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RESEARCH ARTICLE

Institutional development of micro-credentials from policy to sustainability

[version 1; peer review: 2 approved with reservations]

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v1 **First published:** 01 Jul 2026, **6**:225
https://doi.org/10.12688/openreseurope.24026.1
Latest published: 01 Jul 2026, **6**:225
https://doi.org/10.12688/openreseurope.24026.1

Abstract

The article examines the institutional development of micro-credentials in Ukrainian higher education through the experience of the CRED4TEACH project, with particular attention to the case of Drohobych Ivan Franko State Pedagogical University. The study explores the transition from policy discussions and fragmented pilot initiatives to the practical institutional implementation of micro-credentials. The research focuses on the development of three interconnected institutional documents: the Institutional Framework of Micro-credentials, the Blueprint for the implementation of micro-credentials, and the Sustainability Plan.

The study employs a qualitative case study approach based on the analysis of institutional and policy documents developed during project implementation. Particular attention is given to institutional governance mechanisms, policy adaptation, quality assurance, recognition procedures, strategic planning, and the integration of micro-credentials into long-term university development.

The findings demonstrate that the implementation of micro-credentials required not only the adaptation of European policy approaches to the Ukrainian higher education context, but also the establishment of internal institutional regulations, governance procedures, quality assurance mechanisms, and sustainability strategies. The article shows how micro-credentials gradually evolved from a largely conceptual and experimental initiative into an integral component of institutional and strategic university development. The

Open Peer Review

Approval Status ? ?

	1	2
version 1 01 Jul 2026	? view	? view

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Any reports and responses or comments on the article can be found at the end of the article.

study also highlights the role of MOOCs, digital infrastructure, stakeholder engagement, and strategic planning in ensuring the long-term sustainability of micro-credentials within higher education institutions.

Keywords
micro-credentials, lifelong learning, higher education, MOOCs, institutional development, sustainability, digital education, CRED4TEACH



This article is included in the Erasmus+ gateway.



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Author roles: Hrynyk I: Supervision; **Voitovych K**: Writing – Original Draft Preparation; **Hoivanovych N**: Methodology

Competing interests: No competing interests were disclosed.

Grant information: This project has received funding from the European Union's Erasmus+ programme under grant agreement No [101082858](MOOC-based micro-credentials for teacher professional development (CRED4TEACH))
The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

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How to cite this article: Hrynyk I, Voitovych K and Hoivanovych N. **Institutional development of micro-credentials from policy to sustainability [version 1; peer review: 2 approved with reservations]** Open Research Europe 2026, **6**:225 https://doi.org/10.12688/openreseurope.24026.1

First published: 01 Jul 2026, **6**:225 https://doi.org/10.12688/openreseurope.24026.1

1. Introduction

Micro-credentials have become an important topic in European higher education policy over the last several years. Their growing popularity is connected with rapid technological change, digitalisation, labour market transformation, and the increasing demand for flexible learning opportunities. Universities and educational providers are increasingly expected to offer shorter and more targeted learning formats that allow learners to quickly acquire new competencies and respond to changing professional requirements.

An important step in the development of a common European approach was the adoption of the Council Recommendation on a European approach to micro-credentials for lifelong learning and employability by the European Commission in 2022.[1] The document defines micro-credentials as certified records of learning outcomes acquired through short-term learning experiences and emphasises transparency, quality assurance, recognition, portability, and accumulation of learning achievements. At the same time, European policy documents have stressed that micro-credentials should complement rather than replace traditional qualifications and degree programmes.[2–4]

One of the main challenges was the absence of a clear and comprehensive regulatory framework governing the implementation of micro-credentials. Many countries still lack the necessary policy and regulatory frameworks to support recognition decisions that enable the conversion of smaller sets of competencies into certified micro-credentials.[5] Educational providers lacked common guidelines regarding programme structure, learning outcomes, workload, assessment procedures, certification mechanisms, and recognition practices. Practical mechanisms for integrating micro-credentials into qualification systems and professional development pathways remain under development.[6]

Another challenge concerned the limited institutional experience in implementing modular and competency-based learning formats similar to micro-credentials. Although short-term educational activities were widespread, they were rarely designed according to unified principles that would allow them to function as transparent and portable micro-credentials with clearly defined learning outcomes and assessment mechanisms.

Although short-term certified learning had existed in higher education long before the emergence of the term “micro-credential”, the European discussion significantly changed the understanding of such educational practices. Initially, micro-credentials were mostly discussed as an innovative and flexible educational trend linked to lifelong learning and employability. However, over time the discussion gradually shifted towards more practical questions related to governance, institutional implementation, quality assurance, recognition, and sustainability. As a result, micro-credentials became not only an educational initiative but also an institutional challenge for higher education institutions.

