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THE BLENDED LEARNING METHOD AS A TOOL FOR EDUCATIONAL INNOVATION IN THE INTERUNIVERSITY MASTER'S PROGRAM "SMART INDUSTRIES AND DIGITAL TRANSFORMATION"

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Abstract. The accelerated transformations of the educational environment, generated by digitalization, globalization and the need for flexibility, are leading universities to adopt innovative pedagogical models. In the Republic of Moldova, the NeedEDU4.0 project proposes a blended learning model to modernize educational processes at the master's level, in the context of the implementation of the interuniversity program "Smart Industries and Digital Transformation". The article presents the conceptual and normative foundation of the model, the pedagogical structure, the roles of the actors involved, the technological resources used, the mechanisms of academic mobility and the procedures for evaluation and quality assurance. The results highlight the benefit of the blended learning model as a tool for making higher education more flexible, accessible and modern, constituting a replicable reference for other university programs oriented towards digitalization and Education 4.0

Keywords: *higher education blended learning, digitalization, academic mobility, Education 4.0, digital pedagogy.*

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Introduction

The transformations in higher education have acquired, in the last two decades, a constantly increasing intensity, determined by the accelerated dynamics of digital technologies, the expansion of academic mobility and the need to synchronize with European quality standards. In the Republic of Moldova, these developments have generated a favourable context for initiating structural reforms in higher education, by adopting innovative pedagogical models that facilitate adaptation to the challenges of contemporary society.

The interuniversity master's program "Smart Industries and Digital Transformation", developed within the NeedEDU4.0 Erasmus+project represents such a strategic approach, oriented towards the implementation of a modern blended learning model, oriented towards professional relevance, flexibility, and advanced digital skills.

The need for such a model derives from the current realities of the labor market, in which digital skills, autonomous learning capacity, collaboration in virtual environments and adaptability to hybrid work environments are becoming essential. Educational systems are increasingly faced with the requirement to train graduates capable of responding to dynamic work contexts, and master's programs are called upon to offer not only knowledge transmission, but also authentic, integrated, student-centred learning experiences. In this sense, blended learning is becoming a fundamental tool for modern universities.

The need to organize an interuniversity program in a mixed regime, methodologically harmonized and technically coordinated between three Moldovan higher education institutions, has required the development of a complex model, based on national normative acts, institutional procedures and a coherent pedagogical architecture.

The article offers a comprehensive and detailed examination of the methodology employed in developing the blended learning model, presenting its conceptual foundations, pedagogical architecture, and sequential stages of implementation. It further outlines the distinct responsibilities

of the actors involved; emphasizing the coordinated roles of institutional coordinators, academic staff, and master's students in ensuring the model is effective functioning. In addition, the study analyses the digital tools that support instructional activities and highlights the mechanisms designed to guarantee the quality, coherence, and sustainability of the model. The discussion is extended with an exploration of the long-term implications of the blended framework, as well as an assessment of its potential for broader adaptation and replicability at the national level.

Methodology for designing and implementing the blended learning model in the interuniversity master's program

The methodological development of the model began by analysing the national regulatory framework. The Education Code and government decisions on the organization of university programs enshrine the right of institutions to implement blended programs, but condition the observance of certain quality, equivalence and monitoring criteria. The ANACEC standards on the external evaluation of programs, as well as the European quality assurance practices established by ENQA, provided the conceptual basis for defining the minimum requirements regarding the program structure, learning activities, assessment of results and monitoring of student progress.

The next stage was the internal analysis of the existing methodologies in the three partner institutions. This analysis focused on the procedures used for online teaching, the structure of digital resources, the organization of synchronous and asynchronous activities, the regulations on assessment and the procedures for equivalence of results in inter-institutional situations. Universities had different practices regarding the degree of digitalization, the level of formalization of online activities and the use of technological tools. Harmonizing these differences required the definition of a common methodological framework, unitary, but flexible enough to allow adaptation to the particularities of each institution.

The next methodological stage was the pedagogical modelling itself. In this stage, the structure of the courses, the proportion of synchronous and asynchronous activities, the types of formative and summative tasks, the digital tools used, the communication flows and the procedures for checking progress were defined. The modelling was carried out based on modern pedagogical principles, oriented towards active learning, collaborative learning and the use of interactive digital resources.

The piloting of the model in real conditions began on October 1, 2025 by piloting the first group of master's students and teaching staff from all three institutions and the activities are carried out in both synchronous and asynchronous formats. The data collected following the piloting will be analysed to identify difficulties, strengths and adjustment needs. During the piloting period, a continuous evaluation and adjustment of the model will be carried out. The monitoring process will be carried out by the inter-institutional quality assurance team.

