

Sergiy Londar

Dr. Sc. (Economics), Professor, SSI "Institute of Educational Analytics", Kyiv, Ukraine,
londar.sergiy@gmail.com
ORCID ID: <https://orcid.org/0000-0003-1838-288X>

Oleksandr Bosenko

Ph. D. (Economics), SSI "Institute of Educational Analytics", Kyiv, Ukraine,
bosenkooleksandr@gmail.com
ORCID ID: <https://orcid.org/0009-0004-3414-8908>

Ivan Gaiduk

Ph. D. (Economics), SSI "Institute of Educational Analytics", Kyiv, Ukraine, gaiduk94ivan@gmail.com
ORCID ID: <https://orcid.org/0000-0003-3144-1469>

ENSURING THE RESILIENCE OF UKRAINIAN EDUCATION DURING THE WAR AS AN EXPERIENCE FOR IMPROVING THE EDUCATION SYSTEMS IN THE EU COUNTRIES

Abstract. *The resilience of an educational system during wartime is determined by its capacity for rapid adaptive response to exogenous threats, internal structural reconfiguration, and the preservation of equitable access to high-quality education for all stakeholders. Ensuring systemic resilience requires not only legislative and regulatory modifications but also the integration of advanced technological solutions, the implementation of innovative governance frameworks, and the reengineering of the educational ecosystem to sustain operational continuity. This study seeks to identify, critically analyse, and systematically categorise the principal managerial strategies, technological interventions, and policy frameworks that have reinforced the adaptive capacity of Ukraine's education system under wartime conditions. The study further explores the scalability of these resilience-enhancing mechanisms within the context of European Union (EU) educational infrastructures. The analysis concerns key administrative and pedagogical reforms enshrined within legislative and regulatory instruments that have facilitated the systemic stabilisation and operational resilience of Ukraine's education sector. Particular emphasis is placed on the evolution and institutionalisation of digital learning infrastructures, which have become integral to the functional continuity of the educational process at all levels. The study evaluates the deployment of digital information management systems, AI-driven educational analytics, cloud-based e-learning platforms, and dynamic decision-support dashboards developed by the Ministry of Education and Science of Ukraine. These digital tools have significantly optimised real-time communication channels, facilitated comprehensive situational monitoring, and enabled data-informed policy formulation within the sector. Furthermore, they have played a pivotal role in the large-scale implementation of distance learning modalities, the preservation and dissemination of Ukrainian-language instructional content for displaced learners, and the adoption of innovative, evidence-based pedagogical methodologies. The study conducts a rigorous assessment of the empirical outcomes of these strategic interventions, with a focus on their implications for educational achievement metrics, institutional stability, and the psychological resilience of students and educators. Additionally, the research systematically identifies and synthesises the resilience deficits within EU educational frameworks, particularly in response to crisis-induced disruptions. The compounded impact of the COVID-19 pandemic and the unprecedented influx of refugee students from Syria, Ukraine, and various African regions have exposed critical*

© Лондар С. Л., Босенко О. С., Гайдук І. С., 2024

vulnerabilities in the EU's educational infrastructure, necessitating comprehensive structural recalibration. Ukraine's extensive experiential knowledge in maintaining educational continuity amidst severe sociopolitical upheaval presents a valuable repository of best practices. This accumulated expertise offers actionable insights for the European academic community, facilitating the development of robust contingency frameworks capable of sustaining inclusive, high-quality education in the face of systemic volatility.

Keywords: *resilience, education system, war, institutions, organisations, instruments, digital technologies, EU education systems.*

JEL classification: I21, I25, H56.

DOI: 10.32987/2617-8532-2024-6-5-25.

The education system is one of the key components of any country's development, performing the function of forming human capital, increasing intellectual potential and social cohesion. In times of war, education usually faces unprecedented challenges [1] that require rapid adaptation to new realities and the implementation of new effective management solutions. Ukraine, finding itself in the difficult conditions of the current full-scale war unleashed by Russia, has faced the need to transform the educational system, and increase its resilience in these conditions in order to continue the educational process and ensure access to education for every Ukrainian child. Today, we can state that despite thousands of damaged or destroyed educational institutions, millions of internally displaced persons and refugees fleeing the country, and constant Russian drone and missile attacks into the country, the Ukrainian education system has survived. Educational institutions continue to operate, and millions of children continue their education. Over the course of several years of war, Ukraine has accumulated invaluable experience in successfully ensuring resilience in emergency situations, which should be carefully analysed and scaled up for use by other countries.