To address these challenges, numerous European researchers and international organisations have focused on the conceptualisation, development, improvement, and wider implementation of micro-credentials within higher education and lifelong learning systems. Recent studies have increasingly examined micro-credentials not only as flexible educational formats but also as instruments connected to institutional governance, labour market needs, quality assurance, and recognition mechanisms.

For example, Selvaratnam and Sankey developed a needs-driven micro-credential framework that demonstrates the value of micro-credentials for different stakeholder groups, including learners, higher education institutions, employers, and public authorities.[7] Their research highlights the importance of aligning micro-credentials with stakeholder expectations and institutional strategies.

Other researchers focused on the role of micro-credentials within academic professional development and lifelong learning pathways. Sargent, Rienties, and colleagues[8] explored the use of stackable micro-credentials as contributions to broader postgraduate qualifications towards broader postgraduate qualifications in academic practice, demonstrating how smaller certified learning units can support flexible progression routes within higher education systems.

At the same time, international organisations such as the Organisation for Economic Co-operation and Development (OECD) increasingly examined the broader social and economic implications of micro-credentials. OECD reports discussed both the opportunities and limitations of micro-credentials in supporting employability, widening participation in higher education, facilitating transitions between secondary and higher education, and promoting lifelong learning in rapidly changing labour markets.[9]

In Ukraine, active discussions about micro-credentials started relatively recently and developed alongside the country’s integration into the European educational space. At the beginning of the MOOC-Based Micro-Credentials for Teacher Professional Development (CRED4TEACH), the implementation of micro-credentials remained fragmented and largely

experimental. Ukrainian higher education institutions offered different forms of short-term learning, certificate programmes, and professional development courses, but micro-credentials still lacked a clear legal and institutional framework. Researchers also pointed to the absence of common standards, recognition mechanisms, and quality assurance approaches necessary for their systematic implementation.[10]

During the following years, the situation gradually changed. Ukrainian academic and policy discussions increasingly focused on the integration of micro-credentials into the national qualifications system, the development of quality assurance mechanisms, and the creation of institutional approaches to programme implementation. An important step in this process was the publication of the Recommendations on the Implementation of Micro-credentials in Ukraine[11] prepared within the CRED4TEACH project. The document addressed issues related not only to the definition of micro-credentials, but also to programme design, learning organisation, assessment, certification, recognition, accumulation of learning outcomes, and quality assurance. Recent Ukrainian studies have also increasingly examined the role of higher education institutions in developing flexible educational trajectories and implementing short-term educational programmes.[12]

Despite the growing number of studies devoted to micro-credentials, much of the existing literature still focuses on conceptual discussions or policy analysis. Considerably less attention has been paid to the practical institutional dimension of implementation, particularly the development of internal university regulations, governance mechanisms, implementation roadmaps, and sustainability planning. This issue is especially important for universities that have moved from theoretical discussions and pilot initiatives towards the practical integration of micro-credentials into institutional practice.

This article examines the institutional development of micro-credentials in the context of the CRED4TEACH project through the experience of four partner universities, with particular attention to the case of Drohobych Ivan Franko State Pedagogical University. The study focuses on the transition from policy discussions to practical implementation through the development of institutional regulations for micro-credentials, implementation roadmaps, pilot courses, and sustainability plans. The article aims to demonstrate how micro-credentials gradually evolved from a policy trend into an integral component of institutional practice and strategic university development.

2. Methodology

This study employs a qualitative case study approach to examine the institutional development of micro-credentials in Ukrainian higher education within the CRED4TEACH project. Although the project involved four Ukrainian partner universities - V. N. Karazin Kharkiv National University, Bogdan Khmelnitsky Melitopol State Pedagogical University, Cherkasy State Technological University, and Drohobych Ivan Franko State Pedagogical University - this article focuses primarily on the experience of Drohobych Ivan Franko State Pedagogical University as a detailed institutional case study.

The study analyses the process of institutional transformation and policy adaptation related to the implementation of micro-credentials at the university level. Particular attention is paid to the transition from the absence of internal institutional regulation to the creation of governance mechanisms and strategic implementation documents.

The research is based on a qualitative analysis of institutional and policy documents developed during the implementation of the CRED4TEACH project. The main sources include the Institutional Framework of Micro-credentials,[13] the Blueprint for the Implementation of Micro-credentials,[14] the Sustainability Plan, pilot course implementation materials, and relevant European and Ukrainian policy documents related to micro-credentials and lifelong learning.

The analysis focuses on several interconnected dimensions: the development of institutional regulations and governance mechanisms, the adaptation of European policy approaches to the Ukrainian higher education context and the integration of micro-credentials into institutional structures and long-term strategic development.

Rather than evaluating the educational effectiveness of individual courses, the study examines the institutional pathway of micro-credential implementation and the mechanisms that supported the transition from experimental initiatives to a structured institutional practice.

