2.2. RESTORATION OF HUMAN POTENTIAL IN THE EDUCATIONAL ENVIRONMENT DURING WAR

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***Abstract**. The article focuses on the study of the issue of restoring human potential in Ukraine's educational environment during the full-scale war that began in 2022. The purpose of the work is to theoretically substantiate and practically develop a comprehensive model of restoring human potential, which integrates the psychological, pedagogical, and organizational components of supporting participants in the educational process. The study employs a mixed-methodology approach that combines quantitative methods (a survey of 1,247 pedagogical workers and statistical analysis) with qualitative approaches (47 semi-structured interviews, 13 focus groups, and observation in 12 educational institutions). The results revealed significant regional differentiation in the educational process, as well as high levels of professional burnout among teachers, characterized by emotional exhaustion (M=4.23±1.12). Additionally, the study identified the spontaneous development of adaptive strategies structured around three dimensions: emotional support, technological adaptation, and academic flexibility. The critical role of institutional support has been established: institutions with a high level of it demonstrate half the rate of teacher burnout and 26% higher academic performance. A conceptual model of human potential restoration has been developed, integrating four levels of intervention (individual, group, institutional, systemic) and three temporal phases (survival, adaptation, transformation) with cross-cutting support components. The practical significance of the study lies in the empirical substantiation of educational policy priorities, including the development of a national strategy for psychological support for teachers, the implementation of differentiated regional policies, investments in resilient digital infrastructure, and the provision of systemic support for the institutional potential of educational institutions.*

***Keywords**: professional burnout of teachers; psychosocial support; adaptive learning strategies; digitalization of education; institutional resilience; crisis management; trauma-informed pedagogy.*

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Introduction

The relevance of this study lies in the critical need to preserve and restore the human potential of Ukraine in the context of a full-scale war, where the educational environment serves as a crucial space for shaping the nation's resilience, supporting psychological well-being, and preparing the country for its future reconstruction. According to estimates by international organizations, the total loss of human capital in Ukraine due to the war's impact on education may have long-term consequences for socio-economic development, making the problem of restoring educational potential a matter of national security.

Modern armed conflicts pose unprecedented challenges to education systems, significantly affecting the physical, psychological, and social well-being of all participants in the educational process. The problem of restoring human potential in war conditions is particularly relevant in the context of preserving the quality of education, providing psychological support, and creating a safe environment for learning and development. According to UNICEF (2025), 4.6 million children in Ukraine face permanent educational barriers, as the fourth school year during the war has begun, making the issue of restoring the educational process one of the priorities of national policy. The scale of the education crisis in Ukraine surpasses the challenges that education systems faced during the COVID-19 pandemic, when, according to UNESCO (2021), more than 1.6 billion students worldwide experienced disruptions to their studies due to school closures.

The global context of the problem of restoring human potential in conflict situations demonstrates the complexity and multidimensionality of this phenomenon. P. Justino (2022), in his study of the vulnerability, resilience, and resistance of the civilian population during the war in Ukraine, emphasizes that the education system becomes a critical factor in preserving social cohesion and human capital in conditions of protracted conflict. The author notes that the destruction of educational infrastructure and the psychological trauma experienced by participants in the educational process pose long-term risks to the country's economic and social development.

The theoretical framework for understanding the role of education in times of crisis has evolved from a utilitarian approach to human capital to a more holistic understanding of human capabilities. A historical review of the role of education (from the concept of human capital to the human capabilities approach) has demonstrated its economic and protective function in times of crisis. At the same time, education performs a supportive psychological well-being and social integration (S. Leoni, 2023). K. Boisvert (2022) develops this idea by analyzing discourses on human capital, human rights, and protection in the context of the educational response to COVID-19. The researcher emphasizes the need for a balance between the economic and humanistic goals of education in times of crisis.

The Ukrainian context of education restoration during the war is characterized by unique challenges and demonstrates different models of adaptation of educational institutions. V. Bugrov *et al.* (2023) described the experience of Taras Shevchenko National University of Kyiv, which navigates educational activities as a frontline during the war, highlighting strategies for ensuring continuity of education, psychological support, and preservation of the academic community. O. Orzhel *et al.* (2023) analyzed the challenges of displaced universities in Ukraine and developed optimal models for their development, emphasizing the importance of flexibility, collaboration, and innovation in conditions of uncertainty.

Digital technologies have become a critical tool for supporting education during wartime, although their implementation is accompanied by numerous challenges. L. Matviichuk *et al.* (2022) investigated the organization and implementation of e-learning in wartime conditions within Ukraine, identifying technical, pedagogical, and psychological barriers to distance education in extreme conditions. Opanasenko and Novikova (2022) compared the experience of distance learning during the COVID-19 pandemic and the war in Ukraine, finding that the war context creates additional challenges related to security, internet connection stability, and the psychological state of participants. Dudar *et al.* (2025) investigated the use of Internet platforms in an open educational environment to organize independent work for students, emphasizing the potential of

digital technologies to support learning autonomy even in conditions of limited access to traditional educational infrastructure.

The experience of organizing education during the COVID-19 pandemic has established a technological foundation and methodological framework for distance learning, which has proven to be critically important in wartime conditions. Nestorenko and Pokusa (2020) conducted a comprehensive analysis of the educational response to the pandemic crisis, revealing both the possibilities of online learning to ensure educational continuity and its limitations in supporting the social and emotional development of students. Carlana and La Ferrara (2021) demonstrated the effectiveness of online tutoring to support students' academic achievements during COVID-19, especially for vulnerable groups, which is confirmed by the experimental study of Gortazar et al. (2024), who established the positive impact of structured online support programs on the success of children from low-income families. However, the war context creates additional challenges associated with the instability of infrastructure, psychological traumatization, and security risks, which require adapting the pandemic experience to the specifics of armed conflict.

The importance of developing self-regulated learning skills in a digital environment is supported by a study by Bernacki et al. (2025), who utilized multimodal learning analytics to validate digital traces of self-regulated learning and predict students' academic performance. The authors demonstrated that students with higher levels of metacognitive skills and self-monitoring exhibited better learning outcomes in an online environment, which is particularly relevant to the Ukrainian situation, where a significant portion of learning occurs remotely with minimal direct supervision from teachers.

