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N. S. Bobro
Ph.D, Doctor of Philosophy,
Director of the digital department of the European University,
director of the "NooLab & AI" scientific laboratory
of the European University
ORCID: orcid.org/0009-0003-5316-0809

PEDAGOGICAL FOUNDATIONS FOR THE FORMATION OF A STUDENT'S VIRTUAL IDENTITY IN THE EDUCATIONAL ENVIRONMENT OF A DIGITAL UNIVERSITY

The article is devoted to a comprehensive theoretical and analytical study of the pedagogical foundations for the formation of a student's virtual identity in the educational environment of a digital university. The relevance of the topic is determined by the profound transformational processes in higher education associated with the spread of digital platforms, automated services, and virtual educational environments, which are changing the nature of student participation in the learning process and the ways in which they interact with the university environment. Under these conditions, educational interaction increasingly takes place in virtual space, where digital tools perform the functions not only of a technical intermediary but also of a factor of pedagogical influence. This highlights the need to rethink the role of a student as an active participant in the educational process in a digital environment and to define the conditions for forming their sustained educational presence. Under these conditions, virtual identity emerges as a sustainable form of a student's educational presence, which is formed through systematic interaction with digital tools for learning, communication, and management of learning engagement. The aim of the article is to provide a theoretical justification for the pedagogical mechanisms for the formation of a student's virtual identity and to analyze the practical experience of implementing an integrated virtual educational environment within the university structure. The methodological basis of the study consists of methods of theoretical analysis, systematization, and generalization of scientific approaches to the digitalization of education, as well as an analysis of the practical results of the pilot implementation of a digital educational platform. The article describes the key functional components of the virtual educational environment, in particular, mechanisms of authentication and academic identification, tools for organizing schedules and tracking learning engagement, gamified motivational elements, digital student identifiers, and personalization and institutional communication services. It has been shown that the coordinated functioning of these components ensures the integrity of the educational environment and influences the nature of student engagement in learning activities. It is substantiated that the integration of these components contributes to increasing student engagement, supports the continuity of educational interaction, and creates conditions for the formation of a conscious and stable virtual identity. The practical experience of the pilot implementation of the EUni student account in 2025 confirmed the feasibility of the comprehensive use of digital tools as components of a holistic educational environment. The prospects for further development of digital university models related to the expansion of automated educational and management processes are outlined.

Key words: *student's virtual identity, virtual educational environment, digitalization of higher education, gamification of learning, digitalization, digital university.*

Problem statement. The modern higher education system operates under conditions of intensive digital transformation, accompanied by changes in learning formats, the increasing complexity of educational ecosystems, and the growing role of virtual environments in everyday academic interaction. In this context, the issue of the formation of a student's virtual identity as a sustained, conscious, and institutionally established presence in the university's digital educational space becomes relevant. Insufficient conceptualization of the pedagogical foundations of this process complicates the integration of digital platforms into learning activities, reduces the effectiveness of personalizing educational trajectories, and limits the potential of digital tools as means of motivation, communication, and management of learning engagement. In this regard, there is a need for scientific understanding of the pedagogical mechanisms for the formation of a student's virtual identity in the educational environment of a digital university, taking into account the current challenges and trends in the development of higher education.

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Analysis of recent research and publications. In contemporary scientific research, the challenges of digital transformation of institutions and educational environments are considered through the prism of changes in organizational models, management approaches, and behavioral practices of participants in the educational process. Thus, A. Krap, S. Bataiev, V. Kozub, N. Hlevatska, and others [1] analyze the impact of digital innovations on the transformation of modern management methods, emphasizing the role of digital technologies in changing the logic of how organizations function. The issue of digital transformation as a tool for optimizing processes and increasing sustainability is explored in the works of R. Lisova, O. Parfentieva, V. Dmytrovska, and S. Kyrylenko [2], which provides a basis for analyzing digital educational platforms as complex socio-organizational systems. In the context of higher education, O. I. Tymoshenko and S. M. Yahodzinskyi [3] study the digitalization of universities amid current challenges, emphasizing the need to create integrated digital educational environments.

Institutional and managerial aspects of implementing digital tools in public administration are covered in the work of V. Bielikov, M. Matveyeva, A. Salamakha, and V. Kharchun [4], which expands methodological approaches to analyzing digital transformations in educational institutions. The research by S. I. Kubiv, G. S. Lopushnyak, Y. I. Lenher, and A. Kozhyna [5] is devoted to assessing the innovation potential of European countries and shapes the macrocontext of the development of digital universities.

