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**EDUCATIONAL INNOVATIONS DURING THE WAR:
THE DEVELOPMENT OF DISTANCE LEARNING IN UKRAINE**

Abstract. *The article examines the current state and transformations of the higher education system in Ukraine under martial law, with a focus on the development of distance learning as a key tool for ensuring the continuity of the educational process. The dynamics of the number of educational institutions and students from 2021 to 2024, as well as the financial indicators of the institutions' activities, are analyzed. Innovative technologies and psychological and technical support are described that ensure the effectiveness of the distance learning format. The work proposes a strategy of combining distance learning with formal employment as a mechanism for overcoming staff shortages, increasing the competitiveness of students, and preserving the country's educational potential.*

Keywords: *distance learning, martial law, digital technologies, personnel shortage, educational reforms, education development strategy.*

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**ОСВІТНІ ІННОВАЦІЇ ПІД ЧАС ВІЙНИ:
РОЗВИТОК ДИСТАНЦІЙНОГО НАВЧАННЯ В УКРАЇНІ**

Анотація. *У статті досліджено сучасний стан та трансформації системи вищої освіти України в умовах воєнного стану, зокрема розвиток дистанційної освіти як ключового інструменту забезпечення безперервності освітнього процесу. Проаналізовано динаміку кількості освітніх закладів і студентів у 2021–2024 рр., а також фінансові показники діяльності установ. Охарактеризовано інноваційні технології, психологічну й технічну підтримку, що забезпечують ефективність дистанційного формату. Автором запропоновано стратегію поєднання дистанційної освіти з офіційним працевлаштуванням як механізм подолання кадрового дефіциту, підвищення конкурентоспроможності студентів і збереження освітнього потенціалу країни.*

Ключові слова. *дистанційна освіта, воєнний стан, цифрові технології, кадровий дефіцит, освітні реформи, стратегія розвитку освіти.*

Introduction. In today's world, the educational process is undergoing unprecedented transformations caused by the development of digital technologies, socio-economic changes, and global crises. Innovative approaches to learning have become particularly relevant, with distance learning becoming a key tool for ensuring the continuity of the educational process. In the context of the war in Ukraine, distance learning has become not only a forced alternative to traditional forms of education, but also a means of maintaining access to education, developing professional competencies, and supporting social stability. That is why a more detailed analysis of distance education in the context of war is a relevant topic for further study.

Both domestic and foreign scientists have actively researched the issue of distance learning development. In particular, V.V. Savitska [1] emphasizes the role of digital technologies in modernizing the educational process, while K.A.A. Gamage, R.G.G.R. Pradip, V. Nadjanadovich-Visak and N. Gunawardana [2] emphasize the need for flexible educational models during crises. G. Kuzan [3] and A. Krasulia, M. Platonova, T. Smirnova, L. Ilyinskaya [4] emphasize the importance of psychological support for learners and the development of teachers' digital competence during the pandemic and war. At the same time, international experience demonstrates the effectiveness of combining learning with practical activities,

which helps students adapt more quickly to the labor market in unstable conditions. Despite numerous studies, the issue of integrating distance learning with parallel employment as an element of a sustainable education system during wartime remains insufficiently explored. That is why a strategy for distance learning, combining education and work, is proposed, which can be an effective response to the personnel shortage in Ukraine and simultaneously contribute to the professional self-realization of young people.

Problem statement (formulation of the research objective). The purpose of the article is to analyze the general state of higher education in Ukraine and the peculiarities of distance learning under martial law, and to propose a strategy for improving distance learning that takes into account the needs of the economy and the labor market.

Research results (presentation of the main material). Therefore, before proceeding to the analysis of distance learning in Ukraine, it is proposed to consider in more detail the peculiarities of the educational process in the country. Over the past few decades, education in Ukraine has undergone significant reforms and transformations. The country's education system, historically shaped by its Soviet past, is now adapting to global educational standards in an effort to enhance the quality of education, expand access to knowledge, and align it with European norms.

The structure of education in Ukraine is shown in Table 1.