The issue of educational quality and inclusivity becomes particularly complex in the context of war. Zayachuk (2025) analyzed the provision of quality higher education in Ukraine during the war, highlighting key challenges: maintaining academic standards, ensuring equitable access to education, adapting curricula, and preserving teaching potential. Diachenko *et al.* (2024) reviewed the state of inclusive education in Ukraine, its achievements, challenges, and prospects, emphasizing that the

war exacerbated the problems of accessibility of education for vulnerable groups and, at the same time, created new opportunities for innovative solutions.

The international experience of post-conflict countries provides important lessons for Ukraine. Milton (2019) examined Syrian higher education during the conflict, revealing the regime's strategies for survival, protection, and security, and demonstrating the complexity of sustaining education systems in the face of prolonged hostilities. Mualla and Mualla (2022) analyzed the challenges and opportunities for higher education in Syria after the war and pandemic, emphasizing the importance of international support and institutional resilience for rebuilding the education system.

Conceptual approaches to education in post-conflict societies are evolving from simple infrastructure restoration to comprehensive peacebuilding strategies. Kester *et al.* (2022) explored the role of higher education in peacebuilding in conflict-affected societies, moving beyond the «good/bad» binary and emphasizing the need for a critical and contextualized approach. Kukhianidze (2022) argued for the importance of peace education in post-conflict settings as a mechanism for trauma transformation and sustainable peacebuilding. Mohamed Yusuf Adan (2025) developed a 4R (rights, responsibilities, representation, recovery) analytical framework to examine the role of peace education in promoting social justice and sustainable peace in post-conflict societies.

The long-term consequences of war for human development and the education system require a systemic understanding. Hameed *et al.* (2024) examined the asymmetric effects of prolonged war on human resource development in Afghanistan using the NARDL approach and found that negative shocks have a deeper and longer-lasting impact than positive changes. Ma *et al.* (2022) argued for the need to restore the potential of university teachers in the post-war context of sustainable development in Ukraine, emphasizing the critical importance of investing in teaching staff as a prerequisite for quality education.

International support for the restoration of Ukraine's education system demonstrates global recognition of the critical

importance of this issue. The European Commission (2024) recognized education reform as a priority area for European integration, despite the war conditions, in its report on Ukraine. The World Bank (2024) announced support for Ukraine's education system through the new LEARN project, with available funding of approximately $415 million, which underscores the strategic importance of education for the country's future recovery. UNESCO (2023) emphasizes in its reports the need to transition from crisis response to strategic education restoration, taking into account long-term development goals.

Despite the growing body of research on education in wartime, the systematic integration of psychological support, pedagogical innovations, and institutional transformations into a unified model for restoring human potential remains a relatively understudied area. The development of contextualized approaches that take into account the specifics of prolonged high-intensity conflict and the simultaneous need to support international educational standards is particularly relevant.

The purpose of the study is to theoretically substantiate and practically develop a comprehensive model of restoring human potential in the educational environment during war, which integrates the psychological, pedagogical, and organizational components of supporting participants in the educational process.

In accordance with the goal, the following research tasks were defined:

1. Analyze international and Ukrainian experience in restoring education systems during armed conflicts and identify effective practices for application.
2. To explore the challenges and strategies for ensuring educational quality, inclusivity, and continuity of learning in wartime.
3. To substantiate the role of digital technologies in supporting the educational process and determine the conditions for their effective implementation.
4. Develop a model of institutional support for educational institutions that ensures the preservation of human potential and psychological well-being of all participants.

5. Determine the directions of post-war restoration of the education system, taking into account the principles of sustainable development and peacebuilding.

The scientific novelty of the study lies in the development of a comprehensive multilevel model of restoring human potential in the educational environment during war, which for the first time integrates individual (psychological support of participants), institutional (adaptation of educational institutions), technological (digital tools), and systemic (educational policy) levels of support into a single interconnected system. Unlike existing fragmentary approaches, the proposed model considers the dynamic nature of the crisis and the prospect of post-war recovery, providing mechanisms for adaptation to changing security conditions and a gradual transition from a survival mode to the strategic development of the educational system.

The research was conducted from 2022 to 2024 and employed a comprehensive interdisciplinary approach that combined theoretical and empirical research methods. The methodological basis was a systematic approach to analyzing educational processes in crisis conditions, a comparative analysis of international experiences, and an activity-based approach to developing practical recommendations.

A systematic literature review was carried out using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology to ensure a comprehensive analysis of scientific publications. The search for sources was conducted in the international Science Research Databases Scopus, Web of Science, ERIC (Education Resources Information Center) and Google Scholar using the keywords: «education in war», «education conflict zones», «educational resilience», «trauma-informed education», «post-conflict education», «Ukraine education war» for the period 2019-2024. The initial search revealed 347 publications, of which 86 scientific papers were selected for analysis after applying the inclusion criteria (relevance to the topic, peer review, English language, full-text access).

Content analysis was used to systematize information from official reports of international organizations (UNESCO, UNICEF, World Bank, European Commission) on the state of education in

Ukraine and other countries affected by military conflicts. Statistical data, strategic documents, and recommendations on supporting education systems in crisis conditions for the period 2022-2024 were analyzed.

Comparative analysis was used to compare the experience of restoring education systems in different countries (Syria, Afghanistan, Yemen, and Ukraine) in order to identify common patterns, specific features, and transferable practices. Strategies for ensuring the continuity of education, mechanisms of psychological support, models of organizing the educational process, and approaches to restoring educational infrastructure were compared.

Modelling was used to develop a conceptual model of restoring human potential in the educational environment, integrating individual, institutional, technological, and systemic levels of support for participants in the educational process during the war.

The research employed empirical methods, specifically a questionnaire survey conducted among teaching staff of general secondary and higher education institutions in Ukraine to identify key challenges, needs, and strategies for adapting the educational process in wartime conditions. Two specialized questionnaires were developed: for teachers (45 questions) and for lecturers of higher education institutions (52 questions), covering blocks of questions on organizational changes, psychological state, methodological approaches, digital tools, and support needs.