The behavioral aspects of students' choice of learning formats and their impact on educational outcomes are analyzed by G. Kortemeyer, N. Dittmann-Domenichini, and C. Merki [6], which is important for understanding the specifics of student participation in digital and hybrid environments. The conceptual foundations of digital transformation as a systemic process are presented by N. Verina and J. Titko [7]. The socio-pedagogical consequences of using digital technologies in distance education are considered by B. Williamson, R. Eynon, and J. Potter [8].

Empirical evidence of the impact of gamified mechanisms on learning outcomes and student engagement is provided in a longitudinal study by G. Lampropoulos and A. Sidiropoulos [9], which directly correlates with the issue of the formation of a student's virtual identity in the educational environment of a digital university.

The aim of the article. The main aim of this study is to provide a theoretical justification for the pedagogical foundations for the formation of a student's virtual identity in the educational environment of a digital university and to analyze the practical experience of implementing integrated digital tools as factors supporting learning activity, motivation, and sustainable educational interaction.

Presentation of the main material. Modern information technologies, in particular Internet resources, e-learning, and virtual educational environments, ensure that students have free access to the necessary information not only within their own university, but also in scientific, cultural, and information centers of the global educational space. Such access contributes to the formation of an independent, critically informed, and reasoned position on current issues, and also provides the opportunity for their comprehensive and multifaceted study. In modern conditions, information technologies are not opposed to traditional education, but act as its organic complement, expanding the didactic possibilities of the educational process and increasing its flexibility [1; 8].

The use of information and communication technologies in student training enhances the communicative focus of learning, creates conditions for intercultural interaction, promotes the development of information and communication competence, and increases the effectiveness of independent learning activities. In this context, the virtual educational environment as an innovative component of modern pedagogical practice is of particular importance. This environment should be understood as the combination of information content and communication capabilities of computer networks that are formed and used by all participants in the educational process for educational purposes. The functioning of a virtual educational environment is impossible without constant interaction and cooperation between the university administration, teachers, students, and specialists responsible for technical support and moderation of digital services [5; 7].

The integration of a virtual educational environment into university activities allows for an effective response to organizational challenges, in particular ensuring the continuity of the educational process in the event of the temporary absence of teachers, their participation in professional development programs, or academic mobility [6, p. 94]. At the same time, such an environment creates a basis for designing individual educational trajectories for students, taking into account their learning needs, pace of learning, and time constraints.

A practical example of the implementation of a virtual educational environment is the web version and mobile application of the EUni student account, launched in 2025 within the PHEI "European University," which provides integrated access to educational, communication, and service functions within a next-generation university (see Figure 1).

The operation of the EUni student account begins with the authentication module, which plays a fundamental role in providing personalized access to the resources of the virtual educational environment. This functional block covers user registration proce-



Fig. 1. Authentication interface in the web version of the EUni student account

dures, login via email and password, and account confirmation via a one-time code sent to the email address. This approach not only helps protect personal data but also fosters a responsible attitude among students toward their digital presence in the educational environment.

An important element of the module is the ability to select a user role, which ensures the correct identification of the student in the system and determines the logic of further interaction with the educational and service components of the platform. The implementation of the access recovery function enhances the resilience of the educational process, minimizing the risks of temporary exclusion of students from educational interaction due to technical or organizational reasons [4, p. 202]. In the pedagogical dimension, the authentication module is not only a technical tool, but also a means of institutionally consolidating the student's virtual identity, since it is from the moment of entering the system that their active participation in the university's digital educational environment begins [2; 3].

The next component of the virtual educational environment of the EUni student account is the functionality for selecting and assigning a study group, which ensures the institutionally correct integration of the student into the academic structure of the university (see Figure 2).

This module provides access to a hierarchically organized list of faculties and study groups formed in accordance with educational programs, levels of training, and forms of education, allowing students to identify their academic status in the digital educational space. The availability of search tools within this functional block optimizes navigation in the complex organizational architecture of a higher education institution and ensures the accuracy of the study group selection. The procedure for assigning an active group performs a system-forming function, since it determines the parameters of the student's further interaction with the educational environment, in particular, automatic synchronization with the schedule of classes, display of educational activity results, and access to relevant educational and communication resources.