Table 1

Characteristics of the Ukrainian education structure

Type of education	Characteristics
Preschool education	Available to children from the age of three, preschool education is provided in kindergartens.
Primary education	Compulsory education begins at the age of six and lasts for four years.
Secondary education	It is divided into two cycles: lower secondary (grades 5–9) and upper secondary (grades 10–11). After completing secondary education, students can enroll in vocational schools, technical colleges, or universities.
Higher education	Offered at universities, academies, and institutes, it is divided into two main levels: bachelor's degree (4 years) and master's degree (2 years).

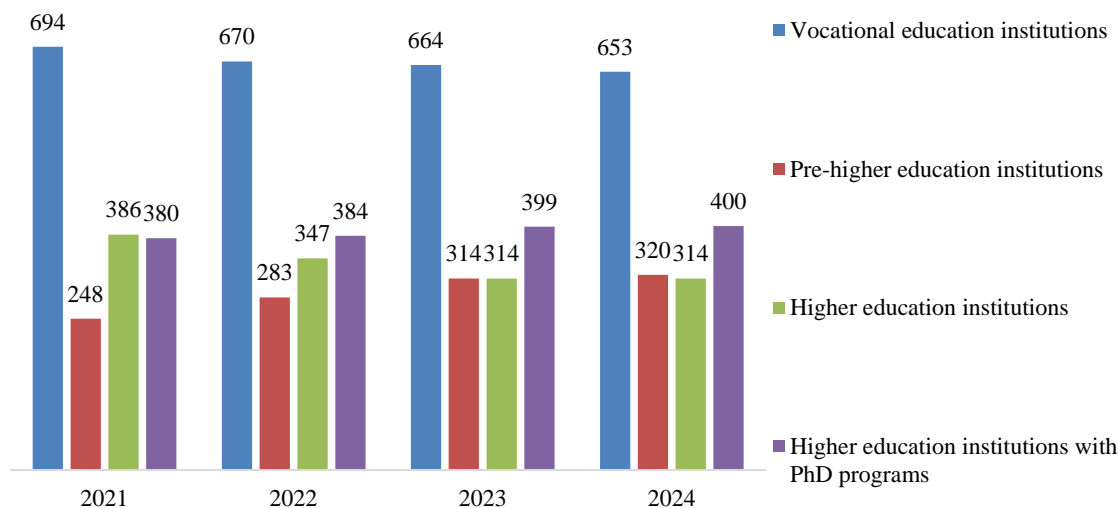
Source: developed by the authors based on [5, 6].

It is worth noting that Ukraine is seeking to integrate its education system with European Union standards, particularly through the Bologna Process, which aims to harmonize degree structures and qualifications across the European Union. Therefore, having determined the importance of higher education and education in general, we propose to analyze the development of education in Ukraine.

Fig. 1 shows the dynamics of higher education institutions in Ukraine.

Analyzing the data in Fig. 1, one can observe that during the period 2021–2024, significant structural changes occurred in the higher and vocational education system. There has been a reduction in the number of vocational education institutions, from 694 in 2021 to 653 in 2024, resulting from the optimization of the educational institution network and the loss of military infrastructure. A similar trend is characteristic of higher education institutions, the number of which has decreased from 386 to 314, indicating the consolidation of universities and a transition to a more concentrated educational model. At the same time, vocational pre-higher education institutions are showing steady growth, increasing from 248 in 2021 to 320 in 2024, which may be due to increased demand for applied specialties and a shift away from mobilization. Against this backdrop, the number of higher education institutions offering postgraduate programs is also growing, increasing from 380 in 2021 to 400 in 2024, indicating