The study sample was formed using the stratified random sampling method, taking into account the regional distribution and the type of educational institution. The total sample consisted of 1,247 respondents, comprising 847 teachers from general secondary education institutions (67.9%) and 400 teachers from higher education institutions (32.1%). Regional distribution: Western Ukraine – 31%, Central Ukraine – 28%, Eastern Ukraine – 22%, Southern Ukraine – 12%, internally displaced persons (IDPs) – 7%. The inclusion criteria for the sample were: active pedagogical activity between 2022 and 2024, work in war conditions on the territory of Ukraine or with Ukrainian

students/pupils abroad, and voluntary consent to participate in the study.

Semi-structured interviews were conducted with administrators of educational institutions (rectors, directors, deputies), educational psychologists, and international experts on education in crisis situations. A total of 47 interviews were conducted, each lasting between 45 and 90 minutes. Interview questions focused on strategies for managing an educational institution in conditions of uncertainty, mechanisms for supporting teaching staff and pupils/students, effective practices for adapting the educational process, and visions of recovery prospects. Interviews were recorded (with the consent of the respondents), transcribed, and analyzed using thematic analysis.

Focus groups were organized separately for different categories of participants in the educational process: teachers/lecturers (6 focus groups of 8-12 participants each), students of higher education institutions (4 focus groups of 10-15 participants each), and parents of students (3 focus groups of 8-10 participants each). The duration of each focus group was 90 to 120 minutes. The issues discussed included the psychological challenges of teaching during wartime, the effectiveness of different teaching formats, support needs, and suggestions for improving the educational process.

The included observation was conducted in 12 educational institutions (8 schools and 4 universities) across different regions of Ukraine during the 2023-2024 academic year. The observations focused on the organization of the educational process, the psychological climate in the educational institution, the use of digital technologies, the implementation of security protocols, and strategies for pedagogical support of students. The results of the observations were recorded in field notes and analyzed using a qualitative content analysis approach.

The analysis of documents included the study of internal regulatory documents from educational institutions (regulations on the organization of the educational process in wartime, psychological support plans, and security protocols), educational and methodological materials adapted to wartime conditions, and

reporting documentation on the functioning of institutions from 2022 to 2024.

Methods of data processing and analysis included quantitative and qualitative data. Quantitative data from the questionnaire were processed using the statistical package SPSS Statistics 26.0. Descriptive statistics methods were used (frequency analysis, calculation of average values, standard deviations), Pearson correlation analysis to identify relationships between variables, factor analysis to identify latent structures, and χ^2 criterion to test the statistical significance of differences between groups. The level of statistical significance was set at $p < 0.05$.

Qualitative data from interviews, focus groups, and observations were analyzed using thematic analysis, following the six-step procedure outlined by Braun and Clarke: data review, initial code generation, theme identification, theme review, theme naming, and report preparation. Coding was performed using NVivo 14 software. The reliability of coding was ensured through the double independent coding of 20% of the transcripts by two researchers, followed by the calculation of Cohen's Kappa ($\kappa = 0.82$), indicating a high level of reliability.

Data triangulation was used to increase the validity of the research results by comparing and integrating data obtained using different methods (quantitative and qualitative) and from different sources (educators, administrators, students/pupils, parents, international experts).

The study was conducted in accordance with the ethical principles of the social sciences and was approved by the institutional ethics committee. All study participants provided informed consent to participate after receiving detailed information about the purpose, procedures, and possible use of the study results. Confidentiality and anonymity of the data were ensured; personal information of respondents was not disclosed, and pseudonyms or generalized characteristics were used in the reports. Given the traumatic context of the study, participants were provided with information about available psychological support resources, and during interviews and focus groups, the researchers avoided questions that could cause traumatization.

The study has several limitations that should be taken into account when interpreting the results. First, the sample does not include teachers and students from temporarily occupied territories due to the objective impossibility of access, which limits the completeness of the picture of education in Ukraine during the war. Second, the dynamic nature of the war situation means that the results reflect the state at the time of data collection (2022-2024) and may change as events develop. Third, the predominantly online format of data collection, due to security restrictions, may have created a systematic bias in the sample in favor of individuals with better access to digital technologies. Fourth, the self-reported nature of most data is subject to the risk of social desirability bias and subjective perception.

Research Results

Analysis of the survey data revealed large-scale organizational changes in the educational process of Ukrainian educational institutions. Table 1 shows the distribution of learning formats used during the 2022-2024 academic years.

Table 1

Distribution of learning formats in educational institutions of Ukraine (n=1247)

Training format	*SEI (n=847)*	*HEI (n=400)*	*Total*
Full-time (in-person)	23.4%	31.8%	26.1%
Distance (online)	34.7%	28.5%	32.6%
Blended (hybrid)	38.2%	36.3%	37.6%
Variable (depending on the security situation)	3.7%	3.4%	3.6%

Note: SEI – secondary education institutions,
HEI – higher education institutions. $\chi^2(3) = 8.42$, $p = 0.038$

A statistically significant difference was found between types of institutions ($\chi^2(3) = 8.42$, $p = 0.038$), indicating specific adaptation strategies. Secondary education institutions more often used a distance format (34.7% vs. 28.5%), which is explained by greater safety risks for younger children and the

difficulty of ensuring the protection of school infrastructure. Higher education institutions demonstrated a higher percentage of full-time education (31.8% vs. 23.4%), which aligns with Zayachuk's (2025) data on universities' desire to support the academic community through physical presence despite the challenges.

Regional analysis revealed significant differences in the possibilities of organizing the educational process (Fig. 1).