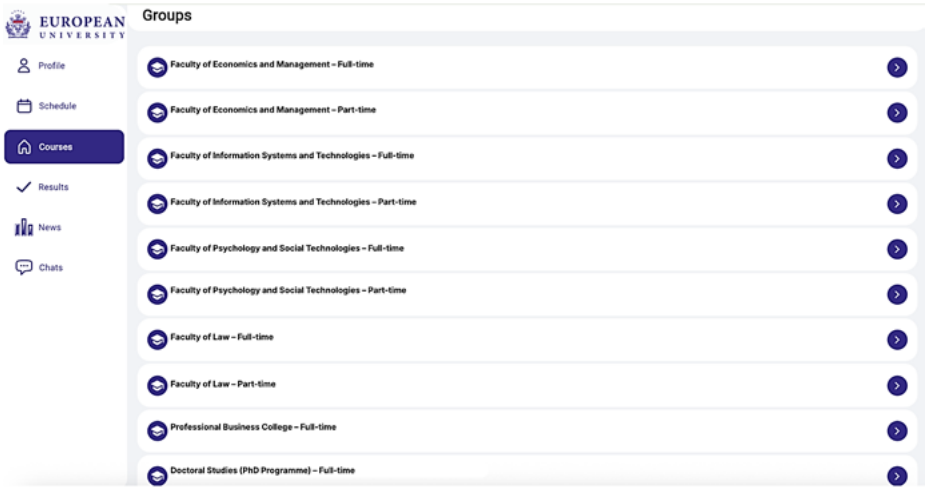


Fig. 2. Selecting and assigning a study group in the web version of the EUni student account

This functionality serves as a tool for the adaptive integration of a student into the university's academic structure, ensuring the alignment of an individual learning trajectory with a normatively organized educational process. This approach contributes to the institutional consolidation of the student's virtual identity, supports the structured nature of educational interaction, and creates the conditions for comprehensive digital support of learning within the educational institution.

The next functional component of the EUni student account is the schedule and attendance module, which ensures the systematic organization of learning activities within the digital educational environment (see Figure 3).

Automatic schedule generation based on assigned study groups allows for real-time updating of class information and ensures consistency between the university's academic structure and the student's individual learning pathway. Viewing classes in a daily format helps to organize the academic workload and supports the process of planning educational activities.

The attendance tracking feature is integrated into the overall logic of the educational process management and ensures objective accounting of student participation in classes, regardless of their format. Combining this function with the ability to integrate online classes via video conferencing platforms expands the functional boundaries of the schedule, ensuring continuity of educational interaction and adaptation to blended and distance learning formats.

The accrual of bonus points for attendance complements the learning activity tracking system with a motivational component aimed at encouraging regular student participation in the learning process. This is confirmed by empirical data, in particular, a study conducted by G. Lampropoulos and A. Sidiropoulos in 2024. Thus, gamified mechanisms, such as point accrual, progress indicators, badges, and role incentives, are considered as tools for managing behavioral engagement, as they transform participation in learning activities into a mode of continuous feedback and measurable progress. The longitudinal study compared the results of students in three learning environments over three academic years, 2021–2024 (online format, traditional format, and gamified format), with a sample of 1,001 higher education students. The authors note that the integration of gamification is associated with an increase in academic performance (success rate, excellence rate, average grade) and a decrease in the withdrawal rate, i.e., with better student engagement in learning.

The most significant effects were demonstrated in the practice-oriented (laboratory) component of the course: in the gamified format, there was a 13% increase in academic performance compared to traditional learning and a 39% increase compared to online learning, an increase in the proportion of "excellent" results by 23% and 130%, respectively, an increase in the average score by 11% and 24%, and an increase in student retention by 36% and 42%.

This logic of stimulating learning activity in EUni is reinforced by the integration of the student ID passport (EdID) functionality, which combines user identification tools with the platform's service and motivational infrastructure. The digital student card serves as a means of identification in the digital environment and, at the same time, acts as an interface for accessing ecosystem services – the store, order history, payments, and bonus accounting. The presence of an internal bonus currency formalizes incentives and allows motivational stimuli to be converted into a manageable reward mechanism, in which bonuses

