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Circular Economy in Fibrous Composites and Technical Textiles Through the Use of Virtual Laboratories

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Roadmap for the validation and accreditation of the course in the framework of microcredentials

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Content

1. EXECUTIVE SUMMARY

This report titled “Roadmap for the validation and accreditation of the course in the framework of microcredentials” provides a comprehensive information about the roadmap for the accreditation and validation of the e-learning course. The roadmap describes actions, which need to be taken by HEIs in this project that are University of West Attica (UNIWA, Greece), Universitat Politècnica de València (UPV, Spain), Kaunas University of Technology (KTU, Lithuania) and The University of Oradea (Romania), in order to integrate microcredentials into the course, to accredit the course with ECTS, the process for recognition and the process of connecting the certificate to the European-wide digital format of ‘Europass Digital Credentials’.

Leader of this task is UNIWA, but all partners participated. A comprehensive study had been conducted using bibliographic research in European Commission guides and guidelines for recognition and accreditation with ECTS of each University.

It is evident from this report that the widespread adoption of microcredentials is critical not only from an economic standpoint, where meeting labour market demands more effectively is an absolute necessity, but also for the mission of education to society. Further edifying students for active citizenship, it can assist higher education institutions in carrying out their public duty by supplementing more conventional methods of instruction and learning. Additionally, educational innovation can be bolstered by microcredentials, which facilitate the acquisition of advanced skills by new categories of students.

2. INTRODUCTION

This roadmap aims to accelerate the flexibility and responsiveness of learning systems within the HEIs of the European partner countries, by providing guidance on the integration of microcredentials into the course, the accreditation of the course with ECTS, the process for recognition and the process of connecting the certificate to the European-wide digital format of 'Europass Digital Credentials'. It has been prepared as part of the CICRUTEX project (Erasmus+) partner countries including Greece, Spain, Lithuania and Romania.

It is based on European Union policies, on documents prepared by European Training Foundation (ETF)[1] and European Commission[2], in-depth analysis of selected international practices and also the practices based on guidelines for recognition and accreditation with ECTS of each HEIs.

This road map is intended for individuals who possess the authority to create, oversee, and provide micro-credentials, as well as facilitate their recognition at the provider, system, or regional levels. This encompasses decision makers within educational institutions (e.g., faculty boards, academic directors, programme directors, and course designers), personnel affiliated with recognition and quality assurance authorities, policymakers in the learning sector, sectoral organisations, professional associations, chambers, and employers involved in personnel training and development. This roadmap pertains to alternative providers, including but not limited to non-formal and informal learning providers, in addition to accredited learning providers and awarding bodies.

2.1 Definition and terminology

Diverse actors have already responded on a global scale to the demand for more adaptable modes of education provision and lifelong learning. Alternative credentials are occasionally offered under brand names such as MicroMasters and NanoDegrees[3]. Notwithstanding various endeavours to establish a precise definition, the escalating quantity of alternative credentials gives rise to inquiries concerning their nature and intrinsic worth. In the absence of a unified definition, micro-credentials may be less effective as evidence of an individual's competencies and aptitudes, whether for the purpose of employment or for the pursuit of additional knowledge. Furthermore, it is not recommended that higher education students seek recognition for their academic achievements beyond the prescribed curriculum. The lack of a universally accepted

[1] Giunipero, R., 2023. GUIDE TO DESIGN, ISSUE AND RECOGNISE MICRO-CREDENTIALS, European Training Foundation. Italy. Retrieved from https://policycommons.net/artifacts/4810855/guide-to-design-issue-and-recognise-micro-credentials/5647373/ on 20 Dec 2023. CID: 20.500.12592/gwh874.

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

[3] https://www.classcentral.com/report/list-of-mooc-based-microcredentials/

definition for microcredentials is cited by members of the consultation group on micro-credentials as the most significant obstacle to their continued adoption[4,5].

Ensuring a transparent and universally accepted definition of microcredentials is crucial for their continued growth and acceptance as a trusted currency for skills. A shared definition must be applicable to all sectors of education and the workplace, and it must reflect the societal mission of higher education institutions, according to their research.

The definition that has been proposed was formulated via an examination of preexisting definitions. The formulated definition of microcredentials includes essential attributes that promote their adoption, such as quality assurance, incorporation of qualifications frameworks, utilisation of credits (where applicable), and measures to guarantee portability and stackability.

The European Union (EU) defines a microcredential as[6]:

the record of the learning outcomes that a learner has acquired following a small volume of learning. These learning outcomes will have been assessed against transparent and clearly defined criteria. Learning experiences leading to microcredentials are designed to provide the learner with specific knowledge, skills and competences that respond to societal, personal, cultural or labour market needs. Microcredentials 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.

The term "microcredential" lacks consensus among scholars worldwide, as dozens of definitions are in use. Additional illustrations of the diverse terminology employed by microcredential providers are as follows: "alternative credentials," "digital badges," "awards," "micro-certifications," "micro-qualifications," "micro-degrees," modules, and units[7].

[4] Larsen, K. N., 2020. Summation of replies to survey 1, s.l.: Danish Technological Institute.

[5] MicroHE Consortium, 2019. Challenges and Opportunities of Micro-Credentials in Europe. Briefing Paper on the Award, Recognition, Portability and Accreditation of Micro-Credentials. version 6.0, https://microcredentials.eu/: MicroHE.

[6] Council Recommendation of 16 June 2022 on a European Approach to Micro-Credentials for Lifelong Learning and Employability." Official Journal of the European Union, vol. 2022/C, 16 June 2022, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022H0627(02)&from=EN . Accessed: December 2023.

[7] Camilleri, Anthony F. Diplomas Track Deep Dive: Ensuring Interoperability. EBSI use case groups Joint workshop, 2019, https://europa.eu/europass/system/files/2020-07/Europass%20Credental%20High%20Level%20View.pdf . Accessed: December 2023.

3. MICROCREDENTIAL INTEGRATION INTO THE COURSE

In this chapter, we propose the actions that are needed to be taken by HEIs, in order to integrate microcredentials into the course, based on the Annex II of the EU Council Recommendation on Micro-Credentials[8]. The objective of this guide is to enhance the connection between validation and certification prior learning, modify quality assurance for microcredentials to suit the needs of various types of providers, and enable the incorporation of smaller units of learning into qualifications frameworks or systems, and finally, to promote the acceptance of microcredentials for employment and education and training (E&T).

3.1 Quality assurance

This action is the first step for the microcredential integration is the quality assurance. Providers should incorporate internal and external quality assurance processes that are appropriate for the intended purpose into their microcredentialing practices. The delivery of courses leading in microcredentials, assessment, and certification are all subject to quality assurance procedures.

An essential component of quality assurance procedures is the mandate to gather feedback from stakeholders on the demand side of microcredentials, including employers and learners. By improving the quality (and reputation) of the microcredentials that a provider issues, among other things, this can enhance the provider's standing and reputation. Fundamentally, the purpose of quality assurance is to guarantee that individuals pursuing a microcredential have access to exemplary learning opportunities that can be acknowledged for employment, education, and training.

Quality Assurance framework was the first task of the 3rd **CircuTex Project Result** (see report). **3/A1 Quality assurance framework:** The first task was the development of a quality framework to ensure transparency for recognition of the e-learning course as microcredentials. The quality framework focused on the quality of the credential itself and the learning experience. The framework builds upon the quality assurance processes applied in the HEIs and offers a common approach for quality assurance principles to the online learning activities and the virtual learning environment.

Design Recommendation

A. Incorporate microcredentials into your institutional quality assurance system.

Actions on Implementation:

- Apply the same internal quality evaluation and assurance processes for micro-credentials as for other programmes and/or qualifications (awards).
- Collect learner feedback on their satisfaction with microcredentials.
- Collect feedback from external stakeholders regarding microcredentials.

[8] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022H0627(02), Accessed: December 2023

- Obtain information and feedback regarding career advancement and labour market integration subsequent to the successful completion of micro-credentials
- As part of evaluation, assess how to improve the design and the provision of microcredentials based on the agreed-upon learning outcomes as well as how to improve the process of certification.
- Review the course/s leading to the microcredential periodically, at minimum annually, and publish a list of changes which have been made since the last edition.

B. Externally review the quality of your institution.

Actions on Implementation:

- Incorporate regular evaluations conducted by an external quality assurance organisation to assess the provider's adherence to pertinent process standards. This may encompass a standard body such as the International Organisation for Standardisation (ISO), a national quality assurance agency, or other sectoral or peer organisations.

C. Publish methods and results of internal and external quality assurance.

Actions on Implementation:

- Publish details regarding the development, evaluation, and certification of microcredentials, as well as the outcomes of internal and external quality assurance.