The resilience of education in times of war is determined by the ability of the system to respond quickly to external threats, transform internally, adapt to changes and ensure access to quality education for all participants in the educational process. This requires not only legislative and regulatory changes, but also the introduction of innovative technologies and new approaches to the management and organisation of the educational environment.

Fig. 1 shows the distribution of Ukrainian children by type of education and age. It can be seen that the lion's share of them is covered by secondary education. Therefore, the study will focus on transformations that strengthen the resilience of secondary education.

To describe the results of our study, let us define the concepts of "education system" and "education resilience".

The scientific literature thoroughly analyses the structure and functions of the *social system* [3], which is defined as *a set of multifunctional, interacting elements that, through their interaction, create additional properties of synergy and emergence for the system that are not present in individual system's components.*

The education system is an important social system, and by analogy with [3], we will assume that the most important *structural elements (components) of*

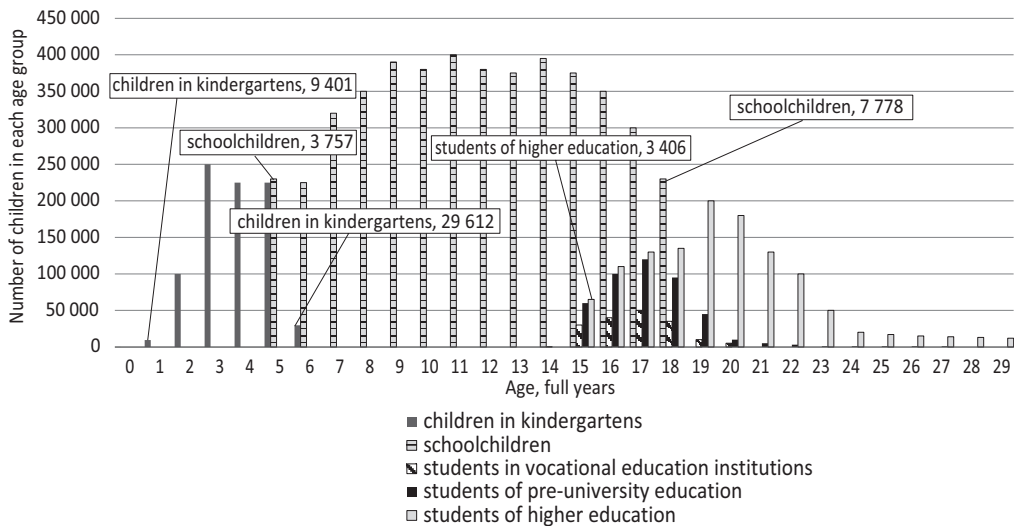


Fig. 1. Ukrainian children distribution by type of education and age in 2023

Constructed by the authors based on: [2].

the education system are *institutions* (the function of forming educational legislation, rules, preserving and disseminating the best traditions and customs, etc.), *organisations* (the function of direct implementation of the educational process; networks of educational institutions; educational management bodies; communities of schoolchildren, students and teachers, etc.) and *tools and technologies* (the function of developing and developing optimal management and educational methodologies). Interacting with each other, the components of the educational system ensure that members of society are educated, critically reflect on the prospects of society's development, and choose the best ways of development and the best technologies.

The Law of Ukraine "On Education" defines the education system as a set of legal acts regulating relations in education (*institutions*); educational institutions, other subjects of educational activity, participants in the educational

process, educational authorities (*organisations*), as well as components of education, levels and degrees of education, qualifications, study programmes, educational standards, licensing conditions (*tools and technologies*) [4].

As we can see, the legislative definition of the education system is structurally correlated with its scientific definition.

This understanding of the education system is confirmed by the structuring of education systems adopted in the EU, which is reflected in the descriptions of national education systems of the Eurydice network [5]. The Eurydice website provides detailed information on the organisation and functioning of education systems in European countries, offering descriptions of national education systems, comparative studies on specific topics, as well as educational indicators and statistics.