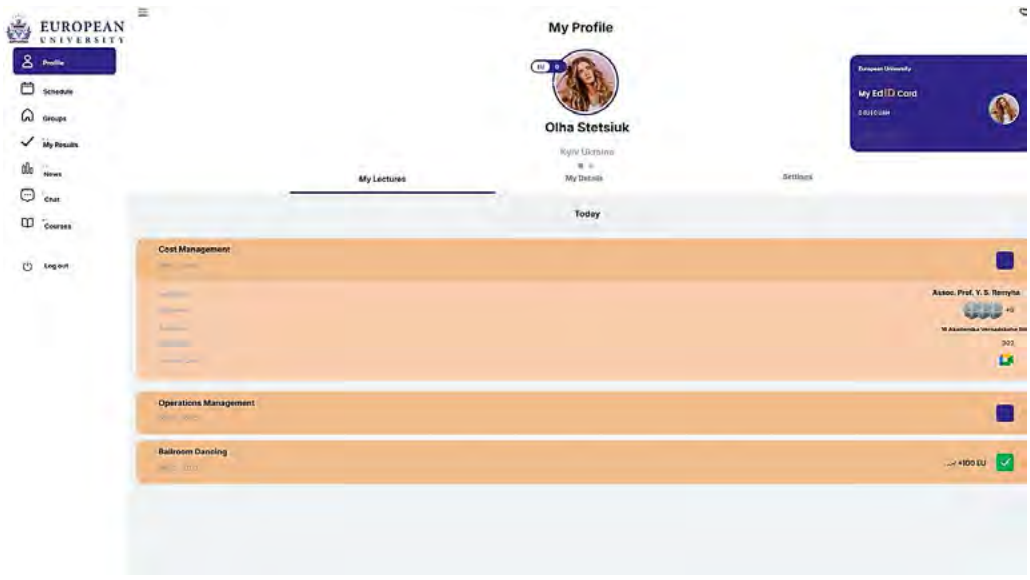


Fig. 3. Class schedule and attendance tracking in the web version of the EUni student account

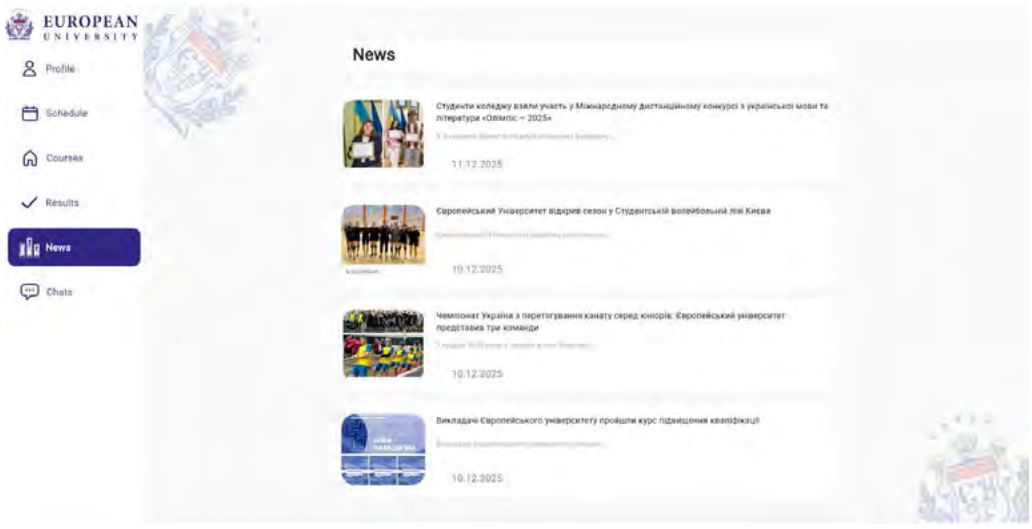


Fig. 4. Centralized news feed in the web version of the EUni student account

for attendance and activity can be converted into digital or material benefits available to students. The integration of payment systems (in the mobile version) reinforces the applied nature of this model, as it provides convenience for transactions and creates a single interface for student interaction with the platform's educational and service modules, which directly supports the process of forming a virtual identity as a sustained presence in the digital university environment.

The notification and settings functionality complements the overall architecture of the platform with tools for personalization and user experience management. The ability to select the interface language, configure notifications, and control system logout increases the transparency of user interaction with the digital environment and provides control over communication load. Customizable notifications (about schedule changes, course updates, results, transactions, or service events) serve as a mechanism for promptly synchronizing students with events in the educational process, and reduce the risk of missing important information in the high dynamics of digital interaction.

A centralized news and announcements feed implements the university's institutional digital communication with students, providing a chronological display of messages and access to full content (see Figure 4).

This approach minimizes the fragmentation of information channels, reduces information asymmetry between administrative units and students, and maintains stable communications within the digital university. The presence of a single announcement space simplifies the delivery of regulatory messages, organizational changes, and event announcements, ensuring consistency of communication with other platform modules (schedule, courses, services, and personal profile).