3.2 Transparency and Portability of microcredentials

3.2.1. Transparency of microcredentials

This action is the second step for the microcredential integration is the transparency and portability of microcredentials. Disseminating information regarding the design and quality of microcredentials in accordance with the transparency standards can expedite and ensure a fair procedure for assessing the microcredential's suitability for employment, education, or training. Recognition is a three-way transaction involving an issuing organisation, the learner and a recognising organisation (such as an employer or E&T organisation). Ensuring transparency of the microcredential is essential to enable the trust that allows such a transaction to take place. According to the EU Council (2022)[9], microcredentials should be measurable, comparable, and understandable, with clear information regarding relevant learning outcomes, workload, content, level, and the learning offer.

[9] Council Recommendation of 16 June 2022 on a European Approach to Micro-Credentials for Lifelong Learning and Employability." Official Journal of the European Union, vol. 2022/C, 16 June 2022, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022H0627(02)&from=EN Accessed: December 2023.

The standard of constitutive elements was the second task of the 3rd **CircuTex Project Result** (see report). **3/A2 Standard of constitutive elements:** This step was to build a standard of constitutive elements of the e-learning course. To develop the standard, the proposed guidelines from the EU standard on microcredentials were followed. It includes information about the learning outcomes achieved and how they were assessed and quality assured. This offered a standardised way of describing microcredentials.

Design Recommendation

A. Publish the learning outcomes, notional workload and, where relevant, credit points of microcredentials

Actions on Implementation:

- Develop criteria and methods for teaching, learning, and assessment in accordance with the specified learning outcomes, and record the connection.
- Implement microcredentials within a pre-existing credit system that, to the greatest extent feasible, adheres to the principles outlined in Annex V of the European Qualifications Framework (EQF).
- Implement the standard paradigm for publishing information regarding microcredentials, as outlined in Annex I of the EU Council Recommendation. Make reference to formal taxonomies, such as competency or skill frameworks (e.g., ESCO), when discussing learning outcomes.

B. Integrate microcredentials into national and regional qualifications frameworks.

Actions on Implementation:

- On the basis of learning outcomes, categorise microcredentials by National Qualifications Framework (NQF) level using the level descriptors.

3.2.2. Portability of microcredentials

According to Council of the EU (2022), microcredentials are owned by the credential-holder (the learner) and may be stored and shared easily by the credential-holder, including through secure digital wallets (such as Europass Digital Credentials), in line with the General Data Protection Regulation. The infrastructure for storing data is based on open standards and data models. This ensures interoperability and seamless exchange of data, and allows for smooth checks of data authenticity.

Design Recommendation

A. Issue micro-credentials as verifiable digital credentials.

Actions on Implementation

- To assure interoperability, issue microcredentials in accordance with a structured data format for credentials (such as the European Learning Model).
- Digitally sign microcredentials to enable a verifier to validate their authenticity.
- Guarantee that students possess and exercise authority over their individual microcredentials.

The Europass Digital Credentials Infrastructure (EDCI) can facilitate the issuance, sharing, and storage of all types of learning accomplishments. The platform utilises microcredentials and a digital format, and can be integrated with the European Student Card Initiative[10].

In order for a digital microcredential to be acknowledged through a digital system, it must satisfy the following conditions:

1. Digital credentials must be transmitted in a universally accepted format from a learner to a verifier (which is any digital system of an entity that recognises digital credentials for the purposes of education, training, and employment, such as Europass Digital Credentials).
2. Authentication of digital credentials can be confirmed by the verifier using methods such as comparing a digital signature to a registry.
3. The content of digital credentials can be processed by the verifier in accordance with a standardised format.
4. The verifier may grant the bearer the status of recognition upon processing the credential and/or holder's content.

3.2.2.1 Process of connecting the certificate to the Europass Digital Credentials

The design of the certificate was the third task of the 3rd **CircuTex Project Result** (see report). **3/A3 Design of the certificate:** Following the issuing of the EU standard, the project partners designed the certificate that participants in the e-learning course will receive when they complete it successfully (Annex I). The certificate will be digitally signed and will provide proof of the learning outcomes achieved. The certificate will be issued by Europass Digital Verifiable Credentials.

In order to ensure that an individual's microcredentials are recognisable in the digital realm, a computer system must possess the capability to decipher the microcredential's contents and authenticate it.

To ensure that the information in the credential can be understood, data regarding a learner's accomplishments must be encoded in a structured data format. In contrast to unstructured formats (e.g., PDFs and scans), which solely present information for human processing, structured data enables computer systems to extract meaning through queries. Thus, for instance, a system could automatically match the qualifications of a candidate with a suitable employment opportunity. Complementary in significance to the implementation of a structured data format is the utilisation of a widely recognised data model. The establishment of standardised practices is the sole means by which digital microcredentials can be processed and shared with an everlasting benefit.

[10] European Commission, 2009d. Recommendation of the European Parliament and of the Council of 18 June 2009 on the establishment of a European Credit System for Vocational Education and Training (ECVET). [Online] Available at: https://ec.europa.eu/education/resources-and-tools/european-credit-transfer-and-accumulation-system-ects_en [Accessed December 2023]

Authenticity is confirmed through the process of digitally authenticating a credential. **A digital signature is a digital code that verifies the contents and the sender's identity of an electronically transmitted document**. The document's integrity is preserved through the use of cryptographic protocols that guarantee the certificate's production cost is lower than that of its paper counterpart, but reproduction by any party other than the issuer is prohibitively costly.

Additionally, one may verify the legitimacy of the establishment that is providing the credential. This requires verifying the institution's credibility to ensure it is not a diploma mill. This can be achieved by incorporating the institution into databases of reputable, high-quality establishments, which credentialing software can query automatically.

Although the implementation of digital signatures would incur additional expenses and require more work, the potential long-term advantages may surpass these disadvantages. For instance, the issuer would no longer need to verify the document once it has been issued, and the recipient would be able to instantly and seamlessly share the credential with third parties.

The Europass Digital Credentials for Learning[11] are accessible to any microcredential provider for the purpose of issuing verifiable credentials. It satisfies the prerequisites for utilising structured data through the application of the European Learning Model. The credentials are presented in two formats: a human-readable "diploma" and a computer-readable code. Their authenticity is further verified through a comprehensive series of checks, as illustrated in Figure 1.

These consist of verifying the digital signature to ascertain that the credential was indeed issued by the awarding body, examining the credential for tampering, and determining whether the credential is valid microcredentials. Furthermore, the system is interconnected with the accreditation database of the European Commission, which verifies and authenticates any credentials that the academic establishment might possess.

Instructions on how to issue European Digital Credentials for Learning (EDC) using your own EDCI-compatible issuer or the EDCI Issuer are provided in the website[11], 'How to issue European Digital Credentials for Learning', that is a step-by-step guide to help build, customise, issue and use your own European Digital Credentials for Learning. In order to acquaint oneself with the procedure, one may conduct trials of the platform's functionalities prior to fulfilling the necessary prerequisites and making the commitment to obtain a certified electronic seal. A 'mock-seal' credential issuance is permitted in the so-called 'Playground' environment; however, credentials generated on this platform will not successfully complete the SEAL verification process in the viewer.

Two fundamental alternatives exist for preparing data for the issuance of European Digital Credentials:

- The platform is integrated with EU Login, so you can register an account and start creating and storing credential templates that are only visible to you entirely via the browser in the Online Credential Builder.

[11] https://europa.eu/europass/en/how-issue-european-digital-credentials

- An alternative method is to export a package as XML from your student information system.

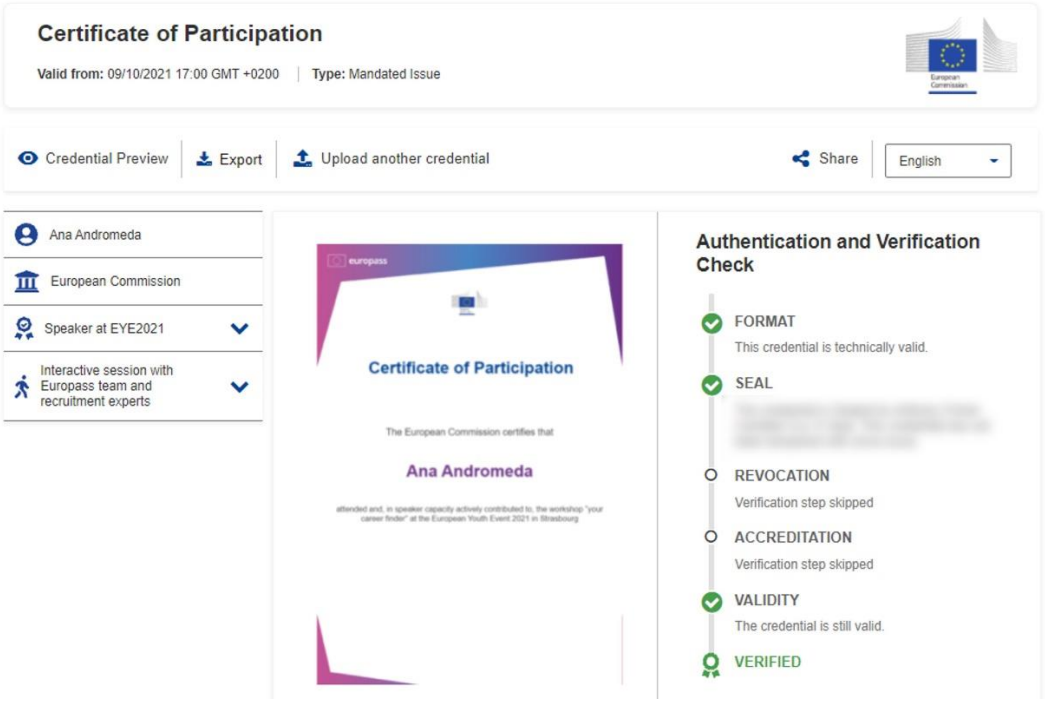

Fig. 1: *Image of a digital certificate of Participation using the Europass platform*

