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забезпечувати дотримання економічної співпраці країн; тощо. Фінансова довіра у глобальній економіці не фокусується тільки на фінансовій системі, вона охоплює питання торгівлі, інвестування, тому є каталізатором глобальної економічної інтеграції.

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DIGITAL TRANSFORMATION OF VOCATIONAL EDUCATION IN THE CONTEXT OF DYNAMIC LABOR MARKET CHANGES

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Abstract. The rapid digitalization of the economy, automation, and the development of artificial intelligence are fundamentally transforming the labor market and increasing demands for new professional competencies. In this context, traditional vocational education and training systems are often unable to respond flexibly and quickly to changing labor market needs. Digitalization of vocational education is therefore viewed as a strategic response to these challenges. The integration of digital learning platforms, MOOCs, simulation environments, and virtual reality technologies

enhances accessibility, flexibility, and practice-oriented skill development. The article also examines the role of adaptive and personalized learning, cooperation with employers through dual education models, the development of soft skills, lifelong learning, innovative assessment methods, and inclusivity. The purpose of the study is to analyze key directions of digital transformation in vocational education as a means of improving employability and aligning training outcomes with labor market requirements.

Keywords: Digital vocational education; labor market; adaptive learning; employability; lifelong learning; digital skills

The rapid development of digital technologies, automation of production processes, and the active implementation of artificial intelligence are driving fundamental changes in the structure of the modern labor market. Professional activity is increasingly associated with digital competencies, the ability to quickly acquire new knowledge, and adapt to constant technological and organizational changes. In this context, the professional training system faces the need for transformation, as traditional educational models often do not provide sufficient flexibility, speed of content updates, or alignment with the real needs of employers.

The existing gap between professional training outcomes and labor market requirements manifests itself in a shortage of qualified personnel in high-tech sectors, while simultaneously there is an increase in the share of workers with outdated or irrelevant competencies. This actualizes the search for new approaches to organizing professional training, oriented toward practical skills, interdisciplinarity, and continuous human capital development. Digitalization of professional training is considered one of the key mechanisms for addressing these challenges. The use of digital educational platforms, massive open online courses (MOOCs), simulation environments, and virtual and augmented reality technologies creates conditions for modernizing the educational process, expanding access to training, and enhancing its effectiveness. Adaptive and personalized educational solutions are particularly important, allowing consideration of individual learner characteristics and the formation of competencies demanded by the labor market. At the same time, the effectiveness of digital transformation in professional training largely depends on the level of interaction between educational institutions and employers, the development of dual education, integration of soft skills, implementation of modern assessment models, and ensuring inclusivity in educational processes. A comprehensive analysis of these aspects is a necessary prerequisite for forming an effective professional training system in the digital economy.

The purpose of this article is to provide a comprehensive analysis of the digitalization of professional training as a response to the transformations of the modern labor market, particularly assessing the role of digital educational technologies, adaptive and personalized learning, cooperation with employers, the development of soft skills, lifelong learning, innovative approaches to assessing learning outcomes, and ensuring inclusive access to professional education.

The modern labor market is undergoing deep transformations driven by the digitalization of the economy, automation of production processes, development of

artificial intelligence, and globalization. These processes significantly change the requirements for workers' professional competencies, highlighting the need for new approaches to professional training. Traditional models of workforce preparation increasingly prove to be insufficiently flexible and slow to respond to structural changes in employment, leading to a growing mismatch between labor supply and employer demand. As noted by Bond et al. (2018) and Hodges et al. (2020), classical educational institutions fail to adapt their curricula and teaching methods to the dynamics of the digital economy, which exacerbates the gap between education and the labor market.

In this context, the digitalization of professional training is considered a strategic response to the challenges of the modern labor market. The use of digital educational platforms, MOOCs, simulation environments, virtual and augmented reality creates opportunities for forming relevant professional skills, increasing access to training, and individualizing educational trajectories. Studies by Radianti et al. (2020) and Zawacki-Richter et al. (2019) demonstrate that digital technologies not only facilitate knowledge transfer but also simulate complex professional situations, which is especially important for practice-oriented specialties. In particular, VR and AR technologies provide a safe environment for skill development in high-risk sectors.

The development of adaptive and personalized learning is of particular importance, based on the use of data analysis algorithms and artificial intelligence. Aleven et al. (2016) and Marougkas et al. (2022) emphasize that adaptive educational platforms allow the formation of individual learning trajectories depending on learners' skill levels, learning pace, and professional goals. This helps reduce the competency gap and increases the efficiency of investments in human capital. Additionally, Wang et al. (2023) demonstrate that the use of AI-driven adaptive systems has a positive impact on graduates' subsequent employment outcomes.

At the same time, digital transformation in professional training cannot be effective without close cooperation with employers. In this context, dual education, internships, and on-the-job training play a key role. Mahfud et al. (2025) show that active employer involvement in curriculum development increases the relevance of training and reduces the period of professional adaptation for graduates.

