELM)** is an open-source software platform developed by the European Commission to support the recognition and validation of skills and competences acquired through non-formal and informal learning. The ELM is designed to enable individuals to create and manage their own digital portfolios of learning achievements, which can include both formal qualifications and non-formal and informal learning experiences. The ELM supports the use of digital badges and blockchain certification to enable the secure and transparent recognition and validation of learning achievements. The ELM is part of the European Commission's efforts to promote lifelong learning and to support the development of a European Education Area, which aims to enable individuals to acquire and develop the knowledge, skills, and competences needed to succeed in a rapidly changing world.

The **European Digital Credentials Infrastructure (EDCI)** is a framework developed by the European Commission to support the issuance, management, and verification of digital credentials. The EDCI provides a set of interoperable and standardized technical specifications, protocols, and services that enable the secure and transparent exchange of digital credentials across different platforms and contexts.

To adopt the EDCI, a university needs to implement a digital credentialing system that is compatible with the EDCI standards and specifications. This system should enable the creation, issuance, management, and verification of digital credentials that conform to the EDCI requirements, such as the use of open standards, the inclusion of relevant metadata, and the use of secure and transparent verification mechanisms.

To adopt the EDCI, a university can follow the guidelines and recommendations provided by the European Commission, such as the *European Blockchain Services Infrastructure (EBSI)* or the *European Qualifications Passport for Refugees (EQPR),* which are based on the EDCI framework. The university can also collaborate with other HEIs, employers, and stakeholders to promote the adoption and implementation of the EDCI and to ensure its relevance and sustainability over time.

References

Sharples, M., Domingue, J. (2016). *The Blockchain and Kudos: A Distributed System for Educational Record, Reputation and Reward*. In: Verbert, K., Sharples, M., Klobučar, T. (eds) Adaptive and Adaptable Learning. EC-TEL 2016. Lecture Notes in Computer Science(), vol 9891. Springer, Cham. https://doi.org/10.1007/978-3-319-45153-4_48

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European Learning Model https://github.com/european-commission-empl/European-Learning-Model/blob/master/README.md

European Digital Credentials Infrastructure – EDCI https://europa.eu/europass/en/what-are-digital-credentials

#8 Standardization of micro-credentials based Qualification Framework

Description

This dimension refers to the need to develop an internal qualification framework for micro-credentials that is aligned with national and European qualification frameworks for higher education and continuous professional development. The scope of the pilot is to support

institutional managers in reflecting on how to develop this internal qualification framework and how to identify stackability options for micro-credentials.

Options
HEIs can use the European Credit Transfer and Accumulation System (ECTS) to assign credit values to micro-credentials and to ensure their comparability and transferability across different programs and institutions. HEIs can also use the European Qualifications Framework (EQF) to define the level of micro-credentials and to ensure their recognition and comparability across different countries and contexts.

In addition, HEIs need to consider the naming and issuance of certificates for micro-credentials. This includes defining the naming conventions for micro-credentials and ensuring that they are clear, concise, and meaningful. HEIs also need to develop a standardized issuance process for micro-credentials, which includes verifying the authenticity and relevance of the micro-credentials and ensuring their secure and transparent distribution to learners.

Finally, HEIs need to consider how to recognize micro-credentials as exemptions in formal programs, such as bachelor's and master's degrees. This includes developing a standardized process for evaluating and recognizing micro-credentials as equivalent to formal courses or modules, and ensuring that this process is transparent and fair for all learners. |

Use cases
- University of Maryland, Global Campus (USA): The university offers a range of micro-credentials and digital badges and provides an internal framework supporting course designer and professors in defining badges/micro-credentials within courses https://badging.umd.edu/procedures.html.   - University of California, Los Angeles (UCLA Extension) (USA): UCLA Extension offers three categories of short programs: Courses, Certificates and Specializations. Courses are single modules, while, according to their definitions, "a certificate offers in-depth study of a professional field through coursework that balances theory and practice, providing learners knowledge and expertise in less time than many traditional postgraduate degrees. A specialization is a short series of courses designed to help you quickly gain knowledge in a focused area of study and acquire in-demand skills sought by employers"; see: https://www.uclaextension.edu/. Courses are recognizable in formal program according to a specific code: XL1 to XL99 are equivalent to undergraduate courses, and recognized in University of California, California State University System and other universities nationwide; while X1 to X199 includes elements not present in undergraduate regular courses, ranging from 1-99 as foundation courses, and from 100 to 199 as junior courses; see: https://www.uclaextension.edu/transfer-credit-courses   - University of California, Irvine Division of Continuing Education (UCI DCE) has developed a comprehensive micro-credentialing framework that classifies credentials based on credit hours, the level of education in their qualification framework, and the stackability of credentials in larger programs.