The pedagogical structure of the mixed / blended model

Implementing the blended learning model requires a clear and well-structured distribution of responsibilities among institutional coordinators, academic staff and master's students. Institutional coordinators ensure the overall coherence of the program by supervising the implementation process, facilitating communication between partner institutions and intervening promptly in the event of technical difficulties. Their coordinating role is crucial for maintaining the uniformity of the model across universities and ensuring that all components function according to the established standards. Teaching staff, in turn, are responsible for designing learning resources, coordinating the instructional activities and evaluating students' progress in line with the academic objectives of each module. Master's students become active participants in their own learning process: they must engage in synchronous and asynchronous activities, access digital resources consistently and complete assigned tasks with responsibility and academic integrity.

The implementation of the blended learning model followed a gradual and methodical process. The initial stage focused on developing a common regulatory framework, which established the guiding principles, responsibilities and operational procedures for all partner institutions. Only after this foundation was consolidated, did the project team proceed to curriculum planning, the design of course structures and the calibration of the proportions allocated to synchronous,

asynchronous and collaborative activities. A particularly important component of the implementation strategy was the continuous training of teaching staff, ensuring that professors were prepared to work within the new model and effectively use digital tools. Beginning on October 1, 2025, the blended learning model entered its pilot phase, allowing the team to test the structure in real teaching conditions. This process will be complemented by ongoing evaluation carried out by the implementation team, which will collect feedback, monitor outcomes and formulate recommendations for long-term improvement.

The pedagogical structure of the blended learning model is anchored in an integrated didactic architecture that brings together synchronous, asynchronous and collaborative activities in a coherent manner. This architecture is designed to guarantee the continuity of the educational process and adaptability to the diverse needs of master's students. Synchronous activities represent the interactive core of the program, enabling real-time communication between students and professors. They support academic dialogue, promote the exchange of ideas, and provide opportunities for thematic presentations and structured debates. These sessions are rigorously planned according to a program-level schedule, and both attendance and participation are monitored through digital LMS platforms, which ensure efficient tracking of student involvement.

Asynchronous activities complement this dynamic by supporting in-depth learning and fostering the intellectual autonomy of students. Through digital materials, pre-recorded video lectures, practical assignments, thematic forums and structured self-assessments, students engage in reflective and self-paced learning processes. Every asynchronous activity is methodologically aligned with synchronous sessions, ensuring pedagogical continuity and avoiding fragmentation. The knowledge, skills and insights developed individually during asynchronous work are subsequently reinforced and applied during synchronous interactions, creating a cyclical and consistent learning experience.

A balanced integration of synchronous and asynchronous learning components supports several essential pedagogical objectives. A primary objective is the personalization of the learning experience. By allowing students to work at their own pace while still benefiting from real-time engagement with professors and peers, the model promotes an individualized yet coordinated educational pathway. Another key objective is maintaining a uniform quality standard across all learning environments. The design of integrated activities helps prevent discrepancies between delivery modes, ensuring equitable access to the same resources, tools and learning opportunities. Moreover, the model encourages interactive and collaborative learning, combining individual initiative with teamwork — an essential requirement for the development of transversal competencies relevant to contemporary industries.

The flexible structure of the program also enhances accessibility for students across the Republic of Moldova, reducing geographical, logistical and socio-economic barriers. In this sense, the blended learning model becomes a strategic tool for democratizing access to master's studies, allowing students to participate actively in academic life regardless of their physical location.

The balanced integration of synchronous and asynchronous components also gives the program a heightened capacity to respond to the rapid transformations of the educational system and broader society. In an environment characterized by uncertainty and rapid change, the flexibility of the model becomes indispensable. The institution can adjust teaching methods, pace, content volume and assessment approaches in response to unforeseen circumstances — whether related to public health crises, economic instability, institutional changes or policy reforms. Learning continuity is thus preserved even under adverse conditions, and academic quality remains stable.

This adaptability extends beyond logistical adjustments to include pedagogical innovation. The model enables the recalibration of learning tasks and workload, ensuring that students remain motivated and that the instructional process retains its relevance. For this reason, the pedagogical structure functions not merely as a technical tool but as a dynamic mechanism of learning management, oriented toward efficiency, innovation and long-term academic sustainability. It supports both immediate operational stability and strategic institutional development by integrating international best practices and contemporary educational principles.