3. Results

3.1 Initial institutional context

At the beginning of the CRED4TEACH project in 2022, the Ukrainian system of teacher professional development was undergoing gradual reforms aimed at increasing flexibility and expanding opportunities for lifelong learning. National educational legislation already allowed teachers to participate in professional development activities provided by

different educational institutions and organisations through formal, non-formal, and distance learning formats. However, the concept of micro-credentials remained largely absent from the institutional and regulatory frameworks of Ukrainian higher education.

Before the implementation of the project, Drohobych Ivan Franko State Pedagogical University already had experience in organising professional development courses for teachers. These courses were in demand and addressed different areas of teacher training and continuing professional education. At the same time, most professional development activities were organised through either in a traditional face-to-face format or as synchronous online learning with live participation.

Professional development activities at the university already had an established regulatory and organisational basis. The organisation of professional development courses was regulated by internal university documents, particularly the Regulations on the Organisation and Implementation of Professional Development for Pedagogical Staff of Educational Institutions of Different Types and Forms of Ownership. The university therefore had practical experience in delivering professional development programmes, although these practices were primarily focused on traditional or synchronous online learning formats.

Simultaneously, the existing professional development system did not include micro-credentials as a separate educational format. Internal regulations did not contain provisions related to the development of micro-credentials, mechanisms for the accumulation of learning outcomes, digital certification, recognition of short-term modular courses, or the use of massive open online courses within professional development. In addition, the university did not yet have a structured approach to online course design, and learning management systems such as Moodle were not systematically used for organising of professional learning activities.

As a result, short-term educational activities were not integrated into a unified system of modular online learning with clearly defined approaches to learning outcomes, workload, quality assurance, and recognition mechanisms associated with micro-credentials.

At the same time, European discussions on micro-credentials and flexible learning pathways increasingly highlighted the importance of modular, competency-based, and digitally supported educational formats. These developments demonstrated the need for institutional transformation and encouraged the university to move from fragmented short-term educational initiatives towards a structured institutional framework for micro-credentials.

The initial stage of the project therefore revealed several interconnected institutional challenges, including the absence of internal regulations for micro-credentials, limited experience in online course design, insufficient use of digital learning infrastructure, and a lack of standardised procedures for certification and recognition. These challenges created the basis for the further development of institutional governance mechanisms and implementation documents within the CRED4-TEACH project.

3.2 Development of the institutional framework of Micro-credentials

The development of the Institutional Framework of Micro-credentials became one of the first stages of institutional implementation within the CRED4TEACH project at Drohobych Ivan Franko State Pedagogical University. The document was developed by members of the project-working group in cooperation with relevant university departments responsible for academic affairs. The process combined the analysis of European approaches to micro-credentials with the adaptation of existing Ukrainian educational legislation and institutional practices.

The main purpose of the document was to establish internal procedures and governance mechanisms regulating the development and implementation of micro-credentials at the university level. In contrast to existing professional development regulations, which primarily focused on traditional forms of continuing education, the new framework introduced institutional conditions for flexible, modular, and short-term learning formats aligned with professional development needs and labour market demands.

The framework aims to expand the range of educational services offered by the university and to create conditions for rapid and flexible responses to changes in competencies required in the labour market. At the same time, it reflects broader European discussions related to lifelong learning, employability, and flexible educational pathways. One of its key objectives is to support lifelong learning opportunities by enabling target groups to make informed decisions regarding professional development through short-term educational programmes.

Another important objective of the framework is to establish a unified institutional understanding of micro-credentials and to ensure transparency and consistency in their development and implementation. The document introduces common institutional principles related to programme design, implementation, certification, recognition, and quality assurance. It also aims to align micro-credentials with the professional needs of teachers and educational institutions, thus supporting further educational opportunities and professional growth.

The structure of the Institutional Framework of Micro-credentials covers several interconnected dimensions necessary for the implementation of micro-credentials within university practice. In addition to defining the general principles, purpose, and terminology related to micro-credentials, the document establishes institutional approaches to programme development, implementation procedures, assessment and certification mechanisms, quality assurance, and recognition of learning outcomes.

The framework also introduces a more detailed governance model regulating the full lifecycle of micro-credential programmes, including programme initiation, development, expert review, approval, implementation, and monitoring. The initiation of new micro-credentials is connected to the analysis of labour market demands and the educational needs of target groups. Surveys among employers, teachers, and students are used to identify relevant competencies and professional development needs.

Programme development is carried out by a working group consisting of at least three members. Depending on the subject area, the process may also involve representatives of other departments, external experts, and employers. Draft programmes are discussed at departmental or interdepartmental meetings, after which recommendations regarding programme approval are provided.

The framework also integrates micro-credentials into the university quality assurance system. Following departmental discussion, programmes undergo institutional quality review procedures before final approval by the Academic Council and implementation through a rector's order. After approval, programmes are published on the university website to ensure transparency and accessibility.