- o <u>Courses</u> are short programs focusing on a specific subject, and can be attended individually;
- o <u>Specialized Studies</u> are short, concentrated curricula;
- o <u>Certificate programs</u> offer an in-depth body of knowledge to ensure you gain mastery of a particular topic;
- o UCI DCE developed a specific set of agreements for the <u>recognition of these credits in partner universities</u> (see https://ce.uci.edu/resources/academic/transfer_credit/)
- o <u>Alternative Digital Credentials</u> (in the form of badges managed by Credly application) are provided transversally to programs, to give evidence to specific skills and competences not always visible on a traditional educational transcript. (see https://ce.uci.edu/resources/academic/badges/)

References
Beattie, S. (2016). *Height vs. Depth in Badging Framework Design*. In: Ifenthaler, D., Bellin-Mularski, N., Mah, DK. (eds) Foundation of Digital Badges and Micro-Credentials. Springer, Cham. https://biblioproxy.cnr.it:2481/10.1007/978-3-319-15425-1_17   Lee, W.O., Tan, J. (2023). *Develop a Qualification Ecosystem for Adult Learners: Micro-credentialing to Formalize Informal and Nonformal Learning*. In: Evans, K., Lee, W.O., Markowitsch, J., Zukas, M. (eds) Third International Handbook of Lifelong Learning. Springer International Handbooks of Education. Springer, Cham. DOI: 10.1007/978-3-031-19592-1_40

#9 Stakeholders' acceptance

Description
While the dimensions described above will be used to describe the pilot micro-credentials and to guide their design and implementation by partner, this dimension will be used as a base for measuring micro-credentials impact on the relevant stakeholders at micro and meso level. The idea is to adopt a Diffusion of Innovation (Rogers, 2003) model, as in Pirkkalainen et al. 2023, and together with User Acceptance of Information Technology (UTAUT) model, a widely used framework for understanding user acceptance and adoption of new technologies. It proposes that four key factors - performance expectancy, effort expectancy, social influence, and facilitating conditions - influence the behavioural intention to use technology, which in turn affects actual use. In the context of micro-credentials and MCE project, a research study using the UTAUT model could investigate the user acceptance and adoption of micro-credentials among three different target groups: students, professors, and university management.   A research study using the UTAUT model could provide valuable insights into the user acceptance and adoption of micro-credentials among different stakeholders in higher education. By investigating the dimensions/items of performance expectancy, effort expectancy, social influence, and facilitating conditions, the study could identify the key drivers and barriers to user acceptance, as well as the factors that can facilitate or hinder

the adoption and diffusion of micro-credentials in the higher education ecosystem. The results of such a study could inform the development and implementation of micro-credentials, as well as the design of policies and strategies that support their recognition and integration into the broader system of qualifications.

To gather data for the UTAUT model, the research study could use a combination of quantitative and qualitative methods, such as surveys, interviews, focus groups, and case studies. The data could be analysed using statistical techniques, such as regression analysis or structural equation modelling, to test the relationships between the four key factors and the behavioural intention to use micro-credentials. The results could be triangulated with qualitative data to provide a deeper understanding of the context, motivations, and attitudes of the target groups towards micro-credentials

Implementation options

For **students**, the following dimensions/items could be investigated:

Performance expectancy: How do students perceive the usefulness and value of micro-credentials for their personal and professional development? How do they compare micro-credentials to traditional degree programs in terms of their perceived benefits and drawbacks?

Effort expectancy: How easy and convenient do students find it to enrol in and complete micro-credentials? What are the perceived barriers and challenges to participation, such as time constraints, technical difficulties, or financial costs?

Social influence: To what extent do students feel that their peers, mentors, or employers value and support their participation in micro-credentials? How do social norms and expectations affect their motivation and commitment to completing micro-credentials?

Facilitating conditions: How accessible and available are micro-credentials to students, both in terms of their physical and digital infrastructure? What resources and support are provided to students to help them succeed in micro-credentials, such as advising, tutoring, or career services?

For **professors**, the following dimensions/items could be investigated:

Performance expectancy: How do professors perceive the potential pedagogical benefits of micro-credentials, such as personalized learning, modularization, and industry relevance? How do they compare micro-credentials to their traditional teaching practices and programs?

Effort expectancy: How easy and feasible do professors find it to design, develop, and deliver micro-credentials? What are the perceived challenges and opportunities of working with new technologies, formats, and stakeholders?

Social influence: To what extent do professors feel that their colleagues, departments, or institutions value and recognize their involvement in micro-credentials? How do institutional policies and incentives affect their motivation and engagement in micro-credentials?

Facilitating conditions: What resources and support are provided to professors to help them develop and teach micro-credentials, such as training, technology, or funding? How do they perceive the institutional infrastructure and culture for micro-credentials, such as governance, quality assurance, or recognition?

For **university management**, the following dimensions/items could be investigated:

Performance expectancy: How do university managers perceive the strategic benefits and opportunities of micro-credentials, such as innovation, differentiation, and revenue generation? How do they align micro-credentials with the overall mission, vision, and goals of the institution?