Contemporary research also emphasizes the growing role of soft skills as an integral component of professional competence. According to Heckman and Kautz (2012), non-cognitive skills significantly influence long-term employment and career success. Succi and Canovi (2020) and Robles (2012) note that digital educational environments create new opportunities for developing communication skills, critical thinking, and teamwork through project-based learning and interactive online formats.

Moreover, the concept of lifelong learning is considered a key condition for workers' adaptability in the face of constant technological changes. Wheelahan and Moodie (2021) stress that micro-credentials and short-term digital programs allow rapid updating of competencies and responsiveness to changing professional demands. Digital learning formats lower access barriers and make lifelong learning a realistic strategy for a broad population.

An important aspect of digitalization is the transformation of approaches to assessing learning outcomes. Fawns et al. (2026) and Kato et al. (2020) emphasize the

advantages of competency-based assessment models, digital certifications, electronic portfolios, and micro-credentials, which provide greater transparency for employers and more accurately reflect learners' real professional skills.

Digitalization also opens new opportunities to ensure inclusivity in professional training. Kett et al. (2021) demonstrate that online learning formats expand access to education for people with disabilities, internally displaced persons, and residents of remote areas. At the same time, the authors stress the need to develop adapted digital solutions and digital equity policies to avoid deepening social inequality.

Thus, the review of contemporary scientific publications shows that the digitalization of professional training is a complex process that combines technological innovations, adaptive educational models, close cooperation with employers, soft skills development, lifelong learning, innovative approaches to assessment, and inclusivity. This systemic approach ensures that professional training aligns with the requirements of the modern labor market and enhances employment effectiveness (Table 1).

Table 1 Key areas of digitalization of professional training

Areas	Main tools	Impact on the labor market
Digital Platforms and MOOCs	Online courses, LMS, virtual laboratories	Increased accessibility and flexibility of learning
VR/AR and Simulations	Virtual simulators, simulation environments	Development of practical skills without risks
Adaptive Learning	AI algorithms, learning analytics	Reduction of the competency gap
Dual Education	Internships, workplace learning	Increased employability
Soft Skills Development	Project-based and team learning	Enhanced worker adaptability
Lifelong Learning	Micro-credentials, online certifications	Professional mobility and resilience
Inclusiveness	Remote formats, adapted platforms	Expanded participation of vulnerable groups

The digitalization of professional training in contemporary conditions is emerging not only as a technological upgrade of the educational process but also as a comprehensive transformation of approaches to human capital development in accordance with labor market demands. The conducted analysis indicates that digital tools substantially change the logic of professional preparation, ensuring its flexibility, accessibility, and practical orientation. The use of online platforms, simulation environments, and virtual reality technologies allows for the modeling of real professional situations and the development of skills directly relevant to the modern economy.

An important outcome of digitalization is the development of adaptive and personalized learning, which contributes to reducing the imbalance between existing employee competencies and employer needs. Personalized educational pathways increase the efficiency of learning, shorten training time, and promote faster integration of graduates into the labor market. Combined with dual education and active

collaboration with employers, this creates conditions for a closer connection between education and the economy.

The development of soft skills plays a particular role in modern professional training, ensuring worker adaptability to constant changes and uncertainty. Digital educational environments open new opportunities for cultivating these skills through project-based activities, teamwork, and interactive simulations. At the same time, the concept of lifelong learning becomes a necessary condition for maintaining workforce competitiveness, and digital formats make it practically achievable.

The transformation of learning outcomes assessment systems and the development of digital certifications, micro-credentials, and e-portfolios contribute to increasing transparency and trust from employers. Alongside this, digitalization creates potential for expanding the inclusiveness of professional training, providing access to education for vulnerable groups. However, realizing this potential requires well-thought-out digital equity policies and adapted educational solutions.

Future research prospects are linked to the empirical evaluation of the impact of specific digital tools on employment outcomes, analysis of the effectiveness of collaboration models between educational institutions and employers, and the study of long-term socio-economic effects of digitalization in professional training. Particular attention should be paid to researching the role of artificial intelligence in managing educational pathways and developing new models of human capital development in the digital economy.

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ВАЛЮТНІ ТА ІНВЕСТИЦІЙНІ ІНСТРУМЕНТИ ВІДБУДОВИ УКРАЇНИ: ФІНТЕХ-ТРАНСФОРМАЦІЯ

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Сучасна цифрова економіка України перетворилася на комплексну, взаємопов'язану екосистему. У цій економічній моделі хмарні обчислення, великі дані та цифрові алгоритми на основі штучного інтелекту, набули статусу критичного фактору виробництва. Особливістю такого цифрового шляху розвитку є крос-галузева конвергенція, коли цифрові рішення забезпечують: точне землеробство в агросекторі, стійкість банківської системи, ефективність