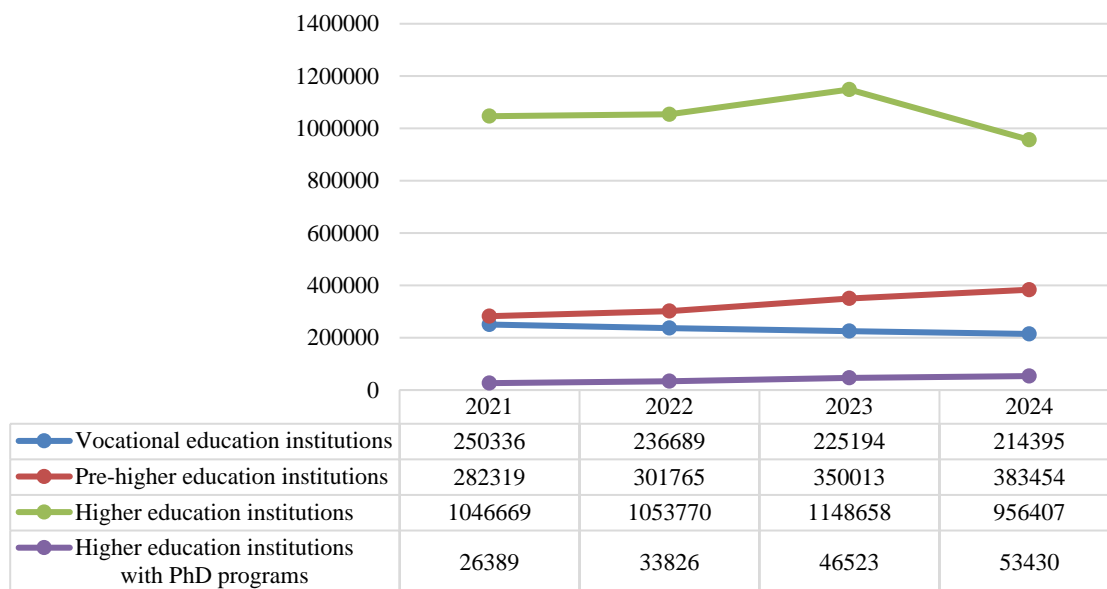
significant demand among Ukrainians in connection with the intensification of mobilization measures.



Source: developed by the authors based on [7].

Figure 1. Dynamics of the number of higher education institutions in Ukraine by type in the period 2021-2024, units

Next, we propose studying the dynamics of the number of students in higher education institutions who studied during the period from 2021 to 2024 (Fig. 2).



Source: developed by the authors based on [7].

Figure 2. Dynamics of the number of students in Ukraine by type of educational institution for the period 2021-2024, persons

An analysis of Fig. 2 reveals an overall decline in the number of students in vocational education institutions, from 250,336 persons in 2021 to 214,395 in 2024. This decline may be attributed to reductions in manufacturing enterprises, youth migration, and a decline in the prestige of blue-collar professions. At the same time, the number of students in pre-higher vocational education institutions has increased significantly – from 282,319 to 383,454 persons

– which indicates an increase in demand for short-term practical educational programs that allow students to quickly acquire a profession and find employment, even during wartime.

The dynamics in higher education are particularly noteworthy, as in 2023, the number of students reached a peak of 1,148,658, the highest figure for the period under review. This increase is partly explained by the intensification of mobilization processes, as obtaining an education provides a deferral from conscription. However, in 2024, there was a slight decline to 956,407 students, which may indicate a stabilization of this process and an outflow of some young people abroad. At the same time, the number of postgraduate applicants is constantly growing – from 26,389 in 2021 to 53,430 in 2024, which demonstrates an increased interest in scientific activity and a desire to continue studying in safer conditions.

Thus, the general trend indicates a reorientation of the educational priorities of Ukrainian youth, with the role of higher and pre-higher education growing as a means of maintaining social stability, promoting professional development, and ensuring legal protection during wartime.

Next, we propose assessing the general economic indicators of educational institutions in our country (Table 2).

Table 2

**Key performance indicators of educational institutions
in Ukraine and their dynamics in 2021–2023**

Indicators	Years			Change 2023 to 2021	
	2021	2022	2023	+/-	%
Revenues from sales (goods, services), million UAH	16650	5732	7756	-8894	-53,42
Average annual value of non-current assets, million UAH	4189,01	4133,70	4343,86	155	3,70
Average balance of current assets, million UAH	4357,07	4350,25	5525,83	1169	26,82
Average annual value of equity capital, million UAH	1898,27	1393,92	1641,13	-257	-13,55
Number of employees, thousand persons	27	21	23	-4	-13,95
Return on assets	3,97	1,39	1,79	-2	-55,08
Asset intensity	0,25	0,72	0,56	0	122,60
Capital-labor ratio	155,60	193,22	187,51	32	20,51
Current asset turnover ratio	3,82	1,32	1,40	-2	-63,27
Duration of one turnover	94,21	273,20	256,48	162	172,25
Labor productivity	618,44	267,94	334,81	-284	-45,86
Net profit, million UAH	126,68	-208,85	-74,03	-201	-158,43
Operating profit margin, %	5,5	29	-7,2	-13	X
ROE, %	3,02	-5,05	-1,70	-5	X
ROA, %	2,91	-4,80	-1,34	-4	X
ROE, %	6,67	-14,98	-4,51	-11	X