4. COURSE ACCREDITATION WITH ECTS

The European Credit Transfer and Accumulation System (ECTS) and the European Credit System for Vocational Education and Training (ECVET) are two instances where workload is quantified in credits. ECTS credits are defined as "the volume of learning based on the defined learning outcomes and their associated workload" in the ECTS Users' Guide[12]. To provide an example, the European Commission (2015)[12] states that the learning outcomes and corresponding workload of a full-time academic year or its equivalent are assigned 60 ECTS credits. To further support this claim, the Commission compares one credit to 25 to 30 hours of labour. The participants of the European MOOC Consortium and other microcredential providers that adhere to the Common Micro-Credential Framework (CMF) exhibit an implementation of the ECTS. It is mandatory for the implementing entities of the CMF to develop and distribute micro-credentials that bestow credit in accordance with the ECTS[13].

Workload is the estimated time invested by learners to achieve the stated learning outcomes. Workload can be reported a simple function of time, e.g., in hours, or using a compound indicator such as credits embedded within credit systems.

At the moment, 49 countries comprising the European Higher Education Area utilise the European Credit Transfer and Accumulation System (ECTS). When considering higher education, the ECTS is a recognised mechanism for displaying the estimated workload and learning outcomes of a course.

ECTS is appropriate for microcredentials due to its learning outcomes and makes learning measurable. ETCS may be incorporated into microcredential certificates or transcripts, and thus potentially enhance their level of transparency. At present, ECTS is predominantly implemented in the realm of higher education; nevertheless, there is potential for its application to be extended to encompass additional sectors. As part of the recognition process, the implementation of ECTS can help make the learning outcomes in a microcredential visible. Alternative credit systems may also be implemented; however, ECTS's extensive usage across Europe provides a distinct advantage. Users must possess the knowledge necessary to convert microcredentials from another credit system to ECTS, as stipulated in Annex V of the EQF Recommendation.

According to European Commission (2020)[14], **microcredentials should be based on a notional workload of 100-150 hours (including revision for, and completion of, the summative assessment). This equals to 4-6 ECTS.** Contrarily, some contend that microcredentials' workloads could be compensated with as little as one ECTS credit. Conversely, 60 or 90 ECTS credits were suggested as alternatives, with the latter

[12] ECTS Users' Guide 2015. Publications Office of the European Union, 2015, https://education and training.ec.europa.eu/sites/default/files/document-library-docs/ects-users-guide_en.pdf. Accessed: February 2023.

[13] The European MOOC Consortium. EMC Common Microcredential Framework. 2018, https://emc.eadtu.eu/images/EMC_Common_Microcredential_Framework_.pdf. Accessed: December 2023.

[14] European Commission (2020). A European approach to micro-credentials, Output of the micro-credentials higher education consultation group, December 2020

amounting to an extent that is already in close proximity to that of the short-cycle qualification.

The MicroHE consortium has developed the **blockchain-based cloud service, Credentify**[15], which permits students and institutions of higher education to issue and receive micro-credentials stackable with ECTS. Based on this tool, in **CircuTex certificates** are assigned 3 ECTS points. The emergence of Credentify has transpired amidst a surge in graduate students' demands for acknowledgment of online education completed outside the purview of their academic institution. As part of their academic pursuits, Credentify enables students to obtain credentials from multiple universities; furthermore, it facilitates the storage and portability of digital student data. Credentify provides a standardised format for documenting micro-credentials in accordance with ECTS, utilising pre-existing recognition tools[16].

The overall conclusion is to provide the greatest possible flexibility[14]. This may necessitate a minimum of one ECTS credit and a maximum of "less than a full degree." There has been speculation regarding the potential range of 1 to 6 ECTS credits that might be considered typical for a solitary microcredential. They have the potential to be integrated in order to offer sufficient adaptability for larger learning units, thereby accommodating diverse national, institutional, and sectoral practices and contexts. Europeann Commission rationalised this adaptability by asserting that it was essential to permit experiments and innovations involving microcredentials of varying sizes in Europe.

The decision of a microcredential provider to either align with an established credit system or create an institution-specific credit system may vary depending on the circumstances. Design principles for a credit system grounded in Annex V of the European Qualifications Framework for Lifelong Learning (EQF)[17], as recommended by the EU Council, are consistently adhered to in all circumstances.

1. Flexible learning pathways ought to be facilitated by credit systems, in order to benefit each individual learner.
2. In order to facilitate the transmission of microcredential components and learning progression, the learning outcomes approach should be systematically applied during the design and development of microcredentials.
3. Credit systems ought to enable the seamless transfer of learning outcomes and support the advancement of students across national and institutional boundaries.
4. Quality assurance should be explicit and transparent to support credit systems.
5. It is imperative that the credit obtained by an individual be duly documented, including the learning outcomes obtained, the name of the accredited institution that granted the credit, and, if applicable, the corresponding credit value.
6. Credit transfer and accumulation systems ought to strive for synergies with prior learning validation mechanisms, cooperating to facilitate and advance credit transfer and progression.

[15] https://credentify.eu/

[16] Knowledge4all, 2018. Credentify solution. Available at: https://credentify.eu/about/. Accessed 20 November 2023

[17] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01)

7. It is imperative that credit systems be enhanced and developed in collaboration among relevant stakeholders operating at both the national and EU levels.

When it is not possible to define workload through a credit system, assuring transparency in the learning outcomes should be the top priority. This would enable the incorporation of microcredentials into national qualification frameworks and the recognition for learning and employment purposes (see Chapter 5).

5. PROCESS OF RECOGNITION

5.1 Introduction

Academic recognition is the procedure by which admission to a study programme is granted in recognition of a particular qualification. The Recommendation of the EU Council to promote automatic mutual recognition of higher education and upper secondary education, training qualifications, and the results of learning periods abroad, requires automatic mutual recognition at both the level of full qualifications and the level of periods of study for the purpose of further learning without the need for a separate recognition procedure, under certain conditions[18].

According to the Lisbon Recognition Convention (ratified by 26 EU Members), degrees, diplomas, or certificates that have been duly issued by competent authorities and are contingent upon the successful completion of a programme of higher education[18]. Unless a significant distinction can be established, these degrees, diplomas, or certificates shall be recognised for the purpose of gaining entry into higher education, obtaining academic titles, or, in specific instances, entering the labour market. Completed periods of study shall be counted towards the attainment of a degree in higher education, unless a significant distinction can be demonstrated otherwise. Academic recognition procedures involve ENIC/NARIC centres, ministries, and higher education institutions as the primary actors, contingent upon the circumstances in Member States. Regarding their procedures, the Lisbon Recognition Convention is applicable. Recent research indicates that the competent authorities should consider the following factors when conducting academic recognition procedures: quality, learning outcomes, level, burden, and profile. These must be described in detail.

According to European Commision (2020)[14]:

The end result of recognition may be, for academic purposes:

- to provide alternative access to higher education;
- give exemptions towards a full degree acquired in a traditional way;
- ensure stackability.

For employment purposes it may:

- general advice to employers in the process of recruitment;
- one step in a procedure before competent authorities assess the access and rights to practice in a regulated profession.

This guide of EU Council distinguishes between:

1. **Recognition of microcredentials for education and training purposes**: the formal acknowledgement of microcredentials by a competent recognition entity for

[18] European Commission, 2018b. Council Recommendation of 26 November 2018 on promoting automatic mutual recognition of higher education and upper secondary education and training qualifications and the outcomes of learning periods abroad. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1568891859235&uri=CELEX:32018H1210(01) . Accessed November 2023

providing an applicant with the right to apply for admission to an education or training programme, to transfer credit within it, or to exempt part or all of it.

2. **Recognition of microcredentials for employment purposes:** the acknowledgement of microcredentials by an employer for providing an applicant with the possibility of employment or job progression.

Microcredentials can be considered as doorways to utilise recognition processes in two new ways.