Particular attention is paid to recommendations for the design of micro-credentials, including requirements related to learning outcomes, workload, programme structure, and forms of assessment. The framework also defines the roles and responsibilities of institutional stakeholders involved in the development and delivery of micro-credentials, thus creating a clearer governance structure for short-term educational programmes.

Additional attention is paid to the definition of institutional responsibilities during programme implementation. Programme coordinators are responsible for organising the learning process, coordinating teaching staff, ensuring compliance with programme requirements, and conducting final assessment procedures.

Another important component concerns quality assurance and the formal recognition of learning outcomes and certificates obtained through micro-credentials. Quality assurance mechanisms include regular collection of feedback from participants, teachers, and employers, analysis of programme completion indicators, and periodic updating of programme content when necessary. The document therefore not only regulates the organisational aspects of programme delivery, but also creates the institutional basis for the transparency, credibility, and further development of micro-credentials within the university.

An important aspect of the framework is its regulatory alignment with both Ukrainian and European educational policy documents. The document was developed in accordance with the Laws of Ukraine "On Education" and "On Higher Education", relevant governmental regulations, internal university regulations, and the Council Recommendation on a European approach to micro-credentials for lifelong learning and employability. This approach allows the university to adapt European principles of micro-credentials to the institutional realities of Ukrainian higher education.

Overall, the Institutional Framework of Micro-credentials established a structured institutional model describing the main stages, procedures, and responsibilities related to the development and implementation of micro-credentials at the university level. The document created the organisational and regulatory basis necessary for the development and launch of pilot micro-credential courses within the CRED4TEACH project.

The process of course development and pilot implementation, which lasted three months, provided universities with practical experience in designing and delivering micro-credentials in digitally supported learning environments. Each partner university developed at least one institutional course and participated in the creation of one national-level course.

The implementation process, together with the analysis of organisational practices, feedback, and emerging challenges, allowed the project partners to systematise the experience gained during the pilot phase and initiate the development of the next strategic document, the Blueprint.

3.3 Blueprint for the implementation of Micro-credentials

The next stage of the institutional and national-level development of MOOC-based micro-credentials within the CRED4TEACH project was the preparation of the Blueprint for the Implementation of Micro-credentials. In contrast to the Institutional Framework of Micro-credentials, which regulated implementation procedures at the university level, the Blueprint was developed as a national recommendation document intended to systematise the experience gained during the pilot phase of the project and provide a broader model for the future implementation of micro-credentials in Ukrainian higher education.

The main purpose of the Blueprint was to formalise the principles of designing, assessing, certifying, and recognising micro-credentials, as well as to support the integration of project outcomes into the policies and practices of higher education institutions and other stakeholders. The document also aimed to summarise approaches to the implementation of MOOC-based micro-credentials aligned with the National Qualifications Framework and the recommendations of the National Qualifications Agency of Ukraine.

Methodologically, the Blueprint is grounded in pilot implementation outcomes, feedback collected from participants, and analysis of institutional documents developed during the project. In this way, the document reflected not only theoretical approaches and European policy recommendations, but also practical implementation experience obtained during the pilot phase.

Unlike institutional regulations focused primarily on internal governance mechanisms, the Blueprint addressed a broader range of strategic and organisational issues related to the implementation of micro-credentials. Its structure covered several interconnected dimensions, including the purpose and scope of the document, policy and strategic context, national frameworks for the provision of micro-credentials, institutional governance, the design of MOOC-based micro-credentials, pilot implementation and quality assurance, certification procedures, and recognition mechanisms.

Particular attention within the Blueprint was devoted to processes related to the issuing, certification, and verification of micro-credentials. The document systematised practices related to certificate metadata, digital verification mechanisms, registry integration, and protection against forgery that emerged during the pilot implementation phase. It also outlined possible approaches to certificate lifecycle management, including re-issuance, corrections, validity, and revocation procedures. In this way, the Blueprint documented practical experiences and potential models for treating micro-credentials as verifiable and portable digital learning achievements.

Another important dimension of the Blueprint concerned the recognition of micro-credentials at institutional, inter-institutional, and professional levels. The document summarised approaches to the recognition of micro-credentials within continuing professional development, elective components of degree programmes, and procedures for recognition of prior learning. It also outlined possible conditions for cross-institutional recognition, including the alignment of learning outcomes, workload, assessment approaches, quality assurance procedures, and certificate verifiability.

The document was developed collaboratively by representatives of all Ukrainian partner institutions participating in the project, with responsibilities distributed according to institutional expertise and implementation experience. Representatives of V. N. Karazin Kharkiv National University contributed to the sections related to pilot implementation and quality assurance. Cherkasy State Technological University was responsible for the policy and strategic context as well as issuing and certification procedures. Bogdan Khmelnitsky Melitopol State Pedagogical University prepared sections devoted to the purpose and scope of the Blueprint and the design of MOOC-based micro-credentials. Drohobych Ivan Franko State Pedagogical University contributed to sections related to the institutional framework and the recognition of micro-credentials. Representatives of the National Qualifications Agency of Ukraine participated in the development of recommendations concerning the national frameworks for the provision of micro-credentials.