Effort expectancy: How easy and efficient do university managers find it to implement and sustain micro-credentials? What are the perceived risks and challenges of managing a complex and diverse portfolio of micro-credentials, such as quality control, branding, or accreditation?

Social influence: To what extent do university managers feel that their stakeholders, partners, or policymakers value and support their investment in micro-credentials? How do external factors, such as market demand, policy frameworks, or technological trends, influence their decision-making and strategic planning for micro-credentials?

Facilitating conditions: What resources and support are provided to university managers to help them design, develop, and implement micro-credentials, such as funding, personnel, or technology? How do they perceive the institutional readiness and capacity for micro-credentials, such as governance structures, partnerships, or marketing strategies?

References

Diffusion of Innovations theory:
Rogers, E.M. (2003) *Diffusion of Innovations – 5th edition*. Free Press, ISBN: 978-0743222099

UTAUT model:
Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 27(3) 425-478.

Diffusion of Innovations as research model for micro-credentials:
Pirkkalainen, H., Sood, I., Padron Napoles, C., Kukkonen, A. & Camilleri, A. (2023) *How might micro-credentials influence institutions and empower learners in higher education?*, Educational Research, 65:1, 40-63, DOI: 10.1080/00131881.2022.2157302

4.2. Template for pilot initiative collection

This section presents a new template, defined for collecting, from higher education institutions participating in MCE project, proposals for the pilot design and implementation.

Pilot courses will be selected by MCE HEIs within their didactic offer; WP5 will ask them to propose at least 2 pilots, and then the consortium will discuss the selection. The objectives are:

- to have at least 1 pilot course per HEI participating in MCE, and
- to run a number of pilots guaranteeing a heterogeneous selection, covering different options in the 8 dimensions identified (from #1 to #8 in the previous section), in terms of stakeholders engagement, collaboration, duration, assessment methodology, educational level, etc.

The 9th dimension will be the one investigated through the research protocol that will be developed in Task 5.2 (addressing the stakeholders' acceptance of the new framework in a context of diffusion of innovations approach).

The information provided will also provide elements for a comprehensive scheduling of the pilot design, implementation, and evaluation activities to be performed in WP5. The following is the proposed template for pilot proposals collection.

The pilots are going to run during the project lifetime, starting from year 2023/2024 and in D5.2 will be described their implementation and the lessons learned from their evaluation.

Section 1 - General Information
Micro-credential/Short Program Title
EQF Level
Credits (ECTS)
Scientific sector / Specialization / Subject
Please provide a description of the main topics of the program
Duration (in weeks)
Foreseen scheduling (start / end date)
Section 2 - Pilot design
Stakeholders' engagement
Direct (codesign) or indirect (access to reports, statistics, interviews, existing data, regulations-related forecasts about a specific learning needs emerging from the labour market); involvement of stakeholders; collaboration with stakeholders in the design phase; collaboration with stakeholders in the implementation
Collaboration with other universities

National or international collaboration in the design of the micro-credential, institutions involved, modes of collaboration and responsibilities.
Funding scheme and business model
Is the program funded at national or international level? Direct fund or participation to competitive calls (i.e.: Erasmus+)? Is the micro-credentials provided for free to students? Are professors involved incentivized through specific economic schemes?
Micro-credential origin
Designed from scratch / Modularization of existing courses / Hybrid approaches
Micro-credentials/Extensions/CPD institutional framework
If the short program/micro-credential is offered within a wider scheme for CPD or micro-credentials in the HEI providing it, please explain
Target population
Students'/learners' identification: who they are, which prerequisites are foreseen for the enrolment, which needs are taken into consideration in the design
Learning outcomes
Course objectives, learning outcomes, foreseen skills and competences achievements
Section 3 - Pilot implementation
Amount of online/offline activities
Amount of synchronous activities
Assessment methodology
Please specific assessment approach, supervision, online/offline testing setting,
Expected student population
Expected number of students enrolled in pilot implementation
Professors / Course designers involved
Number of professors/designers that will be possible to reach for surveys/interviews
Management / Administration involved
Role in the organization and number of directors/managers involved in the micro-credential design and implementation that will be possible to reach for surveys/interviews
External stakeholders
Number, role, typology of external stakeholders involved in pilot design or implementation (if any) reachable for pilot activities – opinions and evaluation (interviews or surveys etc.)
Section 4 - Accreditation
External accreditation
Please provide references to external Higher Education or Professional bodies for accreditation
Internal accreditation process
QA standards, University bodies involved in the approval, monitoring, continuous evaluation
Stackability and recognition
Internal recognition for enrolling in larger program within the same institution. Recognition as continuous professional development in specific professional orders/registers. Existing agreements for automatic recognition in existing programs offered by other HEIs.

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