The purpose of the article is to identify, study and systematise the main management decisions, technological changes and strategies that have

strengthened the resilience of Ukraine's education system in the context of the war impact, for the purpose of possible scaling up in other countries, including the EU.

Since the outbreak of the COVID-19 pandemic, interest in education resilience has been growing worldwide. The Google Trends website shows that the number of searches for "education resilience", which had been increasing gradually, changed the trend dramatically in October 2022 and almost doubled in autumn 2024 (Fig. 2).

The geography of "resilience of education" research covers many countries, as shown in Fig. 3. Most attention is paid to this issue in the United States, the United Kingdom, Australia, Canada, and Germany, as these countries have developed educational systems and are actively conducting research in the field of education policy. China and India also make a significant contribution, as education is considered strategically important for economic growth.

Australia and New Zealand hold key positions due to their research on the impact of climate change and crises on education.

In Europe, this issue is actively represented in France, Italy, Spain and the Scandinavian countries, where the adaptation of education to digitalisation and social challenges is being studied. African countries are less involved, as education research in these regions is more focused on basic issues such as accessibility and funding. At the same time, Portugal and Ireland demonstrate a certain isolation on this topic, which can be explained by linguistic and scientific traditions.

Various aspects of the resilience of the education system in Ukraine during the war have been studied by the following national scholars: L. Londar, V. Rogova, Y. Semeniuk, O. Tashkinova, L. Ponomariova, Y. Lavrysh, I. Lytovchenko, V. Lukianenko, T. Holub [8-12], as well as their foreign colleagues: M. Pietsch, S. Lutar, S. Fergus, M. Zimmerman, N. Gar-

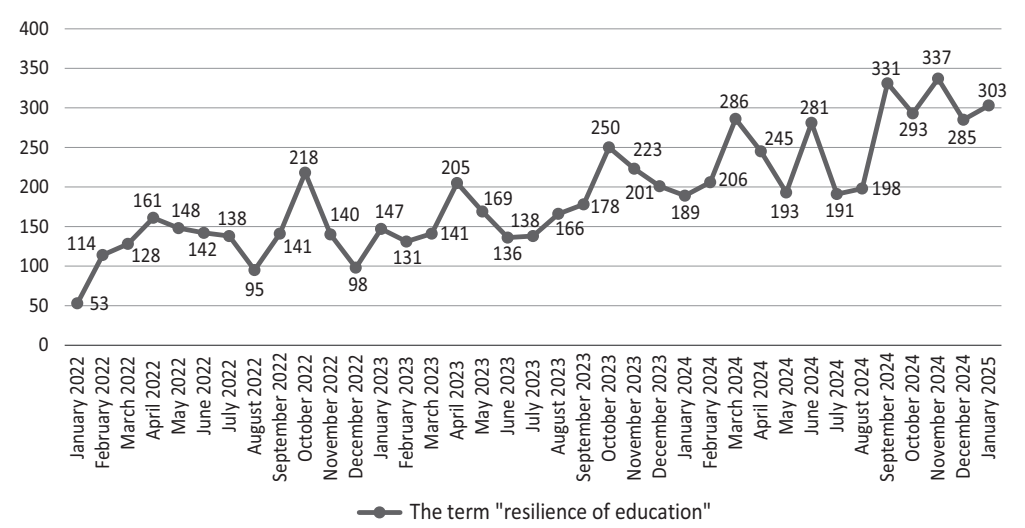


Fig. 2. Number of search queries for the term "resilience of education" from January 2022 to 2025

Constructed by the authors based on: [6].

