description of facts-the formulation of scientific problems; the development of hypotheses, new ideas, and propositions; the formation of a theory, and the organic incorporation of proven propositions.

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DIGITALIZATION OF HIGHER EDUCATION: INTEGRATION OF EDUCATIONAL SIMULATORS AND ARTIFICIAL INTELLIGENCE INTO THE PROFESSIONAL TRAINING SYSTEM

The article provides a comprehensive theoretical substantiation and analysis of the practical aspects of implementing artificial intelligence (AI) and educational simulators within the higher education system. The relevance of the study is driven by the urgent need to bridge the gap between traditional academic knowledge and the rapidly evolving requirements of the global digital labor market. The author explores the didactic potential of AI-driven simulators as sophisticated tools for modeling real-world professional scenarios, offering a risk-free environment for the systematic development of students' hard skills and decision-making abilities.

The research identifies the critical role of mobile applications in constructing flexible educational trajectories and ensuring seamless, ubiquitous access to interactive learning content. A comparative analysis between traditional teaching models and innovative simulation-based approaches is presented, highlighting the advantages of automated feedback and adaptive learning paths. The study details the architectural components of an intelligent educational ecosystem, including cognitive simulators, analytical modules based on Big Data, and mobile interaction platforms.

Significant emphasis is placed on the transformation of the educator's role, shifting from a primary source of information to an architect and moderator of a high-tech learning space. This transition necessitates the continuous development of teachers' digital competencies to manage AI-integrated processes effectively. The findings prove that the synergy of artificial intelligence, mobile technologies, and simulation modeling fosters deep personalization of the learning process. This integration not only enhances student engagement through gamification and SMART-structured tasks but also significantly improves the overall quality and efficiency of professional training for future specialists in various fields, from information technology to physical education and sports. The study concludes that the future of higher education lies in the harmonious balance between human pedagogical expertise and advanced algorithmic support.

Keywords: *higher education, digitalization, artificial intelligence, educational simulators, mobile applications, professional training, digital competence, personalized learning, educational technology, simulation modeling.*

Шинкарьова О. Д., Геревенко А. М., Шинкарьова Н. Г. Цифровізація вищої освіти: інтеграція освітніх симуляторів та штучного інтелекту в систему професійної підготовки.

У статті здійснено комплексне теоретичне обґрунтування та аналіз практичних аспектів впровадження штучного інтелекту та освітніх симуляторів у систему вищої освіти. Актуальність дослідження зумовлена необхідністю подолання розриву між теоретичним навчанням та вимогами сучасного цифрового ринку праці. Автори розкривають дидактичний потенціал ШІ-орієнтованих симуляторів як інструментів моделювання реальних професійних сценаріїв, що забезпечують безпечне середовище для формування hard skills. Визначено роль мобільних застосунків у побудові гнучких освітніх траєкторій та забезпеченні безперервного доступу до навчального контенту. У роботі представлено порівняльну характеристику традиційних та інноваційних моделей навчання, виокремлено ключові компоненти інтелектуальної освітньої екосистеми. Особливу увагу приділено трансформації ролі викладача та необхідності розвитку його цифрової компетентності в умовах глобальної технологізації. Доведено, що синергія штучного інтелекту, мобільних технологій та симуляційного моделювання створює умови для персоналізації навчання та суттєвого підвищення якості професійної підготовки майбутніх фахівців.

***Ключові слова:** вища освіта, цифровізація, штучний інтелект, освітні симулятори, мобільні додатки, професійна підготовка, цифрова компетентність, персоналізація навчання.*

Problem statement. The current stage of higher education development in Ukraine and globally is characterized by a global digital transformation, which necessitates a fundamental revision of methodological approaches to the professional training of future specialists. The rapid advancement of technologies associated with the Fourth Industrial Revolution (Industry 4.0) poses new challenges for higher education institutions: traditional academic models, oriented toward the passive acquisition of theoretical knowledge, are losing their effectiveness in a dynamic digital environment.

The primary contradiction lies in the growing gap between the theoretical training of students and the necessity of mastering high-tech practical skills (hard skills) combined with digital competence. In the context of distance and blended learning, there is an urgent need to create educational environments that allow for the modeling of real-world professional situations without risk or significant resource expenditure.