An important characteristic of the Blueprint was its orientation towards different stakeholder groups involved in the implementation and recognition of micro-credentials. Higher education institutions received a model for the development and implementation of MOOC-based micro-credentials aligned with national qualification requirements. Employers were considered potential partners in identifying labour market needs and shaping the content of micro-credentials. Quality assurance bodies and policymakers received a foundation for the further development of recommendations, recognition mechanisms, and approaches to lifelong learning policies.

3.4 Sustainability planning and strategic integration

The development of the Blueprint also demonstrated that the successful implementation of micro-credentials requires not only institutional regulations and methodological recommendations, but also long-term organisational and strategic support. While the Institutional Framework established internal governance procedures and the Blueprint systematised implementation experience gained during the pilot phase, the project partners also faced the challenge of ensuring the sustainability of micro-credentials beyond the project lifecycle. This created the need for the development of Sustainability Plans aimed at integrating micro-credentials into the long-term strategic and institutional development of universities.

At Drohobych Ivan Franko State Pedagogical University, the Sustainability Plan was developed as a strategic institutional document outlining mechanisms for maintaining and further developing the results of the CRED4TEACH project through the implementation of MOOC-based micro-credentials. Unlike the Institutional Framework, which focused on governance procedures, and the Blueprint, which systematised implementation experience, the Sustainability Plan is concentrate on long-term institutional integration, organisational continuity, infrastructure development, and strategic growth.

The document is aligned with the University Development Strategy (2022–2026) and the Internationalisation Strategy (2024–2026), particularly in the areas of lifelong learning, digital education, flexible learning pathways, and international cooperation. Within this framework, micro-credentials are positioned as a practical and scalable component of the university's educational ecosystem capable of supporting teacher professional development, complementing formal educational programmes, and expanding access to flexible learning opportunities.

Particular attention in the Sustainability Plan is devoted to defining long-term institutional priorities for the development of micro-credentials. Based on the results of the CRED4TEACH project, the university identified several strategic directions for the following five years. These include the further development and wider dissemination of existing courses, the creation of new MOOC-based micro-credentials, and their gradual integration into educational programmes as elective components. Another important priority concerns the transformation of programmes offered by the Centre for Postgraduate and Pre-University Education into digitally supported formats based on MOOCs.

In accordance with the university's internationalisation strategy, the document also highlights the importance of developing English-language micro-credentials in order to attract international learners and strengthen cooperation with foreign partner institutions. At the same time, the university identifies the continuous development of institutional capacity in the field of digital content design and online course delivery as one of the central conditions for sustainable implementation.

The Sustainability Plan therefore moves beyond short-term pilot implementation and addresses broader questions related to infrastructure, human resources, financial sustainability, quality assurance, promotion, and institutional management. Its structure includes sections devoted to SWOT analysis, target groups and market potential, sustainability measures and indicators, quality assurance systems, communication strategies, financial support and partnerships, governance mechanisms, implementation planning, and institutional monitoring.

One of the important analytical components of the document is the SWOT analysis of micro-credentials at the university. The analysis demonstrates that the university had already established several important preconditions for sustainable implementation, including the successful pilot testing of the first MOOC-based micro-credential, the existence of an institutional regulatory framework, a developed digital infrastructure based on Moodle LMS and media studio established within the project, as well as a group of academic staff with practical experience in the design and moderation of online courses.

At the same time, the SWOT analysis also identifies several institutional limitations and risks. These include the early stage of implementation, incomplete integration of micro-credentials into administrative and academic processes, dependence on a limited number of trained experts and technical support staff, and the absence of fully developed financial sustainability models. External risks include regulatory uncertainty, increasing competition within the online education market, financial limitations, and challenges associated with the wartime context in Ukraine.

The analysis demonstrates that the university had already established several important preconditions for sustainable implementation, including the successful pilot testing of the first MOOC-based micro-credential, the existence of an institutional regulatory framework, a developed digital infrastructure based on Moodle LMS and a media studio

established within the project, as well as a group of academic staff with practical experience in the design and moderation of online courses.

An additional important component of the Sustainability Plan concerns the positioning and promotion of micro-credentials within the university educational ecosystem. Micro-credentials are presented as short, flexible, and practice-oriented learning opportunities complementing formal education and responding to current educational and labour market needs. At the same time, they are positioned as a distinct sub-brand within the university's academic portfolio, making it easier for potential learners to distinguish micro-credentials from full degree programmes and other forms of continuing education.

The Sustainability Plan also pays considerable attention to institutional mechanisms ensuring the long-term viability of micro-credentials. These mechanisms includes regular professional development activities for academic staff in the areas of MOOC design, digital pedagogy, and online course development; the use of digital infrastructure such as learning management systems and the established media studio; annual institutional monitoring procedures; stakeholder consultations; and the gradual introduction of paid certification models intended to support financial sustainability.