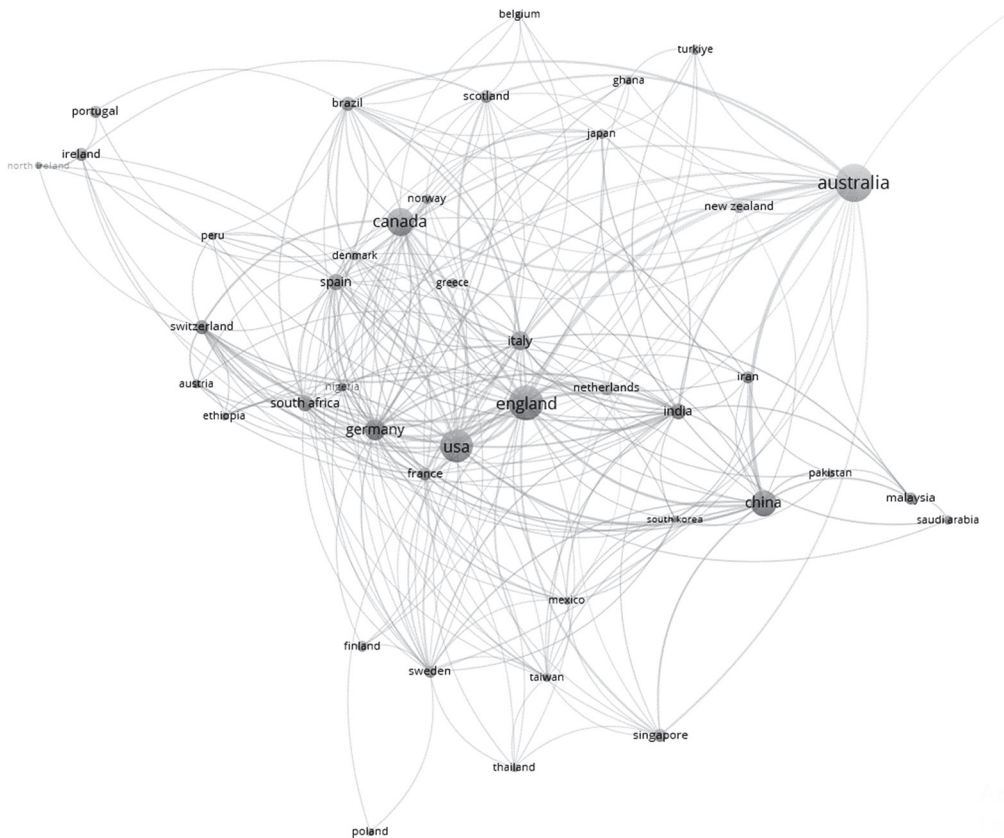


Fig. 3. Geography and magnitude of research on the topic "resilience of education" in the context of countries worldwide

Constructed by the authors based on: [7].

mezi, A. Masten, M. Wang, G. Haertel, H. Walberg, A. Masten, etc. [8; 13–17].

Let's analyse the content of the concept of "resilience of education".

The most common understanding of system resilience by many researchers is that the system has the potential for positive adaptation in the face of disturbances and its transformation to achieve a new stable state.

For example, S. Lutar [13] names two bypass conditions for the concept of resilience: positive adaptation and the presence of disturbances. In general, there are three models of resilience in the scientific literature, which

were formed under the influence of the understanding of the concept of "resilience" in various areas of public life: compensatory, protective, and risk-oriented (challenge model) [14]. While the defensive model is aimed more at forming passive protection, the compensatory and risk-oriented models provide for active protection of the system, starting with actions to analyse the risks of disturbances and ending with the formation of active mechanisms to counteract the most intense risks.

In general, the term "resilience" in the public sphere refers to factors

and processes that relate to negative behavioural reactions associated with stress and lead to adaptive outcomes in these conditions. For example, N. Garmezi and A. Masten defined resilience as "the process, ability or result of successful adaptation despite challenges and threatening circumstances" [15].

As for the general definitions of resilience in education, one of the most widely used in western sources is "increasing the likelihood of success in achieving educational outcomes and other life achievements despite negative environmental influences" [16].

The systemic review [17] defines the concept of resilience in the education system as "the ability of the education system to perceive, withstand and adapt to disturbances while ensuring the continuity of its functioning".

In practice, the resilience of the education system is ensured at different levels. At the top level, education policy is formed and processes are planned to strengthen the system, identify future risks, respond to crises and plan recovery measures [18].

At the level of teaching and learning, measures include teacher training, development of teaching materials, introduction of distance learning approaches during school closures, and provision of remedial education programmes to overcome learning losses [8].

At the level of educational infrastructure, measures are focused on creating a safe learning environment, ensuring water supply, sanitation and hygiene, restoring damaged buildings and structures, and building climate-resilient schools [19].

At the school and community level, initiatives include developing school

safety and continuity management plans, creating safe school environments, training communities to prevent and respond to risks, strengthening links between schools and community groups, and campaigns to return refugee children to school.