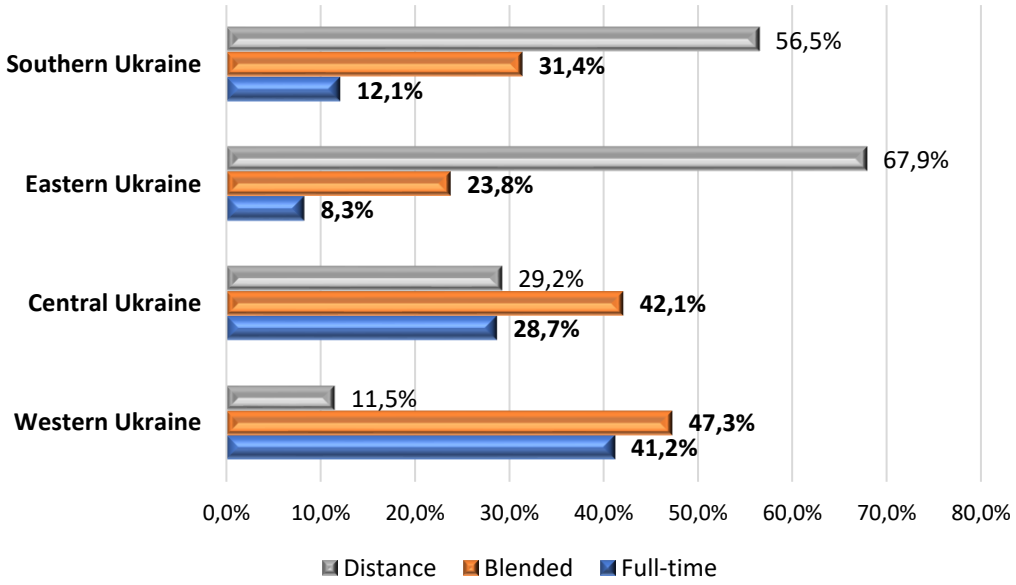

Figure 1. **Distribution *of training formats by regions of Ukraine (%)***

Note: n=1247. Differences between regions are statistically significant ($\chi^2(6) = 347.26$, $p < 0.001$)

The pronounced regional differentiation ($\chi^2(6) = 347.26$, $p < 0.001$) reflects the uneven security situation. The eastern and southern regions, which are experiencing more intense fighting, mainly operate in a distance mode, while the western regions retain the possibility of face-to-face learning. These data are consistent with the European Commission (2024) report on geographical inequalities in access to quality education in Ukraine.

Assessment of the psychological state of teaching staff revealed high levels of stress and professional burnout. Table 2 presents the results of self-report assessment using the adapted Maslach Burnout Inventory (MBI) scale.

Table 2

Indicators of professional burnout of teaching staff (M±SD)

Component	*SEI (n=847)*	*HEI (n=400)*	*t-test*	*p-value*
Emotional exhaustion	4.23±1.12	3.87±1.24	4.62	<0.001
Depersonalization	2.94±1.08	2.76±1.15	2.43	0.015
Reduction in professional achievements	3.51±1.21	3.29±1.18	2.71	0.007

Note: Scale from 1 (never) to 7 (everyday). Values >4.0 indicate high levels of burnout

Correlation analysis revealed significant associations between risk factors and indicators of psychological well-being (Table 3).

Table 3

Correlations between risk factors and psychological well-being of teachers (Pearson's r)

Factor	*Emotional exhaustion*	*Depersonalisation*	*Professional efficiency*
Proximity to the war zone	0.47***	0.34***	-0.41***
Air alarm frequency	0.52***	0.38***	-0.38***
Availability of social support	-0.56***	-0.42***	0.61***
Access to psychological help	-0.39***	-0.28***	0.44***
Internet connection stability	-0.31***	-0.22**	0.36***

*Note: n=1247. **p<0.01, ***p<0.001*

Secondary school teachers demonstrated statistically significantly higher levels of emotional exhaustion ($t(1245)=4.62$, $p<0.001$) compared to higher education teachers. The critically high level of emotional exhaustion ($M = 4.23$) among teachers can be attributed to the additional burden of providing emotional support to children, communicating with anxious parents, and the need to simultaneously perform both pedagogical and psychological functions. These results align with the conclusions of Ma et al. (2022) on the need for targeted support of pedagogical potential to ensure the sustainable development of the education system.

The strongest protective factor (Table 3) was the presence of social support ($r = -0.56$ for emotional exhaustion, $r = 0.61$ for professional efficacy, $p < 0.001$), highlighting the critical importance of supportive pedagogical communities. The frequency of air alarms demonstrated the strongest positive correlation with emotional exhaustion ($r = 0.52$, $p < 0.001$), indicating a cumulative effect of chronic stress resulting from ongoing security threats.

Qualitative analysis of interviews and focus groups revealed a range of adaptive pedagogical strategies that educators spontaneously developed in response to the crisis. Table 4 systematizes the main categories of adaptations and their prevalence.

Table 4

Adaptive pedagogical strategies in wartime (frequency of mention)

Strategy category	*Frequency (%)*	*Examples*
Flexibility in terms and requirements	87.3	Extension of deadlines, alternative forms of assessment
Integration of psychological support	76.4	Psychological moments, relaxation techniques
Adaptation of training content	68.9	Reduction of material, focus on key competencies

Strategy category	*Frequency (%)*	*Examples*
Using digital tools	94.2	Online platforms, video conferences, and asynchronous materials
Individualization of learning	71.8	Personalized tasks, taking into account special circumstances
Creating a support community	82.6	Online groups, regular communication, and peer support

Note: n=1247 survey respondents. Respondents could indicate multiple strategies

The almost universal use of digital tools (94.2%) confirms the findings of Matviichuk et al. (2022) and Dudar et al. (2025) on the critical role of technology in ensuring educational continuity. At the same time, the high prevalence of flexibility strategies (87.3%) and the creation of a community of support (82.6%) indicate a shift from a purely academic to a holistic model of education that integrates learning and psychosocial support.

Factor analysis revealed three main dimensions of adaptive strategies, explaining 68.4% of the variance (Table 5). The development of self-regulated learning has been found to be a crucial component in adapting to distance and hybrid learning formats. Bernacki et al. (2025) demonstrated that digital traces of students' behavior in learning management systems can serve as valid indicators of self-regulated learning and predict academic performance. In the Ukrainian context, where a significant part of learning occurs asynchronously with minimal synchronous contact due to unstable electricity supply, students' ability to independently plan, monitor, and regulate their learning activities becomes even more critical. This requires the targeted development of metacognitive skills and the creation of digital environments that support autonomy without losing pedagogical support (Table 5).