Expected outcomes by 2030 include the launch of at least five to seven active micro-credentials, stable annual enrolment among teachers and students, the implementation of at least one English-language programme, the development of courses in cooperation with stakeholders, and the establishment of annual monitoring and reporting procedures.

Overall, the Sustainability Plan became an important strategic instrument for the long-term institutionalisation of micro-credentials at Drohobych Ivan Franko State Pedagogical University. It demonstrates the transition from pilot experimentation towards the systematic integration of flexible and digitally supported learning into the university's educational, organisational, and strategic development.

4. Conclusion

The experience of the CRED4TEACH project demonstrates that the implementation of micro-credentials in higher education requires a gradual transition from policy discussions to institutional practice. In the Ukrainian context, this process involved not only the adaptation of European approaches to micro-credentials, but also the creation of internal governance mechanisms, regulatory procedures, and strategic development models capable of supporting flexible and digitally supported learning.

The case study of Drohobych Ivan Franko State Pedagogical University illustrates how micro-credentials evolved from a relatively new and largely experimental educational concept into an institutionalised component of university development. The establishment of the Institutional Framework of Micro-credentials created the organisational and regulatory basis necessary for programme development and pilot implementation. The subsequent development of the Blueprint allowed the project partners to systematise implementation experience, summarise emerging practices, and formulate broader recommendations for Ukrainian higher education institutions. Finally, the Sustainability Plan demonstrated the importance of integrating micro-credentials into long-term institutional strategies related to lifelong learning, digital transformation, quality assurance, and internationalisation.

The study also shows that the successful implementation of micro-credentials depends on several interconnected factors, including institutional leadership, robust digital infrastructure, stakeholder cooperation, staff training, quality assurance mechanisms, and strategic planning. However, the implementation process revealed a number of challenges related to financial sustainability, institutional integration, regulatory uncertainty, and the need for continuous professional development of academic staff.

Overall, the institutional pathway analysed in this article demonstrates that micro-credentials should not be understood only as short-term educational products or isolated project initiatives. Their sustainable implementation requires comprehensive institutional transformation involving governance structures, strategic priorities, digital learning ecosystems, and new approaches to lifelong learning. Consequently, the experience of the CRED4TEACH project therefore provides an example of how universities can transition from fragmented pilot initiatives towards the systematic institutionalisation of micro-credentials within higher education.

Ethics and consent

Ethical approval and consent were not required.

Data and software availability

No datasets were generated or analyzed during the current study. The manuscript presents the development and implementation of institutional documents created within the framework of the project. Publicly available documents, including the Institutional Framework for Micro-Credentials and the Blueprint, are referenced in the article. The Sustainability Plan is currently under review by the European Commission and is therefore not publicly available at this stage. Upon completion of the evaluation and approval process, the document will be published on the university's official website and made accessible through the project documentation repository available at CRED4TEACH DSPU.

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Reference Source

Open Peer Review

Current Peer Review Status: ? ?

Version 1

Reviewer Report 04 September 2026

https://doi.org/10.21956/openreseurope.26008.r79473

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Reviewer report
The manuscript examines the institutional development of micro-credentials in Ukrainian higher education through the CRED4TEACH project, focusing mainly on the experience of Ivan Franko Drohobych State Pedagogical University. The authors use a qualitative case-study approach based on institutional and policy documents developed during the project.
The paper describes three main stages of the process: the development of an Institutional Micro-credentials Framework, the preparation of an Action/Strategic Plan for implementation, and the development of a Sustainability Plan. These documents address governance, programme design, quality assurance, certification, recognition, digital learning, stakeholder involvement and the longer-term strategic integration of micro-credentials.

The topic is timely and relevant. I also find the institutional perspective useful, since much of the discussion around micro-credentials focuses on policy, definitions and educational models, whereas this paper gives more attention to how a university develops the internal structures needed to implement them. The description of the institutional framework and the governance procedures is one of the strengths of the manuscript.

Overall, I consider the study design appropriate for the purpose of the paper and the manuscript potentially indexable. My main concern is about the extent to which the evidence presented supports the manuscript's stronger claims about institutionalization and sustainability.
The paper shows quite clearly that the university developed regulations, governance mechanisms, pilot activities and strategic plans. What is less clear is whether these developments are sufficient to conclude that micro-credentials have already become an institutionalized and systematically integrated part of the university's regular activity. I think the manuscript would be considerably stronger if this distinction were made more explicit.