Educational simulators, combined with artificial intelligence algorithms, emerge as an innovative solution to this problem. They provide an immersive learning experience, facilitate the implementation of the «learning by doing» concept, and offer instantaneous intelligent analysis of a learner's actions. However, the integration of these technologies into the higher education system remains fragmented. This necessitates a scientific substantiation of comprehensive professional training models that combine simulation technologies and AI analytics to enhance the overall quality of the educational process.

Literature review. The transformation of higher education in the context of global digitalization is a subject of active scientific discussion. As noted by O. O. Arshava et al. (2025) [1], the implementation of digital technologies not only creates new opportunities for the educational space but also presents higher education institutions (HEIs) with complex challenges that require a revision of the existing experience in implementing innovations. A crucial aspect of this process is the development of digital competencies among educators themselves, which is considered in the works of R. R. Storonskyi et al. (2025) [11] as a key factor in modernizing education within the context of the globalization of the educational environment.

The theoretical and methodological foundations for using interactive teaching methods based on digital technologies were established in the research of O. A. Hryshchenko (2021) [6], while I. P. Honcharova (2023) [5] emphasizes digitalization as a means of improving the accessibility and efficiency of learning.

Furthermore, O. O. Kalinichenko and H. P. Hryban (2025) [7] have demonstrated that artificial intelligence can significantly enhance the effectiveness of physical training, ensure student safety, and increase motivation for regular physical education activities.

The research by Yu. Safonov and O. Korotun (2024) [9] emphasizes the dynamics of teaching technologies and methodologies in Ukraine, while O. Stoika and D. Mateichuk (2023) [10] analyze modern approaches to integrating these tools directly into the educational process of higher education institutions (HEIs).

Educational simulators occupy a special place in the structure of professional training. A. M. Herevenko (2024) [2; 3] provides a detailed substantiation of the technology for creating such simulators using artificial intelligence, which allows for the modeling of complex professional scenarios. This is complemented by studies on the use of mobile applications and tools as interactive learning instruments, which ensure mobility and the personalization of the student's educational track [1; 2].

It is important to note that digitalization also encompasses practice-oriented fields. The introduction of digital tools in physical culture and sports [4], as well as the analysis of non-traditional fitness technologies [11], demonstrate the universality of this technological approach. Despite the significant advantages, the use of IT solutions is accompanied by certain challenges, as pointed out by I. M. Kovalchuk (2022) [8] and O. Korotun (2024) [9], who stress the need for a balanced approach to tool selection.

Thus, the literature analysis confirms that the synergy between educational simulators and artificial intelligence is a logical stage in the evolution of higher education; however, it requires further detailing in terms of developing specific algorithms for their integration into the professional training system.

The aim of the article is to provide a theoretical substantiation and develop the conceptual foundations for integrating educational simulators and artificial intelligence technologies into the professional training system for students of higher education institutions. This integration is designed to enhance the quality of practical training and foster the digital competencies of future specialists.

Presentation of the main research material. The process of digitalization in higher education today goes beyond the simple use of electronic resources, transforming into the creation of complex intelligent systems. As noted by O. O. Arshava et al. (2025) [1], modern challenges require higher education institutions not merely to adapt to digital conditions but to actively implement innovations capable of fundamentally changing the student experience. A central element of such

modernization is the integration of artificial intelligence (AI) into the structure of educational simulators, which allows for the implementation of a personalized model of professional training.

According to research by A. M. Herevenko (2024) [3], educational simulators emerge as a digital environment that reproduces real-world professional scenarios. The use of AI in their development enables the creation of «non-linear» learning trajectories: the system analyzes a student's actions in real-time and adapts the difficulty of the task depending on their mistakes or successes. This ensures high learning efficiency, as the student gains the opportunity to repeatedly practice skills in a safe virtual space, which is particularly relevant for practice-oriented disciplines.

Mobile applications are a vital component of this ecosystem. A. M. Herevenko (2023, 2024) [2; 3] substantiates that learning mobility and the use of interactive applications increase student engagement, allowing them to interact with educational content both synchronously and asynchronously. In combination with simulators, mobile technologies ensure the continuity of professional training, transforming the smartphone into a personal «learning laboratory». This aligns with the findings of I. P. Honcharova (2023) [5] regarding the improvement of educational accessibility through digitalization.

The implementation of such technologies is observed even in fields traditionally considered conservative toward digitalization. For instance, the use of digital tools in physical culture and sports [4] or the application of non-traditional fitness technologies [11] demonstrates that simulation learning and AI analytics are capable of optimizing training processes and monitoring the physical condition of students. As noted by Yu. Safonov and O. Korotun (2024) [9], such multi-disciplinarity of methods is a characteristic feature of the modern transformational economy.