Source: developed by the authors based on [8].

Therefore, based on the analysis of Table 2, the following conclusions can be drawn: in the period 2022–2023, there was a decrease in revenue from the sale of educational services, which was caused by the russian military attack and the closure of universities. The cost of equity also decreased during this period, indicating financial difficulties in 2022 and 2023. Additionally, during the period 2022–2023, educational institutions incurred significant losses, which negatively impacted their profitability indicators. In conclusion, it is worth noting that

Ukrainian educational institutions are still recovering from the events of 2022. However, they continue to face challenges related to profitability and resource efficiency.

The education system in Ukraine is undergoing significant transformations, particularly in the context of martial law, which has accelerated the development of distance learning and substantially altered educational processes. Therefore, Table 3 provides a general description of the characteristics of distance learning in Ukraine in the context of war.

Table 3

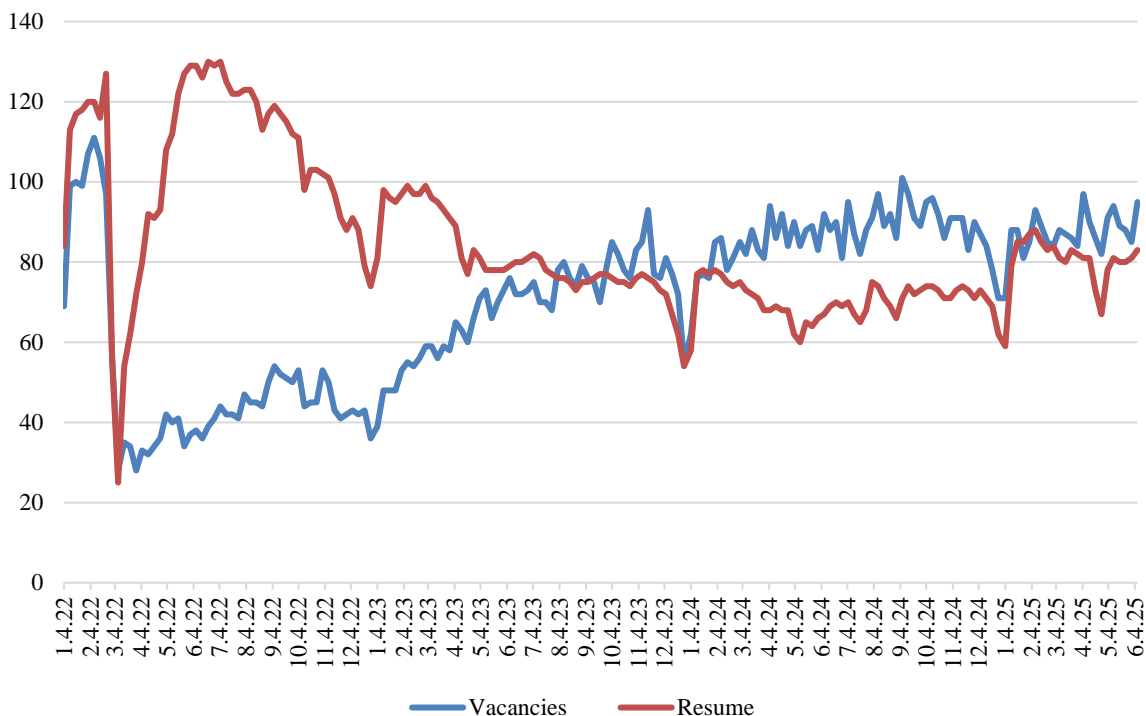
**Characteristics of the organization of distance learning
in Ukraine in the context of martial law**