Within this broader framework, collaborative activities play a pivotal role. They contribute to the development of transversal competencies such as critical thinking, teamwork, problem-solving, creativity and decision-making. Through collaborative tasks, students engage in group work, analyze complex case studies, develop interdisciplinary projects and practice constructive negotiation and argumentation. Interaction within learning teams strengthens responsibility, communication skills and collaborative reasoning — all indispensable in academic and professional contexts.

Each course module incorporates at least one mandatory collaborative activity, carefully integrated into the program's methodological design. This ensures that students do not merely accumulate theoretical knowledge, but apply it meaningfully in practical or simulated contexts. These collaborative activities, in synergy with synchronous and asynchronous components, create a comprehensive, coherent and performance-oriented learning experience, fully aligned with the holistic character of the blended learning model implemented within the program.

Regulation of academic mobilities within the neededu consortium: procedures, responsibilities and institutional recognition

The teaching, practical and research activities carried out by master's students and teaching staff within the framework of academic mobilities carried out between member institutions of the NeedEDU Consortium are mutually recognized, in accordance with the common curriculum, the provisions of the Consortium Agreement and the provisions of this regulatory act. Through this integrated approach, the Consortium ensures curricular coherence and continuity of academic training, regardless of the institution in which the activities are carried out, thus consolidating a common and functional educational space.

In the case of physical mobility of master's students to one of the partner universities, the host institution is obliged to create the necessary conditions for a complete and quality academic experience. Thus, it must provide access to the educational platforms used within the program, ensure technical support and adequate academic consultancy, facilitate the integration of students into the teaching, and research activities of the institution. The host university is also responsible for validating the participation of the master's students in the scheduled activities, by issuing relevant supporting documents, such as attendance records, activity reports, evaluation results or other administrative records requested by the Consortium.

The home institution analyses the documents provided by the host university and is obliged to equate the activities and evaluations carried out during the mobility, according to the internal procedures established at the level of the NeedEDU Consortium. This recognition procedure ensures the transparency, equity and predictability of the academic path of the master's students, avoiding duplication of activities and maintaining the integrity of the common curriculum.

As for the teaching staff involved in temporary mobilities – whether for teaching, mentoring, research or for coordination and co-tutoring activities – the teaching and professional responsibilities assumed in the host institution are considered equivalent to the normalized activity in the home institution. These activities are reflected in the individual activity sheet based on a detailed report, which must be approved by the program coordinators. By formally recognizing the involvement of teaching staff in mobilities, the exchange of good practices, inter-institutional cooperation and the diversification of professional experiences are encouraged.

The institutional coordinators within the Consortium have an essential role in the smooth functioning of academic mobilities. They monitor the process of carrying out the mobilities, ensure the administrative and academic correlation between the institutions involved and contribute to maintaining the quality standards established at the level of the inter-university program. Through their activity, the conceptual and operational unity of the program is guaranteed, as well as compliance with the principles of transparency, accountability and reciprocity between the partners.

Conclusions

The blended learning model developed and implemented within the NeedEDU4.0 project is shaping up as a coherent, modern pedagogical system aimed at improving the quality of higher education in the Republic of Moldova. Built on the principles of flexibility, accessibility and academic efficiency, this model responds to the emerging needs of digital transformation and the

restructuring of educational processes at the university level. Through the advanced integration of digital tools, the balanced combination of synchronous and asynchronous activities and the inclusion of collaborative activities, the program offers a robust, adaptable learning environment focused on the progressive development of master's students' skills.

At the same time, clarifying the roles and responsibilities for all categories of actors – institutional coordinators, teaching staff and students – contributes to the creation of a transparent and efficient operational framework. This facilitates both inter-institutional communication and the good management of didactic and administrative processes, which strengthens the functioning of the inter-university consortium.

A defining element of the NeedEDU4.0 model is the continuous quality monitoring, carried out through digital tools, common procedures and periodic evaluations. These mechanisms allow for the rapid adjustment of the model components, depending on the data collected and the feedback of the participants, transforming the system into a dynamic structure, oriented towards permanent improvement and didactic innovation.

In the current context, marked by the intensification of digitalization processes, inter-institutional collaboration and the need to modernize the teaching-learning process, NeedEDU4.0 stands out as a relevant example of good practice at the national level. The model’s capacity to integrate resources, infrastructures and expertise from several universities demonstrates the feasibility of developing modern inter-university programs, aligned with European standards.

Through its flexible, scalable and replicable nature, this model offers solid premises for its expansion to other fields of study and to other higher education institutions in the Republic of Moldova. Thus, NeedEDU4.0 does not just represent a one-time result of an international project, but a strategic approach with the potential to sustainably contribute to the modernization and internationalization of the national higher education system.

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