However, the successful implementation of this model is impossible without developing a high level of digital competence among educators. R. R. Storonskyi et al. (2025) [11] rightly observe that within this system, the teacher transforms into a moderator of a high-tech process. The educator must not only master the tools for creating simulators but also understand the ethical and didactic boundaries of applying artificial intelligence. This enables the mitigation of challenges pointed out by I. M. Kovalchuk (2022) [8] and O. Stoika (2023) [10], specifically the risks of learning dehumanization and technological dependency.

To visually compare the effectiveness of implementing innovative tools in the educational process, a comparative characteristic of traditional and simulation models was developed (table 1). This table substantiates the feasibility of transitioning to new methods.

Table 1.

Comparative characteristics of traditional and simulation-based professional training models in HEIs

Comparison parameter	Traditional learning model	Model based on AI simulators and mobile applications
Learner's Role	Passive recipient of knowledge	Active researcher («Learning by doing»)
Feedback	Delayed (after instructor's review)	Instantaneous (automated AI error analysis)
Safety and risks	Potential for errors in real-world conditions	Safe virtual environment for testing solutions
Accessibility	Limited by schedule and classroom location	24/7 accessibility via mobile devices and cloud services
Personalization	Averaged approach for the entire group	Dynamic adaptation of complexity to the learner's level
Sources (base)	Traditional textbooks	E-courses, simulators (Herevenko, 2024)

Results and discussion. An analysis of the data presented in Table 1 suggests that the transition to a simulation-based learning model does not merely change the technical means of knowledge transfer but fundamentally transforms the didactic triangle of «teacher – student – educational content». The key advantage lies in shifting the focus from passive observation to active manipulation of professional objects within a digital space.

The mechanism of instantaneous feedback, implemented through artificial intelligence, is of particular significance. This facilitates the realization of the «right to make a mistake» concept, where a failed attempt in the simulator does not lead to a psychological barrier or physical risks; instead, it becomes a source for additional analysis and skill improvement. This approach correlates with research on reducing psychological stress and increasing student engagement through gamified and SMART-structured tasks.

Thus, simulation technologies serve not only as a means of visualization but as a foundation for fostering the professional subjectivity of the future specialist, where digital competence develops in parallel with core professional skills.

The realization of the outlined advantages of simulation-based learning requires a clear technological structuring of the educational environment. The integration of artificial intelligence into higher education is not a chaotic implementation of isolated services; it is the construction of a holistic ecosystem where each component performs its specific didactic function.

The development of educational simulators must be based on a combination of digital online tools that provide interactivity and intelligent modules responsible for content adaptability. To provide a detailed understanding of such a system's architecture, its primary components have been systematized (table 2).

Table 2

Components of the digital professional training system based on AI and simulation technologies

System component	Technological solution	Educational function

Cognitive simulator	Artificial intelligence (generative AI)	Creating adaptive professional activity scenarios
Mobile platform	Mobile applications (apps)	Ensuring interactivity and asynchronous access
Analytical module	Big Data & AI analytics	Digital footprint monitoring and performance forecasting
Virtual laboratory	Educational simulators	Hard skills development in a risk-free environment
Control block	Automated tests and quests	Objective assessment based on SMART criteria

The presented structure demonstrates that digital professional training is a multi-layered process, where mobile applications serve as the connective link between the student and an intellectual knowledge base. According to the views of R. R. Storonskyi et al. (2025) [11], the functioning of such a system requires faculty members to possess not only end-user skills but also the capacity to act as architects of the digital educational space.

It is worth emphasizing that the integration of AI analytical modules and virtual laboratories enables the implementation of the «transparent learning» concept, where the educator receives an objective picture of each learner's competency development. This confirms the opinion of I. P. Honcharova (2023) [5] that digitalization is the most effective means of increasing the transparency and quality of education. The synergy of these components ensures a transition from the quantitative accumulation of knowledge to the qualitative mastery of professional tools, which is the ultimate goal of modernizing Higher Education Institutions (HEIs) amidst global transformations.

Thus, the integration of simulators and AI into the higher education system creates a synergetic effect: the learner gains practical experience, AI provides personalized support, and mobile technologies ensure the flexibility of the process. This establishes the foundation for training a new type of specialist – one capable of rapid adaptation within the conditions of the global digital labor market.