At all these levels, the needs of marginalised groups need to be addressed, as education systems that are neither equitable nor inclusive cannot be sustainable by definition [18].

According to the level approach, researchers consider several forms of educational resilience, namely: individual resilience, educational resilience and organisational resilience.

The pedagogical literature is dominated by research on 'individual learning resilience', which is in the field of human psychology and refers to a person's ability to cope with and recover from adversity [20]. Studies of individual resilience in the Western literature also cover factors beyond the individual, combining individual resilience with an understanding of resilience at the systemic level [21]. Studies of "educational resilience" and "teacher resilience" look at teachers' well-being, job satisfaction, or, conversely, the degree of burnout. Tools such as the Teacher Burnout Scale, the Organisational Wellbeing Index, and the Andrews and Withey Satisfaction Scale are used [22].

The resilience of the system as a whole, as well as the resilience of individual organizations within it (organisational resilience), is considered as desirable system characteristics that enable them to cope with all types of adverse circumstances [23]. Organisational resilience refers to the ability of educational organisations

or the education system as a whole to adapt to predictable failures and adjust to unforeseen sudden shocks [24]. The concept of adaptive organisational resilience always includes three main aspects:

- 1. Ability to manage crises in an unstable and changing environment.
- 2. Focusing on survival, adaptation to conditions and the ability to recover and improve in destructive situations.
- 3. A multi-level concept relating to organisational resources, procedures and processes.

In this context, the concept of adaptive organisational resilience includes the assumption that resilient organisations not only survive crises, but also learn quickly from their experiences and can even thrive. According to the researchers, resilience at the individual level is not the key to organisational resilience; it is the collective, systemic level of action that is important and builds resilience. Accordingly, Hillman and Gunther [25, p. 31] define organisational resilience as "the ability of an organisation to maintain its functions and recover quickly from

adverse circumstances by mobilising and accessing the necessary resources. The organisation's response to adversity is learning and further growth".

Researchers emphasise that after a disruption, the education system often cannot return to its pre-crisis state. Therefore, the resilience of the educational system should also be understood as "constant adaptation and proactive anticipation of changing circumstances" [26]. This means perceiving resilience as a process in which individuals and organisations have to overcome and mitigate existing risks to achieve positive results [27]. Resilience is possible if the environment and the organisation are in an interdependent learning cycle.

Fig. 4 presents a schematic representation of the generalised process of ensuring the resilience of an educational system (organisation).

Thus, based on the analysis, the resilience of the education system can be seen as its ability to flexibly adapt to unforeseen events, challenges, risks at different levels by using its internal energy for analysis and self-learning.

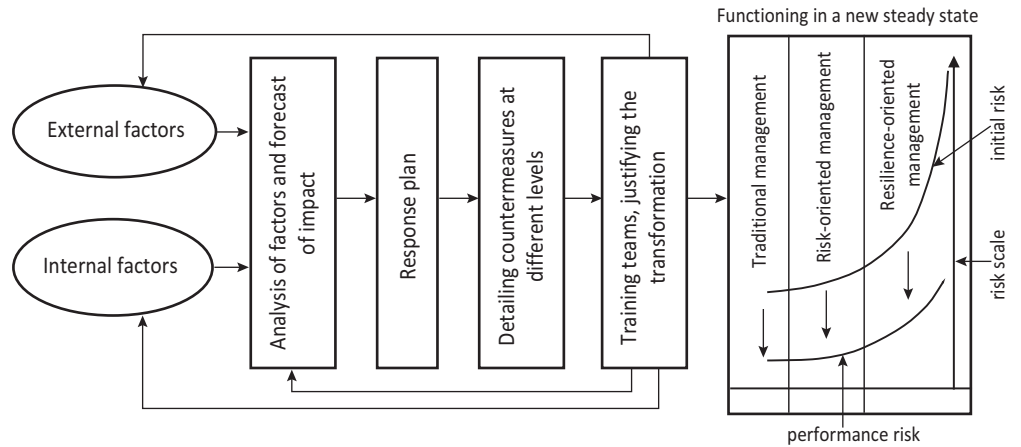


Fig. 4. Resilience of the educational system in times of crisis: stages of formation and components

Constructed by the authors based on: [18].

ning, transformation, renewal and development, using active and effective change management, maintaining and expanding access to the necessary resources, achieving a new sustainable state of operation in changed conditions that differ significantly.