The pilot implementation of the EUni student account at the PHEI "European University" in 2025 made it possible to test practical mechanisms for digital support of learning activities and confirm the feasibility of comprehensive integration of educational, communication, service, and motivational modules within the virtual educational environment of the educational institution.

Conclusions and recommendations. The study substantiates that the virtual educational environment of a digital university is a system-forming factor in the transformation of modern higher education, combining educational, communication, organizational, and motivational components into a single digital architecture. The proposed model of a student account, implemented on the EUni platform, demonstrated the possibility of forming a student's stable virtual identity through the integration of authentication mechanisms, academic identification, learning activity management, gamification, and digital services. It has been established that the combination of schedule, attendance tracking, bonus incentives, digital student ID, and centralized communication channels creates conditions for continuous student participation in the educational process and increases their engagement in the academic environment.

The practical experience of the pilot implementation of the EUni student account at the PHEI "European University" in 2025 confirmed the feasibility of using comprehensive digital solutions for organizing the educational process, as well as their potential as tools for managing learning activities, motivation, and communication in a digital university environment. The results obtained indicate that the virtual educational environment is capable of performing not only a supporting but also an independent function in the structure of higher education,

gradually ensuring the implementation of a significant part of organizational and educational support tasks.

In the long term, it seems scientifically justified and appropriate to develop the concept of a university with a fully automated digital infrastructure, within which the main educational, management, and service processes are implemented automatically on the basis of digital platforms, artificial intelligence, and algorithmic systems without direct human involvement. This approach opens up new opportunities for scaling education, personalizing learning trajectories, optimizing costs, and ensuring the continuity of the educational process, while simultaneously promoting further interdisciplinary research on the pedagogical, ethical, and social implications of the complete digitalization of university education.

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Бобро Н. С. Педагогічні засади формування віртуальної ідентичності студента в освітньому середовищі цифрового університету

Статтю присвячено комплексному теоретико-аналітичному дослідженню педагогічних засад формування віртуальної ідентичності студента в освітньому середовищі цифрового університету. Актуальність теми зумовлена глибинними трансформаційними процесами у сфері вищої освіти, пов'язаними з поширенням цифрових платформ, автоматизованих сервісів і віртуальних освітніх середовищ, які змінюють характер участі студента в навчальному процесі та способи його взаємодії з університетським середовищем. За цих умов освітня взаємодія дедалі частіше відбувається у віртуальному просторі, де цифрові інструменти виконують функції не лише технічного посередника, а й чинника педагогічного впливу. Це актуалізує потребу переосмислення ролі студента як активного суб'єкта освітнього процесу в цифровому середовищі та визначення умов формування його стійкої освітньої присутності. У цих умовах віртуальна ідентичність постає як стійка форма освітньої присутності студента, що формується через системну взаємодію з цифровими інструментами навчання, комунікації та управління освітньою діяльністю. Метою статті є теоретичне обґрунтування педагогічних механізмів формування віртуальної ідентичності студента та аналіз практичного досвіду впровадження інтегрованого віртуального освітнього середовища у структурі університету. Методологічну основу дослідження становлять методи теоретичного аналізу, систематизації й узагальнення наукових підходів до цифровізації освіти, а також аналіз практичних результатів пілотної реалізації цифрової освітньої платформи. У статті охарактеризовано ключові функціональні компоненти віртуального освітнього середовища, зокрема механізми автентифікації та академічної ідентифікації, інструменти організації розкладу і обліку навчальної активності, гейміфіковані мотиваційні елементи, цифровий студентський ідентифікатор, сервіси персоналізації та інституційної комунікації. Показано, що саме узгоджене функціонування цих компонентів забезпечує цілісність освітнього середовища та впливає на

характер залученості студента до навчальної діяльності. Обґрунтовано, що інтеграція зазначених компонентів сприяє підвищенню залученості студентів, підтримує безперервність освітньої взаємодії та створює умови для формування усвідомленої й стабільної віртуальної ідентичності. Практичний досвід пілотної реалізації кабінету студента EUni у 2025 році підтвердив доцільність комплексного використання цифрових інструментів як елементів цілісного освітнього середовища. Окреслено перспективи подальшого розвитку цифрових університетських моделей, пов'язаних із розширенням автоматизованих освітніх і управлінських процесів.

Key words: *віртуальна ідентичність студента, віртуальне освітнє середовище, цифровізація вищої освіти, гейміфікація навчання, діджиталізація, цифровий університет.*

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