The three-factor structure illustrates the holistic nature of pedagogical adaptation, which occurs simultaneously at the emotional, technological, and academic levels. The largest

contribution of the emotional support factor (28.3% of the variance) emphasizes the priority of psychological well-being over purely academic goals in crisis conditions.

Table 5

Factor structure of adaptive pedagogical strategies

Strategy	*Factor 1: Emotional support*	*Factor 2: Technological adaptation*	*Factor 3: Academic Flexibility*
Psychological interventions	0.83	0.21	0.15
Creating a community	0.79	0.28	0.23
Empathetic communication	0.76	0.19	0.31
Using an LMS	0.24	0.87	0.16
Asynchronous learning	0.18	0.84	0.22
Digital tools	0.29	0.81	0.19
Flexible terms	0.27	0.14	0.82
Content adaptation	0.22	0.25	0.79
Alternative assessment	0.34	0.21	0.76
Eigenvalue	3.42	2.87	2.15
% variance	28.3%	23.6%	16.5%

Note: Factor extraction method: Principal Component Analysis. Rotation: Varimax. KMO=0.89, Bartlett test p<0.001

A detailed analysis of the use of digital platforms revealed a differentiated picture of technological integration. Figure 2 presents the frequency of use of different categories of digital tools. The almost universal use of instant messaging (96.8%) and video conferencing (91.2%) indicates the priority of synchronous communication for maintaining social connections and emotional support. The relatively lower frequency of use of interactive platforms (54.7%) may be explained by the limitations of internet

connectivity in the context of the energy crisis and the technical complexity of integration.

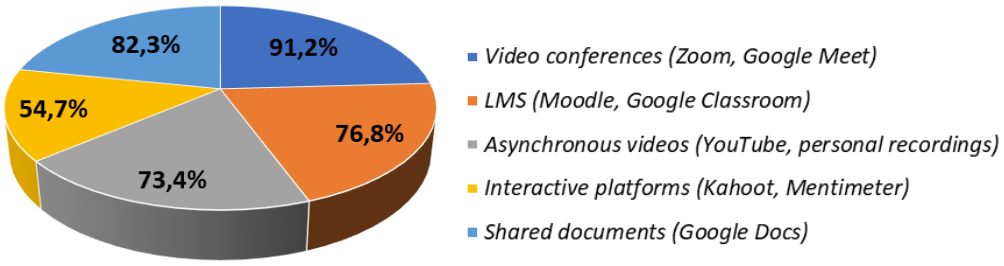

Figure 2. **Frequency of use of digital tools by teachers (%)**

Note: n=1247. Respondents could indicate multiple tools

However, a qualitative analysis of the interviews revealed significant challenges to digitalization. Thematic analysis identified five main barriers (Table 6).

Table 6

Barriers to the effective use of digital technologies

Barrier	*Frequency of mentions in interviews (%)*	*Typical quotes*
Power supply instability	83.0	"The biggest problem is not knowing if there will be light during class."
Insufficient technical support for students	68.1	"Not all children have devices or stable internet."
Limited digital competence	57.4	"Many older teachers have difficulty adapting to technology."
Screen fatigue	74.5	"Students complain about constant computer work."
The complexity of online assessment	61.7	"It is difficult to objectively assess knowledge remotely."

Note: n=47 interviews with administrators of educational institutions

Despite the challenges, research demonstrates the potential effectiveness of online learning when properly organized. Carlana and La Ferrara (2021), based on an analysis of data from over 1,400 Italian students, demonstrated that structured online tutoring programs significantly improved academic performance during the COVID-19 pandemic, particularly for students with low socioeconomic status. These results are confirmed in an experimental study by Gortazar et al. (2024) conducted in Spain, where an online tutoring program for vulnerable children led to statistically significant improvements in mathematics and reading scores (effect size of 0.15-0.18 standard deviations). The Ukrainian context, however, is characterized by additional challenges: while the lack of physical presence was the main constraint during the pandemic, in wartime conditions, unstable power supply, psychological trauma, and security risks become critical, requiring the adaptation of online support models to these specific conditions. These results are also consistent with the findings of Opanasenko and Novikova (2022) about the specific challenges of distance learning in wartime, which go beyond typical technological barriers and include infrastructural constraints caused by the conflict.

A comparative analysis of educational institutions with different levels of institutional support revealed its significant impact on adaptation outcomes. Institutions were classified according to the Institutional Support Index (ISI), which integrated indicators of the availability of psychological assistance, methodological support, technical support, and administrative flexibility (Table 7).

Table 7

Comparison of adaptation indicators by level of institutional support

Indicator	*Low ISI (n=312)*	*Average ISI (n=547)*	*High ISI (n=388)*	*F-statistic*	*p-value*
Teacher satisfaction (1-7)	3.21±1.15	4.58±0.97	5.73±0.82	247.36	<0.001
Emotional exhaustion (1-7)	4.87±1.03	3.96±1.12	2.94±1.08	158.42	<0.001

Indicator	*Low ISI (n=312)*	*Average ISI (n=547)*	*High ISI (n=388)*	*F-statistic*	*p-value*
Academic performance of students (%)	62.3±12.4	71.8±10.2	78.6±8.7	93.67	<0.001
Contingent retention (%)	88.4±6.8	93.2±4.6	96.7±3.2	87.25	<0.001

Note: ISI – Institutional Support Index. Data are presented as M±SD. ANOVA with Tukey HSD post-hoc test

Statistically significant differences across all indicators ($p<0.001$) demonstrate the critical importance of systemic institutional support. Institutions with high ISI demonstrated almost half the levels of emotional exhaustion of teachers (2.94 vs. 4.87) and significantly higher academic performance (78.6% vs. 62.3%). These data confirm the findings of Bugrov et al. (2023) on the importance of proactive institutional management for ensuring the resilience of educational communities.

Based on the integration of quantitative and qualitative data, a conceptual model of human potential restoration in educational environments during wartime has been developed (see Figure 3). The model is structured around four interrelated levels of intervention and three temporal phases.