The education system in Ukraine has faced unprecedented challenges due to the insecurity caused by the war. The educational process is forced to adapt to constant threats, significant population displacements and the destruction of infrastructure. Pupils and students often change their place of residence, making it difficult for them to integrate into new learning environments. At the same time, many educational institutions have been damaged or completely destroyed, making it impossible for them to operate normally. The lack of material and financial resources further exacerbates the problem, limiting the ability to resume the educational process. Educators and students face significant psychological difficulties, which affect their ability to teach and learn effectively. The use of digital technologies could be a way out, but not everyone has sufficient technical training for quality distance learning. The situation with human resources is particularly threatening due to the outflow of qualified specialists. Inequality in access to education between different regions of Ukraine is growing, which may have long-term consequences for the country's development.

Let's consider the range of key challenges that require a comprehensive approach and support at the national and international levels:

- significant movement of people from the place of danger (movement of parents with schoolchildren, both within the country and abroad);

- possible destruction and loss of educational infrastructure;

- lack of resources (material, financial) to restore the participation of affected persons in the educational process (access to education for students, resettlement of teachers in a new location, etc;)

- possible losses of educational staff and students (due to staff attrition, injuries, illnesses or deaths);

- lack of readiness to use digital and distance learning technologies due to insufficient qualifications;

- psychological vulnerability of participants in the educational process;

- increased inequality in access to education.

Thus, over the course of several years of war, Ukraine has gained invaluable experience in successfully ensuring the resilience of its education system in the face of extraordinary circumstances. Many educational systems around the world, including the EU, are also facing numerous challenges caused by migration, climate and other social factors. Therefore, Ukraine's experience should be carefully analysed and used by other countries, including the EU, to make practical decisions aimed at strengthening the resilience of their own education systems.

Let's consider the detailed changes in the components of the education system (institutions, organisations, technologies and tools) in Ukraine during the war that contributed to the improvement of education resilience.

During the war, Ukraine underwent significant changes at the institutional level to ensure its resilience. The government adopted a number of legislative acts regulating the functioning of educational institutions under martial law.

In particular, by law:

- flexible forms of education were introduced, including distance, blended and asynchronous education for children in combat zones or abroad;

- amendments were made to state education standards to allow for the adaptation of curricula to meet the needs of students in crisis;

- a number of bureaucratic procedures, including teacher certification and licensing of educational institutions, were eased to ensure the continuity of the educational process;

- a decision was made to maintain funding for educational institutions, even if students temporarily left the country;

- a regulatory framework was created to support teachers who were forced to move and continue to work remotely;

- mechanisms for international recognition of Ukrainian educational documents were introduced, which facilitates the education of refugee children abroad;

- psychosocial support programmes for students and teachers were expanded, etc.

Let's examine some of the key regulatory measures introduced in the initial months following the full-scale invasion of Ukraine by the Russian Federation:

1) Order on the establishment of the Situation Centre of the Ministry of Education and Science of 24.02.2022 No. 229 – ensured operational monitoring of the state of education in the context of war and coordination of actions to support educational institutions. The Situation Centre contributed to a rapid response to threats, ensuring the safety of participants in the educational process and the resumption of education [28];

2) Order on some issues of organising the work of professional pre-higher and

higher education institutions during martial law of 07.03.2022 No. 235 – regulates the specifics of the functioning of higher education institutions, including the possibility of flexible learning and distance learning for teachers. This made it possible to maintain the educational process in difficult conditions and support students, including those who were forced to leave [29];

3) Order on some issues of organisation of general secondary education and the educational process under martial law in Ukraine of 28.03.2022 No. 274 – ensuring the continuity of school education through distance formats, adaptive timetables and international cooperation. The order also regulated the education of children abroad through integration into Ukrainian and local education systems [30];

4) Order on the organisation and conduct of the national multi-subject test in 2022 No. 434 dated 12.05.2022 – introduction of an alternative to the traditional EIT in the form of a multi-subject test, which allowed graduates to gain access to higher education despite the military circumstances [31];

5) The Order on Approval of the Procedure for Interagency Cooperation on the Issuance of Documents on Basic Secondary Education and Complete Secondary Education Issued under Martial Law in Ukraine dated 09.06.2022 No. 538/192 – regulated the mechanism for issuing certificates to Ukrainian schoolchildren who were forced to go abroad, ensuring their right to education. The order also facilitated the integration of Ukrainian graduates into the global education system without losing opportunities for further education [32].