Proposed algorithm for integrating digital tools. Based on the conducted research and analysis of technological capabilities, we propose the following algorithm for integrating digital tools into the educational process.

- Utilize generative AI to create professional situational scenarios that include «critical decision points».
- Organize simulator content according to microlearning principles, ensuring each module is accessible via mobile application and requires no more than 10-15 minutes to complete.
- Implement cloud platforms for simulators that do not require high processing power from student's personal devices (bring your own device approach).
- Integrate AI chatbots as digital assistants to provide 24/7 prompts and guidance during independent work within the simulator.
- Shift the grading system from evaluating only the final result to analyzing the «error-correction process» captured by the simulator's analytical module.
- Conduct regular workshops for educators on updating digital simulator content using online tools that require no programming knowledge (no-code technologies).
- Use the simulator as a mandatory pre-requisite for physical practice or laboratory work. Access to real equipment or objects is granted only after the successful completion of the virtual scenario.

Conclusions. The study establishes that the digitalization of higher education at its current stage is a systemic process requiring the integration of high-tech tools into the traditional professional training framework. The analysis leads to the following conclusions.

Digital technologies, specifically educational simulators and Artificial Intelligence, transform the learner's role from a passive recipient of information to an active subject of professional activity. This bridges the gap between theoretical foundations and the practical demands of the modern labor market, aligning with the challenges of Industry 4.0. It is demonstrated that educational simulators developed using digital online tools create a safe and immersive environment for mastering professional skills. The application of AI within these systems ensures dynamic scenario adaptability and instantaneous feedback, significantly intensifying the learning process.

The synergy between mobile applications and AI analytics enables the realization of continuous and personalized learning. Mobile apps serve as a user-friendly interface for interacting with complex simulation platforms, ensuring the flexibility of the educational trajectory.

Implementing these innovative models requires faculty members to possess more than just basic IT literacy; it demands the development of specific digital competencies to effectively manage a high-tech educational environment.

Future research directions. Prospects for further study include exploring the integration of Virtual Reality (VR) and Augmented Reality (AR) into AI-driven simulator structures. Additionally, there is a need to develop sector-specific methodologies for using AI to assess the soft skills of future specialists during simulation-based training. Special attention should also be given to creating unified national platforms for exchanging digital educational content between higher education institutions.

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DISCLOSURE OF RESOURCES AND COMPONENTS THAT INFLUENCE THE HEALTH OF MODERN YOUTH

A person's life depends on the health of the body and the extent to which its psychophysiological potential is utilized. All aspects of human life across a broad spectrum of social lifeproduction, labor, socioeconomic, political, family, spiritual, health, and educationalare ultimately determined by health. According to the structure of the relative weight of factors determining health risks, the most significant factor is "Lifestyle," accounting for 49-53% of health. This factor includes harmful working conditions, poor living conditions, stress, physical inactivity, unstable families, loneliness, low educational and cultural levels, excessive urbanization, unbalanced and irregular diet, smoking, alcohol and drug abuse, and many others. In second place is the "Genetics and Human Physiology" factor, determining health by 18-22%. This factor includes a predisposition to hereditary and degenerative diseases. The "External Environment" factor ranks third, determining health by 17-20%. Natural and climatic conditions include air, water, and soil pollution with carcinogens and other substances, sudden changes in atmospheric conditions, and increased solar, magnetic, and other radiation. The fourth-ranked factor is "Healthcare and Medical Activity," determining health by 8-10%. These include the ineffectiveness of personal hygiene and public preventive measures, poor quality of medical care, and the untimeliness of its provision. According to the World Health Organization, "health" is a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity. However, this definition cannot be used to assess health at the population or individual level. According to the World Health Organization, in health statistics, health at the individual level is defined as the absence of identified disorders and diseases, and at the population level, as the process of reducing mortality, morbidity, and disability.

Key words: *Health, lifestyle, positive and negative factors, risks, students, solutions.*

Сироватко Зоя. Розкриття ресурсів та компанентів маючих вплив на стан здоров'я сучасної молоді. *Життя людини залежить від здоров'я організму та ступеня використання його психофізіологічного потенціалу. Усі аспекти людського життя в широкому спектрі соціального життя-виробничому, трудовому, соціально-економічному, політичному, сімейному, духовному, медичному та освітньому - зрештою визначаються здоров'ям. Згідно зі структурою відносної ваги факторів, що визначають ризики для здоров'я, найбільш значущим є*