Design Recommendation: *Enable multiple, feasible routes for microcredential recognition*

Actions on Implementation

- Establish inter-provider Credit Exchange Agreements between networks of microcredential providers.
- Incorporate "free electives" into academic programmes that permit students to acquire them through the use of microcredentials issued by external providers.
- Support recognition when no other recognition route is accessible through the utilisation of Recognition of Prior Learning as a "fallback" route.
- Implement the principles of International Conventions, including the Global Convention on the Recognition of Qualifications Concerning Higher Education (GRC).
- In cases where the provider is a formal learning provider, assessment centre, or awarding body:
    - Collaborate with private or public sector entities (including companies and other bodies/organisations) to jointly develop and distribute microcredentials that may be automatically recognised for educational and employment purposes.
- In the case of a non-formal or informal learning provider, including work-based learning centres, professional bodies etc.:
    - Collect and adapt their recommendations to develop and provide interoperable microcredentials that are suitable for the intended purpose.

According to Council of the EU (2022)[6]: ***Microcredentials have a clear signalling value of learning outcomes…[and] are recognised, where possible, by the competent authorities, for academic, training or employment purposes, based on the information provided according to the European standard elements (Annex I) and the principles for the design and issuance of micro-credentials (Annex II).***

5.2 Recognition of microcredentials for education and training

This type of recognition occurs whenever prior learning is validated for the purpose of formal education and training. This may encompass the following: eligibility for enrollment in an E&T organisation, exemption from a part of a programme, as well as stacking or combining credentials for the purposes of progression through an education and training programme or for certification of learning outcomes.

Various routes may be utilised to achieve this, contingent upon the presence of credit sharing and recognition agreements, regional or international frameworks for recognition, validation arrangements, or both. European Training Foundation suggests that provides of microcredentials ensure the prerequisites for recognition to occur via different recognition routes[1]. The authority to recognise qualifications primarily resides with the educational and training institution to which an individual submits an application for recognition in Europe. In light of the absence of standardisation regarding microcredentials' definitions, processes, and evaluation criteria, E&T organisations are obligated to customise recognition criteria.

The e-Valuate project[19], which was spearheaded by Nuffic, demonstrated the feasibility of obtaining academic recognition for self-contained e-learning, which encompasses microcredentials as well, in order to gain entry into higher education. Seven evaluation criteria for micro-credentials were proposed by the initiative, drawing inspiration from the processes used to acknowledge foreign qualifications:

1. **Quality of the course/module:** the microcredential or accreditation of the microcredential provider is subject to internal or external quality assurance procedures.
2. **Authenticity of the credential (verification of the certificate)/Online verification:** the authenticity of a credential can be ascertained through the provider's website for the programme or by examining the digital signature on a verifiable credential.
3. **Level of the course:** should be based on established qualification frameworks at the national or regional level, rather than to a platform specific classification.
4. **Learning outcomes:** should be exhaustively detailed, preferably in relation to a skill or competence framework.
5. **Workload:** should be specified in terms of both theoretical and practical effort expended by the learner;
6. **Ways of assessment/Testing:** assessment of learner performance/ the existence of standardised testing rubrics against which to assess learner performance.
7. **Identification of the learner/Online identification:** mechanisms/procedures to ensure that the credential-holder is the same person who followed the learning experience and participated in the assessment.

[19] NUFFIC, 2019. Practitioners guide for the recognition of e-learning, https://www.nuffic.nl/en/subjects/recognition-projects/ e-valuate: NUFFIC

Nuffic have developed a free access online tool[20] to help credential evaluators in assessing microcredentials against these criteria (Fig. 2,3).

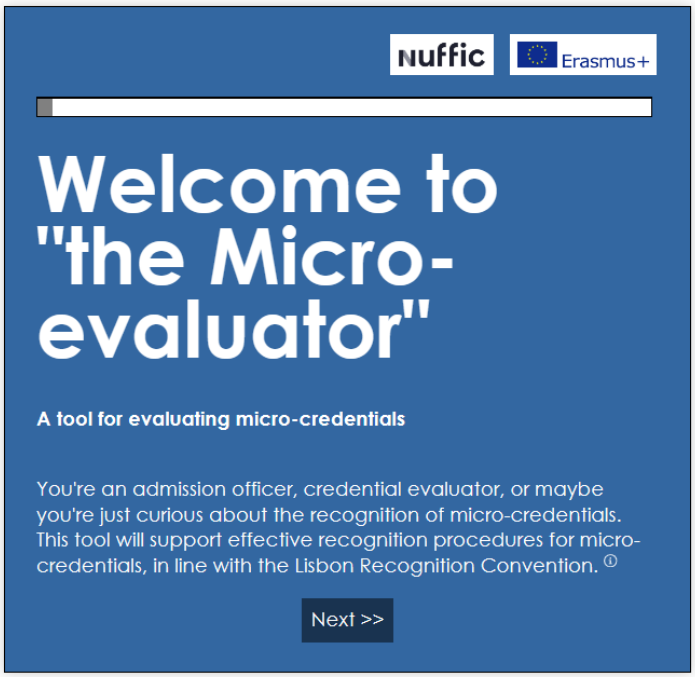

Fig. 2: *Screenshot of the Micro-Evaluator tool*

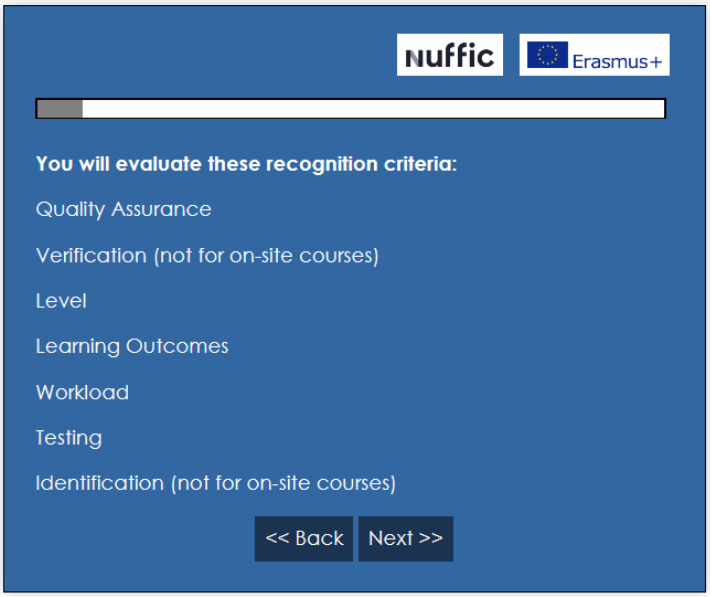

Fig. 3: *Micro-Evaluator tool: Evaluation of recognition criterio*

[20] https://fd8.formdesk.com/nuffic/micro-credentials/?get=1&sidn=c7aa32c5b48245d78325aee512ac5361 as of 14 November 2023.

The substantial administrative workload associated with conducting case-by-case evaluations of microcredentials motivates providers to develop routes for automatic or semi-automatic recognition whenever feasible.