The model assumes a nonlinear, iterative nature of the recovery process, with the possibility of regression between phases depending on the security situation. It is critical to synchronize interventions at all levels and ensure cross-cutting support components throughout all phases.

The results of the study reveal a complex, multidimensional picture of the restoration of human potential in the educational environment during war, characterized by the simultaneous occurrence of destructive and creative processes, crisis and innovation, trauma and resilience.

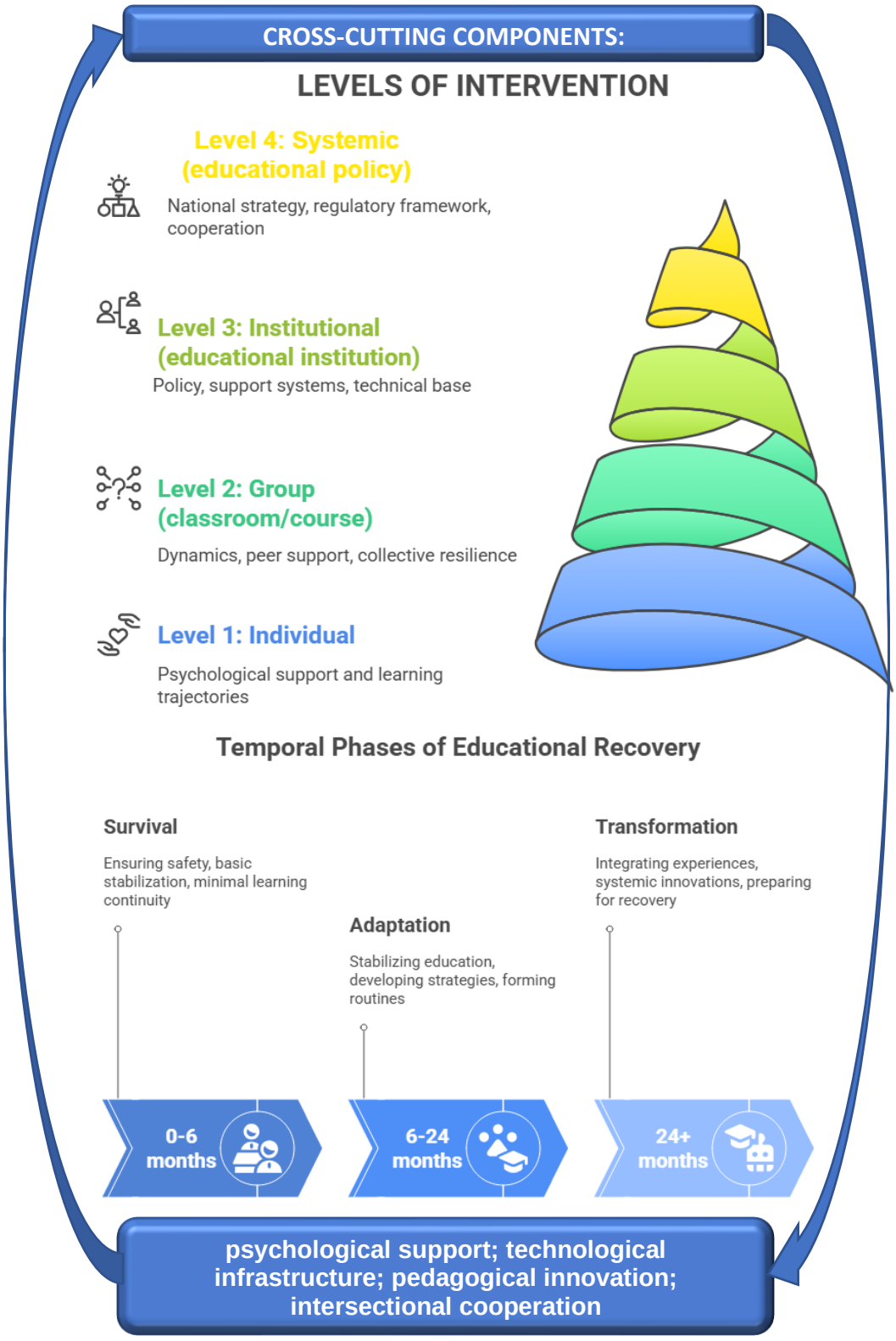

Figure 3. **Conceptual model of restoring human potential in the educational environment during war**

Note: The model is based on the integration of empirical research data and international experience.

High levels of professional burnout among teachers, as measured by emotional exhaustion (M = 4.23 in teachers), are a worrying signal that echoes Ma et al. (2022)'s warnings about the risks of losing pedagogical potential. Compared to studies of teacher burnout in "peaceful" conditions, where the critical level is usually recorded in 15-25% of teachers, the Ukrainian situation demonstrates a significantly higher prevalence of the problem. This requires the urgent development of large-scale programs of psychological support for teachers, which should become a priority of educational policy. Importantly, the presence of social support proved to be the strongest protective factor (r = - 0.56), which is consistent with theoretical models of resilience and emphasizes the need for investment in creating and supporting professional communities of practice.

The spontaneous adaptation of pedagogical practices to wartime conditions demonstrates the impressive creativity and resilience of educators. The identified three-factor structure of adaptations (emotional support, technological adaptation, and academic flexibility) indicates the holistic nature of the professional response to the crisis, which extends beyond the technocratic "transition online." The priority of emotional support (28.3% of the variance) reflects the intuitive understanding of educators of what Boisvert (2022) conceptualizes as the protective function of education in crisis conditions. This fundamentally changes the understanding of the pedagogical role: the teacher/lecturer becomes not only a translator of knowledge, but also a key agent of psychosocial support and the formation of resilience.

The results on the use of digital technologies extend the findings of Matviichuk et al. (2022) and Dudar et al. (2025), demonstrating not only the scale of implementation but also the complexity of the challenges that arise. The almost universal use of messengers (96.8%) along with the lower frequency of specialized educational platforms (54.7% for interactive tools) indicates a gap between technological accessibility and pedagogical integration. The identified barriers, particularly the instability of electricity supply (83.0% of mentions), are specific to the military context and distinguish the Ukrainian situation from the experience of digitalization during the COVID-19 pandemic, as

analyzed by Opanasenko and Novikova (2022). This requires the development of «low-tech» backup strategies and support for hybrid models that can function in conditions of unstable infrastructure.