Aspect	Characteristics
Technological innovations	Active implementation of artificial intelligence, augmented and virtual reality, big data, and machine learning to create an interactive learning environment. Development of virtual laboratories and simulators to compensate for the lack of access to classrooms.
Flexibility of the educational process	Educational institutions are developing blended learning formats that combine online resources with traditional teaching methods. Microlearning is being used – short learning modules aimed at rapid knowledge acquisition.
Psychological support	Online platforms are being created to provide psychological support to students and teachers, and webinars are being held on adapting to stressful conditions. Mentoring programs, internal social networks, and support communities are being developed to reduce emotional stress.
Technical support	A technical support system for users is being implemented, and online chats and call centers are being created. Higher education institutions are cooperating with local communities and businesses to provide students with technology and internet access. Recommendations are being provided on how to use available platforms on different devices.
Adaptation of participants in the educational process	The digital competence of teachers and students is being improved, and training sessions on the use of distance learning platforms are being held. Particular attention is being paid to involving participants in the co-creation of the learning process.
Organization of practical training	Practical classes are being converted into online masterclasses, which are conducted on specialized platforms such as Microsoft Teams or standard platforms like Zoom, making them easy to use for both teachers and students.

Source: developed by the authors based on [9, 10].

Thus, the organization of distance learning in Ukraine under martial law has become comprehensive and flexible, as educational institutions are actively implementing innovative technologies, from artificial intelligence to virtual reality, which allow for the continuity of learning even in the absence of physical access to classrooms. At the same time, special attention is paid to psychological support for students and teachers, improving digital literacy, and developing technical assistance systems. The practical component of education is being transformed through online formats, collective projects, and partnerships with industry organizations. In general, distance learning has become not only a forced adaptation, but also a catalyst for innovation, strengthening the Ukrainian higher education system in crisis conditions. It is in this context that it is proposed to further integrate distance learning and combine it with work, which will allow students not only to obtain an education but also to

realize their potential and gain experience at the same time. This idea emerged within the context of a significant staff shortage caused by the war, which continues to escalate (Fig. 3).