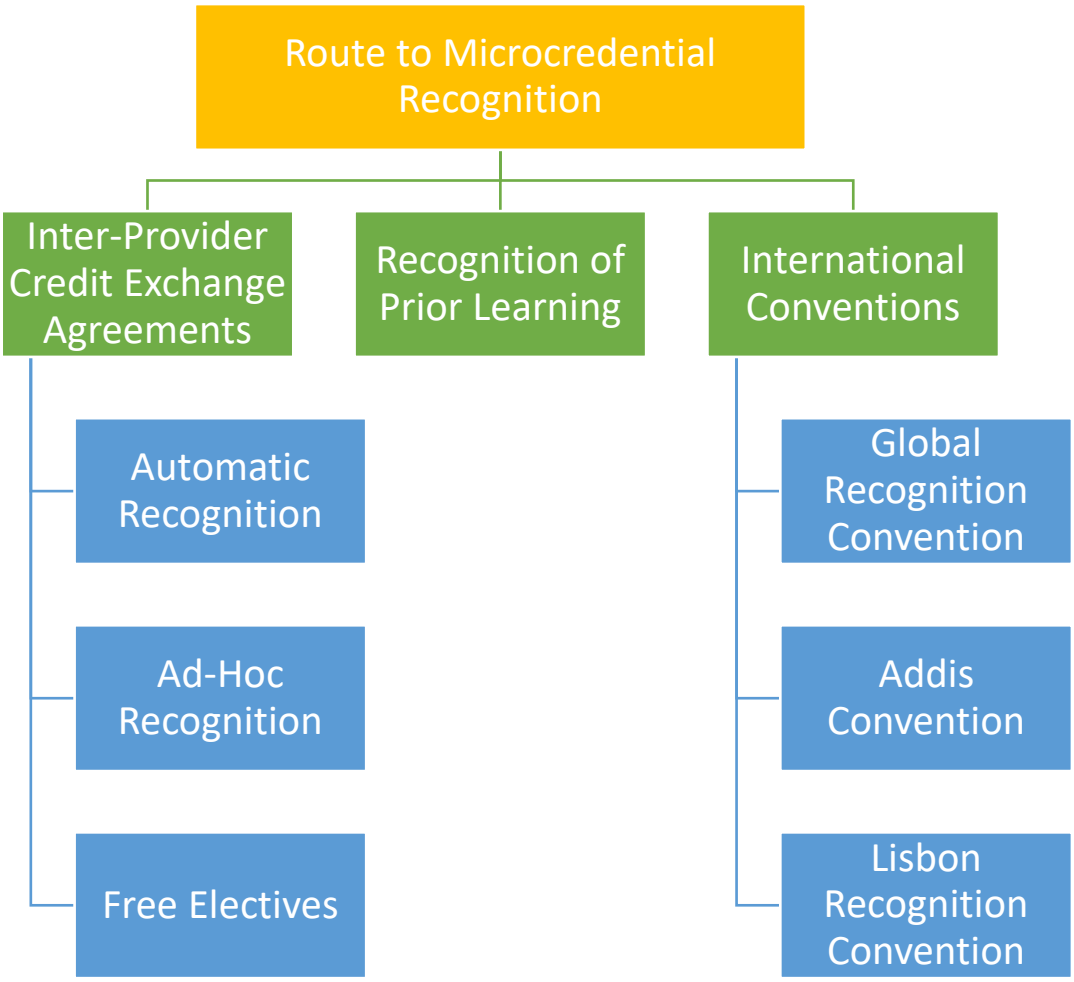

Fig. 4: *Principal routes to recognise microcredentials for education and training purposes. Source: ETF*[1]

The most automatic route entails the utilisation of **a credit-exchange agreement between the educational and training institutions** concerned to recognise a microcredential**. In the absence of such an agreement, microcredentials may be recognised in accordance with the processes for Recognition Prior Learning (RPL).** Either way, recognition could potentially grant an individual admission, advancement, or completion of a programme of study predicated on microcredentials obtained from an alternative learning institution. Furthermore, in institutions affiliated with systems that have ratified the Convention on the Recognition of Qualifications concerning Higher Education in the European Region (LRC)[21] and/or the UNESCO Global Convention on Higher Education (GRC)[22], which are

[21] https://www.coe.int/en/web/conventions/full-list?module=treaty-detail&treatynum=165. Accessed on 15 December 2023

[22] https://www.unesco.org/en/legal-affairs/global-convention-recognition-qualifications-concerning-higher-education?hub=66535. Accessed on 15 December 2023

both legally binding frameworks designed to guarantee equitable and transparent recognition procedures, a microcredential may also be recognised for access to Higher Education in institutions. At the moment, the majority of "recognition routes" are conceptual or in the testing phase. Interviews suggest that in situations where RPL is accessible, it is currently the only route that is widely utilised.

5.2.1. Recognition via Credit-Exchange Agreements

'Recognition Networks' which use inter-institutional agreements:

- Best route to the recognition of microcredentials between learning organisations.
- Common feature of mobility programmes.
- Within VET, a Memorandum of Understanding (MoU) is often signed to regulate mobility. Described in detail here[23]
  MoU confirms that VET partners accept each other's:
  - status as competent institutions
  - quality assurance, assessment, validation and recognition criteria and procedures as satisfactory for the purposes of credit transfer
  - conditions for the operation of the partnership, such as objectives, duration and arrangements for review of the MoU
  - compatibility of qualifications concerned for the purposes of credit transfer, using the reference levels established by a regional qualification framework such as the EQF
  - other actors and competent institutions that may be involved in the process concerned and their functions

Table 1: *Route to Microcredential Recognition by Recognition via Credit-Exchange Agreements*

Routes to Microcredential Recognition	
Automatic Recognition via Inter-Institutional Agreements	A group of E&T providers can agree to allow their learners to utilise credits from other providers parties, as part of their study programme. The fundamental characteristic of these agreements is their automaticity: learners enrolled in a programme at their home organisation may obtain microcredential that fulfils the agreement's criteria and is incorporated into the programme, without requiring additional administrative processes. These agreements may be formulated with varying level of ambition and scopes. An inter-institutional agreement will regulate microcredential credit transfer and the key elements of the agreement are: • Two or more institutions party to the agreement. • Modules/courses which shall be available for exchange. • Programmes (at the home institutions) where these modules/courses may be included.

[23] "Recommendation of the European Parliament and of the Council of 18 June 2009 on the Establishment of a European Quality Assurance Reference Framework for Vocational Education and Training." Official Journal of the European Union, vol. 2009/C, 18 June 2009, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009H0708(01)&from=EN. Accessed: December 2023.

	• Conditions for the automatic recognition of these modules/courses.
Ad-hoc recognition via Inter-Institutional Agreements	The use of trilateral contracts between a learner's home institution, an institution they choose to visit (virtual or a physical mobility) and the learner. An inter-institutional agreement will establish a trust relationship between the institutions participating, but will not provide for automatic recognition of all such study periods. Instead, these are regulated on an ad-hoc basis by the learning agreement, key elements recommended[24]: • Parties to the agreement, including the learner. • Modules/courses which are to be exchanged in the specific mobility. • Specific dates for the mobility period. • The specific programme (at the home institutions) where these modules/courses may be included. • Conditions for the automatic recognition of the modules/courses *Requires significantly more administration than the automatic recognition route, it may be easier to implement for institutions, since it uses existing structures and procedures that are already established for mobility periods.*
Recognition via free electives	Numerous microcredentials are designed with the intention of motivating learners to broaden their horizons and gain supplementary self-identified abilities that they deem advantageous for their personal growth. In general, the sole criterion for recognition of such elective studies is that the credits be granted by (or the workload obtained from) an institution that is certified or recognised. This facility is frequently utilised to enable learners to participate in entrepreneurship competitions, earn credit for attending summer courses, etc. On occasion, a variant of the programme grants credit for social work or volunteer work. *In light of the extensive adoption of this approach, incorporating microcredentials into free elective programmes for students would be a direct and expeditious method to establish recognition mechanisms.*

In the case of **CircuTex programme**, the recognition route chosen as the most suitable is the Automatic Recognition via Inter-Institutional Agreements.

5.2.2. Recognition of Prior Learning (RPL)

An individual may have their previously acquired learning, especially which took place in non-formal or informal learning contexts, assessed and validated, such as Validation of Non-Formal and Informal Learning (VNFIL). Prior non-formal or informal learning must be

[24] SHARE. Towards a Common Credit Transfer System for Intra-ASEAN and ASEAN–EU Mobility. 2018, https://www.share-asean.eu/sites/default/files/SHARE_HandBook_October%202018%20%2825102018%29.pdf . Accessed: December 2023.

validated in order to be recognised for the purpose of gaining access to education and training, provided that it satisfies the general admission requirements. Microcredentials as the form of certification of individual's learning outcomes acquired through formal, non-formal and informal learning could therefore support both the validation and recognition of prior learning[1].

Based on anecdotal evidence, RPL appears to be the prevailing route of microcredential recognition at present, as most learning organisations have already established protocols for this approach. Therefore, RPL may be regarded as the "fallback" route by default for microcredential recognition, meaning it remains accessible in the absence of alternative routes. However, RPL is also burdensome in terms of administration, frequently necessitating individualised procedures and processes, which further contributes to ambiguous results. This may discourage both educational institutions and learners from utilising this route. Formal qualifications may also be evaluated by E&T providers, especially when the holder of the qualification submits an application for admission to a learning offer without following the standard entry requirements, such as a secondary school leaving certificate. Countries that are signatories to the UNESCO Global Convention on Higher Education (GRC) stipulate that "individuals may request an evaluation of their credentials in order to pursue employment opportunities or apply for admission to higher education programs''.

5.2.3. Recognition using International Conventions

The Erasmus+-funded project "Micro-credentials linked to the Bologna Key Commitments – MICROBOL" proposes that microcredentials granted by Higher Education Institutions may qualify as qualifications under the LRC definition of qualification if they are granted as independent credentials[25]. This enables their evaluation in accordance with the procedures and principles specified in the convention. The endorsement of microcredentials is more overtly expressed in the Global Recognition Convention through its emphasis on recognition prior learning and qualifications derived from incomplete studies. Therefore, signatories are strongly obligated to utilise the tools provided by the organisation in order to facilitate the recognition of microcredentials.

5.3 Recognition of microcredentials for Employment

Skill-based recruiting is widely recognised by employers as a prominent contemporary development in the field of human resource management[26]. Given that the majority of positions require a combination of industry-specific and professional competencies, employers prefer self-reported skill statements on resumes over lists of microcredentials.

[25] MICROBOL. MICROBOL Working Group on Recognition: Input Document for the 2nd WG Meeting. 2021, https://microcredentials.eu/wp-content/uploads/sites/20/2021/05/Microbol_Input-document_recognition-WG.pdf . Accessed: December 2023.