A systematic review of the educational response to the COVID-19 pandemic (Nestorenko & Pokusa, 2020) identified several critical lessons relevant to the military context: the importance of pre-developed digital infrastructure, the need for rapid adaptation of pedagogical approaches, and the criticality of supporting the psychological well-being of participants in the educational process. However, the pandemic experience has also shown the limitations of distance learning for developing social skills and maintaining motivation, which in wartime is complicated by additional psychological traumatization. The experience of successful interventions during the pandemic, such as online tutoring programs (Carlana & La Ferrara, 2021; Gortazar et al., 2024), can be adapted for the Ukrainian situation, taking into account the specifics of the military context: the need for trauma-informed approaches, the instability of the infrastructure, and the longer duration of the crisis.

The revealed impact of institutional support on adaptation outcomes ($F = 247.36$, $p < 0.001$ for teacher satisfaction) empirically confirms theoretical models of multilevel resilience. Institutions with a high Institutional Support Index not only demonstrate better indicators of teacher well-being but also achieve significantly higher academic success among pupils/students (78.6% vs. 62.3%), indicating a cascading effect of support: teacher well-being is transformed into the quality of teaching. This is consistent with the experience of Kyiv National University, described by Bugrov et al. (2023), where proactive institutional leadership ensured relatively successful adaptation. However, significant differences between institutions (from low to high ISI) indicate uneven institutional capacity and the need for systemic support from central education authorities.

The developed conceptual model of human potential restoration provides an integrative framework that synthesizes international experiences and the specificities of the Ukrainian context. Unlike linear models of post-conflict recovery presented in studies by Milton (2019) on Syria and Mualla and Mualla (2022),

the proposed model accounts for the dynamic nature of a protracted conflict through temporal phases, allowing for regression. The allocation of the survival phase (0-6 months) acknowledges the reality that, in conditions of active hostilities, priority is given to basic security and psychological stabilization, rather than academic achievements. The transition to the adaptation and, potentially, transformation phase requires not only time but also the achievement of a certain level of security and stability.

A key innovation of the model is the integration of four levels of intervention (individual, group, institutional, and systemic) with cross-cutting support components. This responds to the criticism of the fragmentation of approaches to education in crisis, which has been repeatedly expressed in international reports by UNESCO (2023). The model emphasizes that effective support requires synchronized actions at all levels, from individual psychological assistance to systemic educational policies.

The study reveals some paradoxes of the crisis experience. On the one hand, war creates destructive conditions for education: high teacher burnout, psychological traumatization of students, and destruction of infrastructure. On the other hand, the crisis stimulates innovations: large-scale digitalization, which in peacetime could take decades, the development of new pedagogical approaches that integrate learning and psychological support, and the formation of strong professional communities of practice. This is consistent with the concept of "post-traumatic growth" and raises the question of which elements of the crisis experience can be preserved and institutionalized in the post-war period as positive innovations.

Comparison with the experience of other conflicts reveals both commonalities and unique aspects of the Ukrainian situation. Similar to the Syrian experience described by Milton (2019), Ukrainian education is facing large-scale destruction of infrastructure and internal displacement of the population. However, unlike Syria, where the education system has largely collapsed, Ukraine demonstrates a higher level of institutional resilience, which is partly explained by a stronger initial institutional base, international support (World Bank, 2024), and digital infrastructure developed during the COVID-19 pandemic.

The experience of displaced universities, analyzed by Orzhel et al. (2023), demonstrates a unique model of institutional adaptation that has no direct analogues in other conflicts and may constitute a valuable case study for the international community.

The study's results have significant implications for education policy. First, a national strategy for psychological support for teachers, along with the allocation of appropriate resources, is needed, as high professional burnout threatens the long-term capacity of the system. Second, a differentiated regional policy is needed, taking into account the difference between the relatively safe western regions and the intensively affected eastern and southern territories. Third, investments in digital infrastructure should be accompanied by the development of «low-tech» alternatives to ensure resilience in conditions of unstable power supply. Fourth, it is necessary to support the institutional capacity of institutions, especially those that demonstrate low ISI, through the provision of methodological, technical, and financial assistance.

The study also has theoretical implications for understanding education in crisis. It empirically confirms the evolution from an economic concept of human capital to a humanistic approach to human capabilities, described by Leoni (2023), demonstrating that in crisis conditions, education performs multiple functions: not only preparing for future economic activity, but also protecting psychological well-being, preserving social identity, and building hope for the future. This requires a reevaluation of the criteria for assessing the effectiveness of education in crisis conditions: in addition to academic achievements, it is necessary to consider indicators of psychological well-being, social cohesion, and resilience.

The question of the long-term consequences of the war experience on Ukraine's human potential is important. Hameed et al. (2024), using the example of Afghanistan, demonstrated the asymmetric effects of a long war, where negative shocks have a deeper and longer-lasting impact. This caveat is particularly relevant for Ukraine: even after the end of the active phase of the conflict, the psychological consequences, gaps in education, and the loss of teaching staff will have a lasting impact. However, the experience of countries that have successfully recovered from

conflicts demonstrates the critical role of strategic investments in education as a mechanism for long-term recovery. Mohamed Yusuf Adan (2025) emphasizes the potential of peace education for transforming post-conflict societies, which should be taken into account when planning the post-war recovery of the Ukrainian education system.

The study's results open up prospects for further scientific exploration. Longitudinal studies are necessary to track the dynamics of the psychological states of teachers and students over an extended period, allowing us to understand adaptation trajectories better and identify factors of long-term resilience. An in-depth study of the experience of various vulnerable groups (children with special educational needs, internally displaced persons, and children from frontline areas) is important, since this study provides mainly a general picture. The issues of learning and development of preschool children, which remained outside the scope of this study, require attention. A comparative study of the effectiveness of different models of psychological support and pedagogical interventions, conducted through controlled or quasi-experimental designs, is promising.