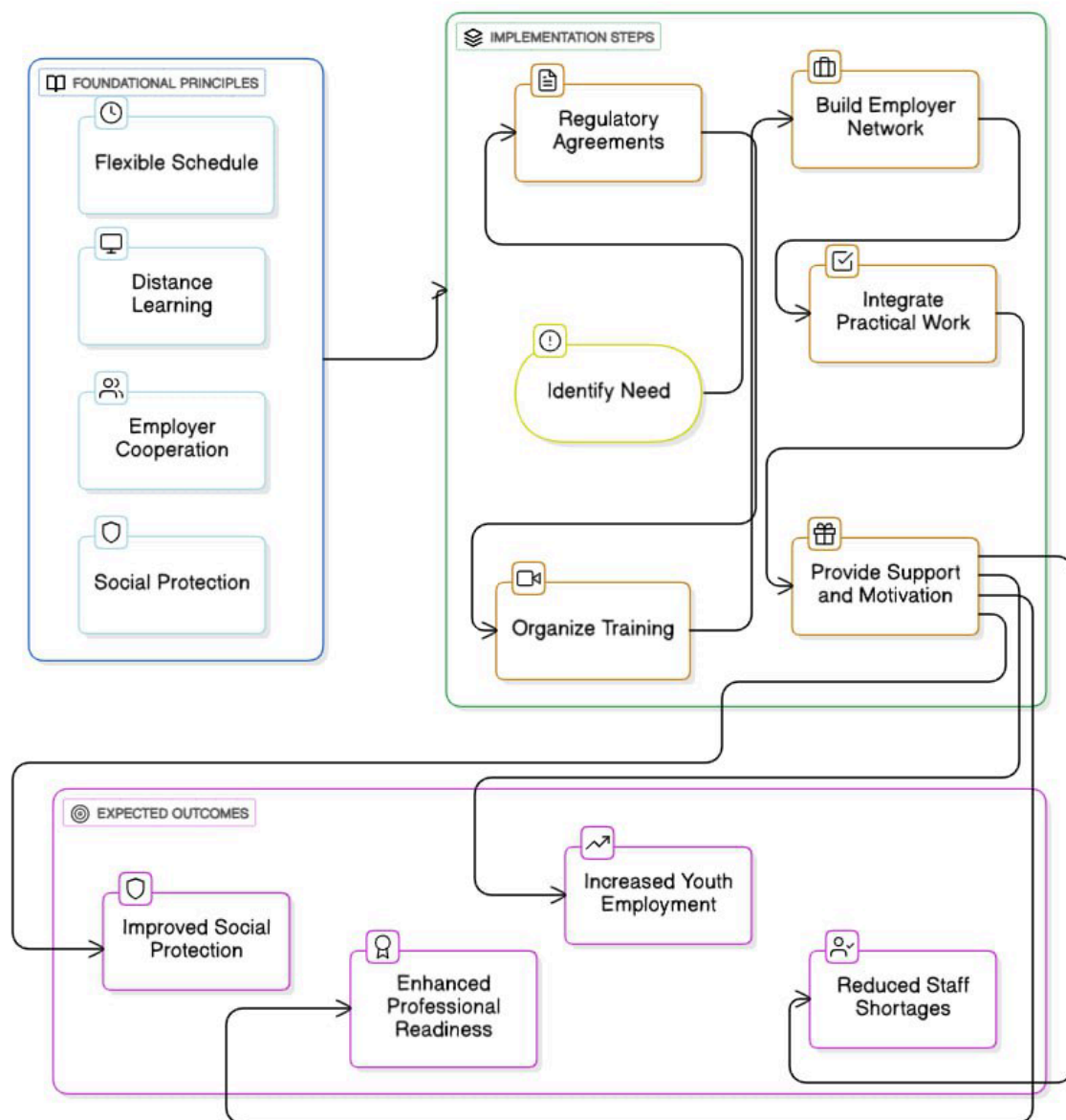
Source: developed by the authors based on [11].

Figure 3. Dynamics of the ratio of published resumes to open vacancies for 2022-2025, thousand units

Analyzing the data in Fig. 3, it is evident that the number of vacancies exceeds the number of available resumes, resulting in an increase in the labor shortage and heightened competition for qualified specialists. In the context of a significant labor shortage, distance education is an effective tool for addressing this imbalance. Transferring students to distance learning in the context of formal employment will not only alleviate the problem of labor shortages but also enhance the competitiveness of the students themselves. Fig. 4 illustrates our approach to integrating distance learning and employment.

Thus, the strategy of combining distance learning and formal employment in the context of the war in Ukraine demonstrates a practical approach to addressing several pressing problems simultaneously: labor shortages, youth employment, and preserving the country's educational potential. The introduction of a flexible evening study schedule enables students to balance work and education without compromising their learning process. The distance learning format ensures the accessibility of education regardless of location, and the ability of teachers to work from home increases the safety and stability of the educational process. At the same time, formal employment provides social guarantees for students, offers them practical experience, and legally exempts them from mobilization without requiring prior reservation.

This model not only supports the economy by attracting young people to work, but also strengthens social stability, as it allows for professional self-fulfillment to be combined with continuing education. In the long term, this strategy could serve as the foundation for a new model of post-war development of the higher education system, centered on flexibility, innovation, and the close integration of education with the real economy sector.



Source: developed by the authors.

Figure 4. Strategy for combining distance learning and employment in the context of war in Ukraine

Conclusions. The study found that Ukraine's education system is undergoing significant changes under the influence of war, economic challenges, and digital transformation. It was determined that during the period of martial law, there was a reduction in the number of educational institutions, a decrease in the number of students in vocational education, and an increase in demand for pre-higher and distance education. At the same time, distance learning has become not only a necessary step but also an innovative tool for ensuring the continuity of the educational process, as it contributes to the formation of digital competencies, the adaptation of students to new conditions, and the maintenance of psychological stability. The study proposed that a strategy combining distance learning with formal employment would enable a more effective response to the labor shortage in Ukraine, ensure youth employment, strengthen the practical component of education, and promote social stability during wartime.

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