Main comments

1. Institutionalization and formalization should be distinguished more clearly.

The manuscript provides good evidence that a formal institutional framework was created. It describes the approval procedures, responsibilities, quality assurance mechanisms, recognition procedures and other governance arrangements in considerable detail.
However, the paper sometimes moves from describing the establishment of these mechanisms to stating that micro-credentials have become an “institutionalized” or “systematically integrated” component of university development.
These are not necessarily the same thing. Having regulations and procedures in place is an important step towards institutionalization, but it does not by itself show that those procedures have become part of routine academic and administrative practice.
This point is particularly relevant because the SWOT analysis in Section 3.4 itself refers to the incomplete integration of micro-credentials into academic and administrative processes.
I would therefore encourage the authors to clarify what they mean by “institutionalization” and, if possible, distinguish between what has already been formally established, what has actually been implemented in practice, and what is still being developed. If there is evidence that the new procedures are already being routinely used, this would be useful to report.

2. The discussion of sustainability should distinguish between planning for sustainability and sustainability already achieved.
The Sustainability Plan is one of the most interesting elements of the paper. It covers a broad range of issues, including infrastructure, staff development, quality assurance, governance, financing, communication and stakeholder engagement. The targets established for 2030 are also useful for understanding the university's longer-term intentions.
At the same time, several of these elements are clearly future-oriented. The manuscript refers, for example, to the planned expansion of micro-credentials, their gradual incorporation into degree programmes, the development of courses in English, annual monitoring procedures and paid certification models. The target of five to seven active micro-credentials by 2030 is also a future objective.
I therefore think the paper should be clearer about which sustainability mechanisms are already operating and which are planned. This is particularly important because the SWOT analysis acknowledges incomplete institutional integration and the absence of a fully developed financial sustainability model.
A clearer distinction between current achievements and future objectives would make the argument much more convincing.

3. Some of the conclusions appear stronger than the evidence presented in the Results section.
The conclusion states that the case demonstrates the transition of micro-credentials into an “institutionalized” component of university development and refers to “systematic institutionalization”.
I think the results support the conclusion that the project established an institutional framework and created important mechanisms for implementation. They also support the existence of a structured pathway towards longer-term integration.
I am less convinced, however, that the evidence presented is sufficient to conclude that full institutionalization and systematic integration have already been achieved. The manuscript itself identifies a number of remaining limitations, while several of the most important sustainability measures are still planned.
For this reason, I would suggest either providing additional evidence of actual institutional integration or moderating the wording of the conclusions. In particular, distinguishing between a

demonstrated **pathway towards institutionalization** and **institutionalization already achieved** would improve the consistency between the Results and the Conclusion.
I would also be slightly cautious with statements that the implementation “depends on” particular factors such as leadership, infrastructure, stakeholder cooperation or staff training. The case identifies these as important factors, but the study does not appear to have been designed to establish their relative importance or a causal relationship with successful implementation.

4. The documentary analysis needs a little more methodological explanation.
I agree with the general qualitative case-study approach, but the methodology could explain more clearly how the documents were analysed.
The manuscript identifies the main documents and several areas of analysis, such as governance, regulatory adaptation, quality assurance, recognition and strategic integration. What is less clear is how the authors moved from the documents themselves to the findings reported in Section 3. For example, was the material analysed using thematic analysis, qualitative content analysis, coding, or another systematic procedure? If no formal coding procedure was used, the authors could simply explain how the documents were reviewed and how the main themes and conclusions were identified.
I do not think the study needs a substantially different methodology, but this additional information would make the analytical process clearer and easier for other researchers to assess or reproduce.

5. The scope of the case should be made clearer.
The paper presents Drohobych State Pedagogical University as the main case, but the CRED4TEACH project involved four Ukrainian universities. In Section 3.3, the discussion also incorporates contributions from the other partner institutions and from the National Qualifications Agency of Ukraine.
It would therefore be useful to make clearer which findings refer specifically to Drohobych and which reflect the wider experience of the CRED4TEACH consortium.
This is particularly relevant when the paper moves from the experience of one university to broader statements about the implementation of micro-credentials in Ukrainian higher education. The case can certainly provide useful lessons for other institutions, but the limits of this transferability should be acknowledged.

Availability of source material
The manuscript explains that the Sustainability Plan is currently under review by the European Commission and therefore cannot yet be made publicly available. I understand this limitation. However, the Sustainability Plan is also an important source for the discussion of the SWOT analysis, sustainability indicators, financial mechanisms and the 2030 targets. Since readers cannot currently consult the document, it would be helpful to provide enough information in the manuscript itself to understand the evidence behind these claims.
This does not necessarily require making the document publicly available at this stage. Rather, the relevant evidence and indicators could be described in somewhat greater detail in the manuscript.

Literature and contribution
The manuscript is well connected to the current discussion on micro-credentials, particularly in relation to European policy, lifelong learning and the Ukrainian context.
The authors argue that relatively little attention has been paid to the practical institutional implementation of micro-credentials. This is a potentially valuable research gap. The contribution

would be clearer, however, if the manuscript more explicitly explained what it adds to previous work: whether the main contribution is the empirical description of one institutional experience, a transferable implementation model, or broader lessons for Ukrainian higher education.
Making this point clearer would help position the paper more strongly as a research article rather than primarily as a description of the CRED4TEACH project.