[26] Fuller, Joseph, et al. "Skills-Based Hiring Is on the Rise." Harvard Business Review, 11 Feb. 2022, https://www2.mvcc.edu/shn/inclusive/pdf/Skills-based-hiring-on-rise-hbr.pdf . Accessed: December 2023.

Employers could more efficiently and directly evaluate an applicant's skills by utilising a combination of credentials, experience, interviews, and tests in the candidate evaluation process. In this context, it is the skills and competencies contained within the microcredentials that are recognised, not the microcredentials themselves. Therefore, microcredential recognition in the recruiting process may be restricted to demonstrating "willingness to learn" or the acquisition of specific specialised skills that are not typically addressed in a comprehensive learning programme. This always operates under the assumption that the employer is amenable to accepting microcredentials and/or that the applicant tracking software it utilises can process and interpret microcredentials. The failure of these assumptions is not an uncommon occurrence[27].

Recognition of micro-credentials becomes more attractive to employers with respect to continuing professional development (CPD). In contrast to alternative CPD options like mentorship or full-time or part-time degrees, microcredentials provide a more adaptable, cost-effective route that can be seamlessly incorporated with the prerequisites for career advancement or responsibility transition. Employers are thus significantly more motivated to recognise microcredentials in this particular domain.

There are multiple routes to recognition:

- An employer may decide to use a specific corporate training provider (such as LinkedIn Learning etc) to recognise courses from the entire list or a subset selected by the employer.
- An employer may decide to agree in advance with an employee to take a specific micro-credential from a specific provider.
- An employee may voluntarily present microcredentials acquired as proof of newly acquired competencies to the employer in order to have them recognised.

[27] SHRM Foundation. Making: A New Strategy for HR Professionals. 2021, https://www.shrm.org/foundation/about/Documents/Making%20Alternative%20Credentials%20Work%20A%20New%20Strategy%20for%20HR%20Professionals.pdf . Accessed: December 2023.

6. PROPOSED APPROVAL PROCESS FOR MICRECREDENTIALS IN EACH HEIs

HEIs CircuTex partners proposed approval process for microcredentials of learning course developed that are similar and in agreement of previous chapter that are based on the guides of European Commission for design, issue and recognise microcredentials.

6.1 Universitat Politècnica De Valencia (UPV)

The Universitat Politècnica de València is working on a proposal for the process of approval and recognition of Microcredentials within its educational system as a way to recognise and validate specific skills acquired by students.

The following is a description of the proposed process for the implementation of a UPV MICROCREDENTIAL, the essential elements that the micro-credential must include, as well as the documentation and information that will be required to define and include a course as a UPV MICRO-credential.

However, as has been indicated, this is a proposal that is currently being worked on and which involves the participation and collaboration of different governing bodies, entities, departments and services of the University. Therefore, until its definitive approval, it is a proposal subject to modifications. There is currently a working group at CRUE level (Confederation of Rectors of Spanish Universities) working on micro-credentials at university level, but guidelines on micro-credentials and their adoption process are not expected until May 2024.

Once the protocol and requirements are defined, the aim is to apply for the recognition as MICROCREDENTIAL UPV of the learning course developed as a result of the CircuTex project and that it forms part of the curriculum of the textile training, both for the Master's Degree in Textile Engineering and the Bachelor's Degree in Industrial Design.

Proposed process for requesting the approval and incorporation of a UPV MICROCREDENTIAL

1. As with any specific training course, it must be submitted for approval by the promoting body (Department Council, Centre Council or Institute Council).
2. In addition to the documentation requested in the Specific Training registration (academic registration and budget), the Micro-credentials Annex document (Annex I) must be attached.
3. It must have a favourable report from the CFP (Lifelong Learning Centre), which will inform and submit the micro-credential for approval to the micro-credential approval committee. In the event that errors are found, the person responsible will be contacted to request that they be corrected.
4. Approval by the Micro-credentials Committee, taking into account the following aspects:
    - Compliance with requirements
    - Suitability for use
    - User satisfaction
5. If approval is obtained by the Commission, the Lifelong Learning Commission will be informed for ratification or, if necessary, clarification.

6. The UPV Governing Council will be informed of the previously approved micro-credentials.

Elements that a UPV MICROCREDENTIAL will contain, as well as the information required to initiate the approval process:

Elements of a UPV MICROCREDENTIAL

1. Title of the microcredential
2. Introduction - description
3. Contents (topics or units to be developed)
4. Access requirements (academic and/or administrative)
5. Learning outcomes
6. Assessment criteria / Type of assessment
7. Classification according to MECES-EQF-CNCP
8. Workload (maximum 15 ETCS)
9. Modality
    - Synchronous (face-to-face/remote)
    - Asynchronous
10. Quality Assurance
    - Compliance with requirements
    - Suitability for use
11. User satisfaction

Documentation for the definition of MICROCREDENTIAL UPV

- Registration in the training portal
- Academic registration signed by the professor in charge and the promoter.
- Annex I Microcredential

- - Annex I Microcredential

Title of the Microcredential	

Description of the Microcredential	

MECES (1)	EQF-MEC (2)	CNCP (3)	Level of Microcredential
Primary education	Level 1: Basic general knowledge	Level 1: Operator	
Secondary Education	Level 2: Tactical knowledge in a specific field of work or study.		
	Level 3: Vocational training from a PCPI (PGS)	Level 2: Medium Technician	
	Level 4: Intermediate-level vocational training courses		
	Level 5: Higher Level Training Cycles (Ciclos Formativos de Grado Superior)	Level 3: Senior Technician	
Level 1: Higher Technician	Level 6: Bachelor's Degrees (Diplomas)	Level 4: Degree	
Level 2: Degree	Level 7: Master's degrees (bachelor's degrees)	Level 5: Master	
Level 3: Master	Level 8: Complementary studies, doctorates and postgraduate specialisations	Doctoral level (not described)	

Cod.	Learning outcome (4)	Assessment criteria	Assessment system
RA1			
RA2			
RA3			
RA4			

(1) Spanish Framework of Qualifications for Higher Education
(2) European Qualifications Framework for Lifelong Learning
(3) National Catalogue of Professional Qualifications(4) Learning outcomes are statements of what a learner is expected to know, understand and/or be able to do at the end of a period of learning (A Framework for QualificaPons of the European Higher EducaPon Area, p. 29).

6.2 University Of West Attica (UNIWA)

In order to meet the increased training, education, and specialization requirements that exist in Greek society and economy, UNIWA places particular emphasis on the implementation of Lifelong Learning programs. In context of the above, and in relation to the National Law (2880 / 19-07-2018) the Lifelong Learning and Training Center was established in July 2018. The primary function for the Lifelong Learning and Training Center is the design, organization and implementation of a series of integrated training programs, continuing education, training and in general, lifelong learning in all areas of knowledge provided by the University.

The scientific staff comes mainly from the academic staff of the University and, whenever appropriate, specialized scientific collaborators are utilized through the University's Educators Registry. The UNIWA Lifelong Learning and Training Center constitutes an essential part of its integrated services both to members of its academic community and to the wider socio-economic environment, nationally and internationally. The implementation of the programs is carried out in modern and well-organized facilities including a range of technologically equipped classrooms and laboratories. At the same time, a variety of programs offer the possibility of e-learning.

Upon successful completion of the training programs, participants receive a Lifelong Learning, Training or Vocational Certificate (depending on the nature and duration of the Program), while programs that meet the required specifications are eligible for ECTS (European Credit Transfer System) or ECVET (European Credit System for Vocational Education and Training) credits. The programs of the Lifelong Learning and Training Center of UNIWA apply to any age-independent group of people, high school graduates, students, graduates, young scientists, unemployed citizens seeking successful access to the labor market, or even experienced staff who wish to acquire cutting-edge knowledge and skills in their fields of interest.

UNIWA staff can apply for integration of microcredential of the learning course developed as a result of Circutex project and will be incorporated into Curriculum of study programmes of the Department of Industrial Design and Engineering.