The limitations of the study, as noted in the Materials and Methods section, require caution in generalizing the results. The lack of data from temporarily occupied territories creates an incomplete picture, and the self-reported nature of most data is susceptible to systematic bias. The dynamic nature of the war situation means that the results reflect a specific temporal slice and may change as events unfold. The predominantly online format of data collection may have created a sampling bias in favor of those with better access to technology, potentially underestimating the challenges faced by the most vulnerable groups.

Despite these limitations, the study makes an important contribution to understanding the restoration of human potential in educational environments during war, providing an empirical basis for policy development and practical interventions. The developed conceptual model offers an integrative framework for systemic support of the educational community, which can be adapted to other crisis contexts. The identified adaptive strategies of educators demonstrate the creativity and resilience of Ukrainian

education, which is a valuable resource for the country's future recovery.

Conclusions

The study revealed a complex picture of the functioning of Ukrainian education in wartime conditions, characterised by the simultaneous manifestation of profound challenges and powerful adaptive mechanisms at three interconnected levels of the educational system.

At the individual level, teachers demonstrate critically high levels of professional burnout, particularly secondary school teachers with indicators of emotional exhaustion, $M = 4.23 \pm 1.12$. At the same time, they spontaneously developed a wide range of adaptive strategies structured around three main dimensions: emotional support, which accounts for 28.3% of the variance in adaptive behaviour, technological adaptation (23.6%), and academic flexibility (16.5%). This highlights the holistic nature of the professional response to the crisis, which extends beyond purely technical solutions and incorporates psychosocial support into the pedagogical process. The strongest protective factor was the presence of social support ($r = -0.56$), highlighting the critical importance of professional communities in maintaining pedagogical potential. Educators have almost universally mastered digital tools, including instant messengers (96.8%) and video conferencing (91.2%), but their effectiveness is limited by specific military challenges, primarily the instability of power supply, which was reported by 83.0% of respondents.

At the institutional level, a cascading effect of support from the institution to individual teacher and student outcomes was found. Institutions with a high Institutional Support Index demonstrated half the levels of teacher emotional exhaustion compared to institutions with a low level of support (2.94 versus 4.87) and significantly higher student academic performance (78.6% versus 62.3%). This pattern confirms that institutional support is not merely an additional resource but a critical factor in the successful adaptation of the entire educational community within the institution. Effective institutions are characterized by three main components: a developed organizational infrastructure

(stable power supply, equipped shelters, technical support), functioning psychological services to support teachers, and managerial flexibility with adaptive work schedules and delegation of authority. These results justify the need to develop national standards for institutional support and targeted funding of the relevant components of institutional infrastructure.

At the systemic level, the educational process exhibits significant regional differentiation, with the prevalence of distance learning higher in the eastern and southern territories (67.9% and 56.5%, respectively) compared to the western regions, where face-to-face learning remains more prevalent (41.2%). This geographical disparity reflects the uneven security situation and creates long-term risks of deepening educational inequalities between regions, which requires the development of differentiated regional policies. For the eastern and southern regions, investments in autonomous power supply systems, mobile learning centers, and enhanced psychological support are critical, while the western regions need to develop capacities for receiving internally displaced students and hybrid learning models. Digital technologies have become a critical tool for ensuring the continuity of education; however, their effectiveness is limited by infrastructural challenges, necessitating the development of resilient digital infrastructure with alternative power sources, local educational servers, and offline versions of learning platforms.

The developed conceptual model of human potential restoration integrates all three levels of intervention through three temporal phases: survival, adaptation, and transformation. In the survival phase, the priority is to ensure basic safety and psychological support needs at the individual level, the functioning of minimal educational services at the institutional level, and emergency funding with regulatory flexibility at the system level. The adaptation phase involves training teachers in adaptive practices, forming professional communities, developing supporting infrastructure within institutions through the introduction of hybrid learning models, and implementing differentiated regional policies with investments in system resilience. The transformation phase focuses on the professional development of teachers through the integration of trauma-informed practices, the transformation of institutions into centers

of pedagogical innovation and inclusiveness, as well as systemic post-war recovery with the integration of the principles of peace education and social justice. The model takes into account the nonlinear nature of the recovery process with the possibility of regression depending on the security situation, which requires flexible response mechanisms at all levels.

Four cross-cutting components integrate all levels and phases of the model: psychological support, ranging from individual therapy to national burnout prevention programs; technological infrastructure, spanning from teachers' personal devices to national educational platforms; pedagogical innovation, from classroom practices to systemic reforms; and intersectoral collaboration, from school partnerships to international initiatives. This integration ensures synergy between the various levels of intervention, amplifying the effect of each component.

The practical significance of the study lies in the empirical substantiation of four priorities of educational policy. First, the development of a national strategy for psychological support for teachers should include the establishment of specialized support centers in each region, mandatory supervision for teachers in high-risk areas, and the integration of support into the system of advanced professional development. Second, implementing a differentiated regional policy with equalization mechanisms through compensation programs, additional funding, and academic mobility is expected to reduce regional gaps by 40%. Third, investments in resilient digital infrastructure with alternative power sources, local servers, and hybrid models that combine high- and low-tech methods. Fourth, systemic support for the institutional potential of institutions can be enhanced through targeted grants for institutions with a low Support Index, the creation of regional support hubs, and updating the regulatory framework for the operation of institutions during times of crisis.

The identified adaptive strategies of teachers can be systematised and disseminated as best practices through a system of professional development, which will allow scaling up successful experience to the entire education system. Indicators of the model's success include a 30% reduction in teachers' emotional exhaustion, an increase in the Institutional Support Index to 7 or more points in 70% of institutions, and a 40%

reduction in regional gaps in educational outcomes. These indicators will provide an objective assessment of the policy implementation's progress.

Prospects for further research include longitudinal tracking of the dynamics of adaptation of participants in the educational process to understand the long-term effects of the crisis and the effectiveness of interventions, in-depth study of the experience of vulnerable groups of students and teachers to develop targeted support programs, comparative analysis of the effectiveness of different models of institutional support to identify best practices, and planning for the post-war restoration of the education system with the integration of the lessons of the crisis period into the long-term transformation of Ukrainian education on the principles of resilience, inclusion, and social justice.

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