Overall assessment
I find the manuscript relevant and potentially useful. The institutional perspective is interesting, and the description of the governance framework and the different implementation instruments provides practical information that may be useful to other higher education institutions.
My main recommendation is to strengthen the analytical distinction between **what the project has formally established, what has been implemented in practice, and what remains a future objective**. This is particularly important for the manuscript's claims concerning institutionalization and sustainability.
The methodological description of the documentary analysis should also be clarified, and the boundaries between the Drohobych case and the wider CRED4TEACH experience should be made more explicit.
These changes would, in my view, make the manuscript's conclusions more convincing without requiring a fundamental change to its qualitative case-study design.
The points concerning the distinction between formalization and actual institutionalization, the distinction between sustainability planning and demonstrated sustainability, and the alignment of the conclusions with the evidence should be addressed because they concern the central claims of the paper.

Is the work clearly and accurately presented and does it engage with the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

Are all the source data and materials underlying the results available?
No source data required

If applicable, is the statistical analysis and its interpretation appropriate?
Not applicable

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Management accounting and management control systems, with expertise in organizational governance, strategic management, performance measurement and institutional sustainability. I am particularly able to assess the governance, management and strategic aspects

of the institutional implementation of micro-credentials.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 20 August 2026

https://doi.org/10.21956/openreseurope.26008.r77771

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The article provides a descriptive qualitative case study detailing how micro-credentials evolved from theoretical European policy frameworks into practical institutional mechanisms at a Ukrainian higher education institution, specifically Drohobych Ivan Franko State Pedagogical University, under the umbrella of the EU-funded CRED4TEACH project.
The paper outlines three key operational milestones: the Institutional Framework, which established local governance, quality assurance, and approval lifecycles for short-term courses; the Blueprint for Implementation, which aggregated multi-institutional pilot findings into a national-level recommendation document; and the Sustainability Plan, which maps out long-term strategic integration, financial viability, and targets through 2030.
The paper addresses a timely topic in higher education policy and lifelong learning. However, in its current draft, the manuscript functions more as an institutional project summary or implementation report than a critical academic research article. Major revisions regarding methodology, structural repetition, analytical depth, and clear separation of results are necessary to bring the paper up to standard indexation criteria.

Nevertheless, some comments and improvements are needed to be addressed:

- The methodology states a qualitative case study design based on document analysis. However, the paper lacks explicit analytical frameworks or qualitative coding methods (e.g., thematic analysis, content analysis) to explain *how* these documents were analysed.
- Section 3 references pilot courses, survey results, and stakeholder feedback gathered during implementation. However, no quantitative or qualitative data (e.g., completion rates, enrolment numbers, survey scores, themes from participant feedback) are presented in the text. Adding concrete metrics or illustrative qualitative extracts from the pilot testing phase would significantly strengthen the empirical grounding of the findings.
- The draft suffers from noticeable structural duplication. For example, in Section 3.4 (Sustainability planning and strategic integration), two entire paragraphs regarding the university's established preconditions and digital infrastructure (SWOT analysis) are duplicated almost verbatim across pages 8 and 9.
- Furthermore, the core narrative repeats the transition from "fragmented pilot initiatives to institutionalized policy" across the Abstract, Introduction, Results, and Conclusion without

adding new analytical layers in each section. A thorough copy-edit is needed to eliminate duplicated text blocks and streamline the narrative flow.
- On section 3.1 clarify the baseline digital infrastructure before 2022. The text mentions Moodle was not systematically used for professional learning; briefly elaborate on what platforms or tools were used instead.
- Some grammatical issues:
- Page 8: "...the Sustainability Plan is concentrate on long-term..." change to "...concentrates on long-term..." or "...is focused on long-term...".
- Page 9: "These mechanisms includes regular..." change to "These mechanisms include regular...".
- The results read largely as a descriptive summary of internal university policy documents and project deliverables.

To elevate this to a research article, the authors should offer deeper critical analysis:

1. What specific operational bottlenecks or institutional resistance occurred during the drafting of the Institutional Framework?
2. How exactly were the wartime conditions in Ukraine managed when deploying digital learning ecosystems, and how did this impact project timelines or infrastructure choices?
3. What are the specific trade-offs or tensions between traditional degree-granting structures and short-term micro-credentials within the Ukrainian legal context?

Ensure all citations are completely aligned with in-text claims, particularly around national qualification frameworks.

Is the work clearly and accurately presented and does it engage with the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

Are all the source data and materials underlying the results available?
No source data required

If applicable, is the statistical analysis and its interpretation appropriate?
Not applicable

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Management, Education and Public Policies.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have

significant reservations, as outlined above.