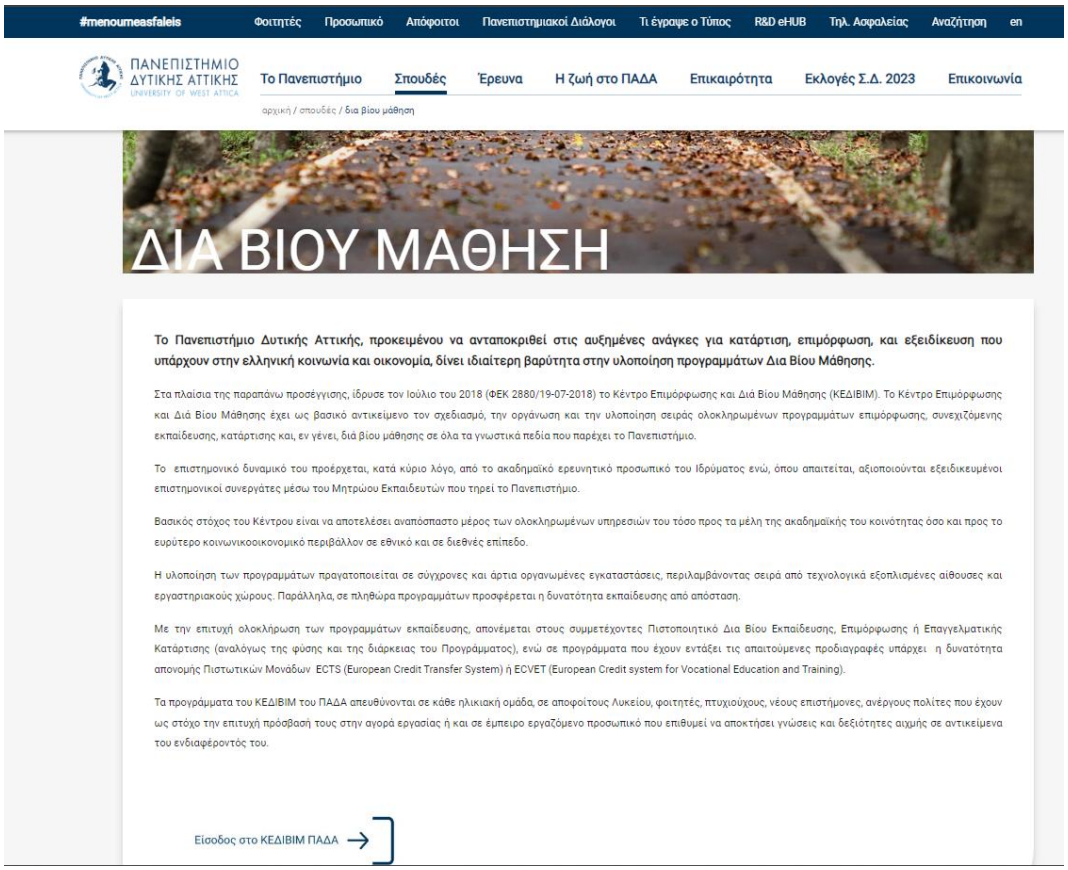

Fig. 5: *Screenshot of the Lifelong Learning and Training Center webpage of UNIWA*

6.3 Kauno Technologijos Universitetas (KTU)

KTU, as part of ECIU consortium, is actively working on development of Microcredentials and their integration into KTU Study programmes' curriculum. The idea is to have developed Microcredentials that will be both integrated into the KTU study process and offered for any interested person from other universities, industry, etc. in such a way creating possibility to reach particular professional level by collecting required number of microcredits in any field. The learning course developed as a result of Circutex project will be incorporated into Curriculum of study programmes of the faculty of Mechanical Engineering and Design.

6.3 University Of Oradea (ORADEA)

University of Oradea will implement the micro credentials in UO Study programmes' curriculum as soon the micro credentials will be implemented and adopted in Romania. The learning course developed as a result of Circutex project will be incorporated into Curriculum of study programmes of the Department of Textiles, Leather and Industrial Management.

However, in the University of Oradea, as well as in the other universities in Romania, the work on the implementation procedure of micro-credentials has not been started.
Overall, the results developed in the different activities of Intellectual Output 3 of the present project on micro-credentials are considered as valuable guidelines and recommendations to facilitate the process of implementation of micro-credentials in Romanian universities.
The results of this project can help decision makers and policy makers to implement the recognition of this form of learning by universities, offering another system that allows a more flexible and adaptable training option for students.

PROPOSED PROCESS FOR IMPLEMENTATION OF MICRECREDENTIALS AT THE UNIVERSITY OF ORADEA

An ever-increasing number of secondary and tertiary graduates face the necessity to periodically upgrade the competences attained during their initial training, in order to meet the constantly developing needs of society and the labour market, and/or even to acquire them in a new format. The present world challenges, such as the pandemic recovery, the transition to green energy and accelerated digitisation, have made it necessary for some people to upgrade their skills, retrain and/or even acquire new ones.

In this context, a fast, flexible and cost-effective option for acquiring and/or upgrading skills, further training or retraining, without pursuing a complete degree programme or a comprehensive continuous training programme, is provided by low volume learning opportunities, short modules or open courses - in formal/non-formal/informal contexts - which result in the award of *micro- credentials.* Due to their flexible format, micro-credentials appeal to a much wider audience than traditional degree programmes, creating learning opportunities even for full-time workers and fostering social inclusion.

Micro-credentials certify the learning achievements of the training programme graduate, where training activities have been delivered face-to-face, in blended learning or online and assessment has been conducted transparently. Micro credentials represent the list of the learning objectives that a student has attained after a brief period of study. These learning objectives will be evaluated using open and well-defined standards. The purpose of learning experiences leading to micro-credentials is to equip learners with particular information, abilities, and skills that address demands in the workplace, society, culture, and personal spheres. Micro-credentials are transferable, possessed by the student, and can be shared. They can be used separately or in conjunction with more extensive credentials. They are supported by quality control that adheres to established guidelines in the pertinent industry or field of endeavour (Recommendation on a European approach to micro credentials for lifelong learning and employability, of the Council of the European Union (EU) of 16 June 2022).

The use of micro-credits by higher education providers has the potential to support lifelong learning, fill the knowledge and skills gap, increase the efficiency of higher education systems, encourage innovation in terms of input, and reach a diverse group of learners. (BFUG, 2020, p. 1)

Up to now, micro-credits and micro-certifications have not been adopted and integrated in the Romanian higher education system, nor is there any legislation in this regard. What happens during this time in the Romanian academic domain depends a lot on how key decision-makers in the field of education (The Ministry of Education,

the National Authority for Qualifications (ANC), the Romanian Agency for Quality Assurance in Higher Education (ARACIS), the Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI) and higher education institutions members of the European University Alliances) and stakeholders, public and private actors, will come to appreciate the importance of adopting micro-credits and curricular reform.

The proposal of strategic directions of action can be a solid starting point for any educational policy approach in favor of adopting and integrating micro-credits and micro-certifications into the higher education system in Romania.

These strategic directions can be expressed punctually and explicitly addressed to the decision makers responsible for the different components that build the entire mechanism of Romanian higher education.

In Romania's case, we believe that a ***widespread acceptance of micro-credits can be achieved through the European University Consortia – European Alliances***, which will be able to design and deliver specialized academic/professional content in different international languages, using micro-credits to provide flexible joint certifications." They will be able to offer students the freedom and flexibility of complex learning experiences, by resorting to flexible / alternative directions and combinations of European specializations agreed at the level of these alliances. The academic construction based on recognized curricular structures, such as: micro- programs, micro-masters, short courses, short intensive programs, nano-certifications, digital badges, will be recognized by European higher education institutions and employers in the European labor market.

The positive premise of this scenario is the fact that in this moment Romania has universities accepted into European Alliances with a strong character of diversity and cultural and academic multiplicity, but also the argument that there is constant strategic support of the state, in the sense of co-financing received from the Ministry of Education to participate in these projects.

European alliances

- Consortia of European universities will be able to provide specialized academic/professional content, in different international languages, using micro-credits to offer "flexible joint certifications", which will give freedom and flexibility to learners to combine courses from the common curriculum agreed at alliance level.
- All these academic learning and training experiences will be recognised by higher education institutions and employers in the European labour market.
- European University Alliances will become the preferred study routes for certain European and international qualifications, defined by highly specialized and valued occupational frameworks.

The University of Oradea has been offering a few training programmes for several years, but this procedure provides a broader and more explicit approach to obtaining micro-credentials, under the new European regulations. I**n the University of Oradea, micro-credits and micro-certifications will be adopted and integrated when they are adopted in the higher education system in Romania.**

Training programmes duration is set in terms of hours. Transfer credits (ECTS) may be awarded for completing such a programme, commensurate with the length of time and the amount of content in the course. One credit is awarded for 25 hours of teaching activity and individual training (e.g. lectures, seminars, assignments, practice, individual study, projects, exams, reviews).

The micro-credential certificate may be issuedin hard copy or digital format and will comply with the national and international regulations in force regarding micro-credentials and the study documents system. The certificate will specify the name of the programme/ open course, the format of the activity (face-to- face, blended or online), the duration in hours and the number of ECTS credits awarded. The micro-credential certificate of achievement will be issued in by the University of Oradea

Elements of a UO MICRECREDENTIAL

Ensuring transparency of the micro-credential is essential to enable the trust that allows such a transaction to take place.

The list of elements which should be used to describe micro-credentials:

1. Micro credential title
2. Introduction-description
3. Contents (topics or units that will be developed)
4. Access requirements (academic and/or administrative)
5. Learning outcomes
6. Evaluation criteria/Type of evaluation
7. Classification according to ROQF -EQF-ANC (National Contact Point for the recognition of qualification)
8. Workload (maximum 15 ECTS)
9. Modality
    a. Synchronous (in person/remote)
    b. Asynchronous
10. Quality guarantee
    a. Compliance with requirements
    b. Sustainability for use
    c. User satisfaction

Implementation of UO MICRECREDENTIAL

When microcredentials will be introduced into legislation at national level by the Ministry of Education, a procedure for introducing microcredits into UO will be developed and approved by the UO Senate.

Based on its own procedure and the legislation in force, the following steps will be taken:

1	The documentation shall be submitted to the Department to be advised by the Department Council
2	After that it has to be advised by the Faculty Council
3	The documentation shall be sent to be advised by the UO Administration Council of the UO
4	It is sent for approval by the Senate of the University of Oradea

For the approval of the micro-credentials, the following aspects will be taken into account:

- Compliance with requirements
- Suitability for use
- User satisfaction

Microcredentials in Romania

Microcredential title	
Description of the Microcredential	

The Romanian educational system (NQF)

Age	Grade / period	Educational levels				Educational levels according	NQF/ EQF Level of qualificatio	Microcredential level
>19	min 3 years	PhD –				8	8	
	1-2 years	Master –				7	7	
	5-6 years	Bachelor – First and second cycle*				7	7	
	3-4 years	Bachelor –				6	6	
	2-3 years	Higher education (short period)				5	5	
	1-3 years	Post-secondary education				4	5	
19	XIII	Upper secondary education	High school education, upper	Technological High School		3	4	
18	XII			Theoretical High School				
17	XI			Vocational training stage – 720	Vocational / profession	3	3	
16	X							
15	IX		High school education, lower				2	

14	VIII	Lower educatio	**Gymnasium****	2	1	
13	VII					
12	VI		**Gymnasiu**			
11	V					
10	IV		**Primary School**	1		
10	IV					
9	III					
8	II					
7	I					
6	Preparatory class					

Code	Learning outcome	Evaluation criteria	Evaluation system.

*Professions regulated by rules, guidelines or best practices in Europe, where a higher education study program lasts between 5 and 6 years, consisting of the first cycle and second cycle of university studies as well as for long-term higher education graduates from the period before the application of the three Bologna cycles, according to art. 153 of the Education Law no. 1/ 2011

** Secondary school graduation will result in being framed in level 1 of qualification as a result of the modification of Annex 2 of GD 918/2013 on the approval of the National Qualifications Framework – draft currently under government ownership.

7. ANNEXES

Annex 1.

Identification of the learner

SURNAME(S)	FIRST NAME(S)	
NATIONALITY		
STUDENT MATRICULATION NUMBER Replace with text		

Issuing organisation

NAME OF THE ORGANISATION	COUNTRY	DOCUMENT NUMBER	ISSUING DATE
Replace with text		Replace with text	09 09 2000

Title of the micro-credential

CIRCULAR ECONOMY OF FIBROUS COMPOSITES AND TECHNICAL TEXTILES

Type of the micro-credential

CERTIFICATE OF ACADEMIC ACHIEVEMENT

Workload

ECTS	EQF LEVEL	
3 ECTS	7	
DURATION OF COURSE: 1 semester		

Objective

To increase knowledge and develop skills in circular economy practices focused on fiber-reinforced composite materials and technical textiles.

Learning outcomes

KNOWLEDGE

- Circular Economy in Relation to Technical Textiles and Composite Materials: Understanding the core elements of circular economy principles and their specific application in the context of technical textiles and composite materials.
- Objectives of Sustainable Development and Textile Industry: Knowledge of the broader objectives of sustainable development and how they are specifically targeted within the textile industry, considering environmental, social, and economic goals.
- Product Life Cycle Assessment (LCA): Comprehension of LCA principles, understanding its purpose, methodology, and the basic stages involved in analyzing the environmental impact of products throughout their life cycle.

- Development of Environmentally Friendly Composites and Technical Textiles: Understanding the methods, techniques, and considerations involved in developing eco-friendly composite materials and technical textiles, aiming to reduce environmental impact.
- Advantages and Disadvantages of Eco-Friendly Materials: Identification and evaluation of the pros and cons of environmentally friendly materials compared to traditional ones, considering factors like cost, performance, and sustainability.
- Certifications and Standards: Knowledge about various product, social, and environmental certifications relevant to the textile and composite materials industries and their significance in ensuring sustainable practices.
- Dimensions of Sustainability: Understanding the multifaceted aspects of sustainability, encompassing economic, ethical, environmental, and educational dimensions.
- Types of Fibers and Yarns: Identification and understanding of the main types of fibers and yarns commonly used in the textile industry, including their properties and applications.
- Textile Materials and Structures for Technical Textiles and Composites: Knowledge about the main types of textile materials and structures utilized in manufacturing technical textiles and fiber-reinforced composites, considering their specific uses and properties.
- Sustainable Matrices for Composites: Understanding sustainable matrices used in the production of fiber-reinforced composites and eco-friendly composite materials, focusing on reducing environmental impact.
- Solutions Applicable in Textile Industries: Identification and understanding of various solutions and strategies applicable in the textile industry to promote sustainability and reduce environmental impact.
- Pollution and Energy Reduction Strategies: Techniques and methods to reduce pollution and energy consumption without inflating operating costs in industrial processes related to textiles.
- Sustainable Processes in Textile Production: Knowledge and implementation of sustainable mechanical and chemical processes within textile production lines to minimize environmental impact.
- Optimization of Waste Treatment and Water Use: Methods and strategies to optimize waste treatment processes and reduce overall water usage in the textile industry.
- Waste Management and Recycling Technologies for Composite Materials: Understanding the waste management systems and different recycling technologies specific to composite materials, including techniques for single raw material products, mixtures of raw materials, and products with critical raw materials in their composition.

SKILLS

- Understanding of the principles of the circular economy: Recognition of the principles of the circular economy, including the concepts of waste reduction, reuse of materials and recycling to create a sustainable production cycle.
- Understanding of the Sustainable Development Goals: Understanding of the broader sustainable development goals and how they relate specifically to the textile industry, aiming for environmentally friendly and socially responsible practices.
- Understanding of Product Life Cycle Analysis (LCA): Ability to analyse and understand the life cycle phases of a product, including raw material extraction, production, use and disposal, to assess its environmental impact.
- Experience in the development of environmentally friendly materials: Knowledge of the techniques and methods used to develop environmentally friendly composite materials and technical textiles, including the choice of sustainable materials and production processes.
- Comparative skills: Ability to identify and evaluate the advantages and disadvantages of environmentally friendly materials compared to traditional materials, taking into account factors such as cost, performance and environmental impact.
- Identification of certifications: Knowledge of various product, social and environmental certifications relevant to sustainable textile production and composite materials.

- Understanding the dimensions of sustainability: Ability to understand the multidimensional aspects of sustainability, taking into account economic, ethical, environmental and educational factors in decision-making.
- Recognition of fibres and yarns: Identification of the different types of fibres and yarns commonly used in the textile industry, considering their properties and applications.
- Problem-solving skills in the textile industry: Ability to identify and propose solutions applicable to improving sustainability within the textile industry, reducing pollution and optimising energy use without increasing operating costs.
- Use of sustainable production processes: Ability to apply sustainable mechanical and chemical processes in textile production lines to minimise environmental impact.
- Efficient waste management skills: Understanding of methods to optimise waste treatment, reduce water use and manage waste in the textile and composites industries.
- Knowledge of recycling technologies: Familiarity with the various recycling technologies for composite materials, including techniques for single and mixed raw material products.
- Understanding of waste management and recycling for composite materials: Comprehensive understanding of waste management systems for composite materials and various recycling techniques applicable to different product compositions.

RESPONSIBILITY AND AUTONOMY

Responsibility:

- Understanding the impact of industrial processes on the environment and society fosters a sense of responsibility towards sustainable practices.
- Awareness of the life cycle of products (LCA) and waste management systems emphasizes the importance of responsible handling throughout the production and disposal stages.
- Identifying solutions to reduce pollution, optimize energy usage, and implement sustainable processes reflects a sense of responsibility towards environmental conservation.

Autonomy:

- Acquiring knowledge about sustainable development goals and certifications empowers individuals to make informed decisions autonomously, aligning with sustainable practices.
- Understanding the advantages and disadvantages of different materials and technologies allows for autonomous decision-making when choosing eco-friendly alternatives.
- Learning about various recycling techniques, especially for products with critical raw materials, enables independent decision-making regarding the best recycling methods for specific materials.

Prerequisites to enrol in the course

High Education Student (Bachelor's, master's and doctoral degrees)

Form of participation in the learning activity

Online

Type of assessment

Completion of final questionnaires passing at least 50% of the questions

Grade achieved

Replace with text[1]

Language of instruction

Replace with text[1]

Certificate awarded

Replace with text

SURNAME AND FIRST NAME OF THE PERSON RESPONSIBLE FOR ISSUING THE CERTIFICATE/POSITION	SIGNATURE OF THE RESPONSIBLE FOR ISSUING THE CERTIFICATE
Replace with text DATE OF VALIDATION 09 (dd) / 09 (mm) / 2000 (yyyy)	