During the war, the organisational structure of Ukraine's education system

was significantly transformed, which helped it adapt to the new conditions. Educational institutions changed the format of their work and introduced distance and blended learning. A significant number of students and schoolchildren went abroad, which led to the creation of Ukrainian educational hubs in European countries. Governing institutions have revised their approaches to managing educational institutions by introducing digital systems for monitoring and coordinating the educational process. Civil society organisations and international partners have been actively involved in supporting Ukrainian educational institutions by providing grant funding and educational materials. An important area has been the formation of new communities of schoolchildren, students and teachers who support each other through online platforms. Universities and schools have joined forces to develop new teaching methods that take into account the needs of children in crisis. Cooperation between public and private educational institutions has been strengthened to jointly address educational challenges. Initiatives are being actively developed to support teachers who have remained in Ukraine or have been forced to move. As a result, the education system has become more flexible, networked, and ready to adapt in the face of instability.

Another important factor was the introduction of new educational and management technologies and educational tools. The massive introduction of distance learning took place through Zoom, Google Classroom, Moodle and other digital platforms. Education management information systems have been introduced to track the movement of students and teachers and keep in touch with

them. The Ukrainian Component programme has been created for children who have moved abroad, allowing them to keep in touch with the national education system. In the face of the destruction of schools and the threat of shelling in the frontline areas, underground school shelters are being opened to ensure safe learning. In the area of inclusive education, initiatives such as the Superheroes School have been stepped up to support the education of children with special educational needs. Adaptive educational technologies play an important role, allowing for the individualisation of the learning process according to the capabilities of students. The widespread use of mobile applications for self-study helps to reduce the knowledge gap due to the intermittent educational process. Educational organisations have expanded online psychological support for teachers, students and their parents. The use of technology has significantly increased the resilience of Ukrainian education, ensuring that it can function even in emergency situations.

In the context of the war, a set of new technological solutions and a set of digital educational tools have been developed to ensure the resilience of Ukraine's education, with national educational management information systems and electronic platforms as the core (Fig. 5):

- The Automated Information Complex for Educational Management (AICEM) software and hardware complex ensures effective management of educational processes at all levels, allowing for quick and informed decision-making based on up-to-date data;

- The automated system for the "Inclusive Resource Centers" plays an important role in ensuring access to education for children with special

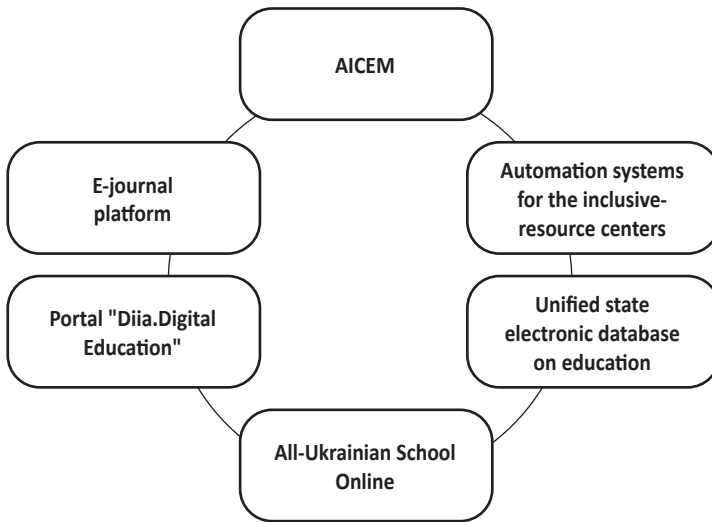


Fig. 5. Complex of national educational management information systems and key electronic platforms in the Ukrainian education system for ensuring resilience in wartime conditions

Constructed by the authors.

educational needs. It helps to coordinate the work of inclusive resources, which helps to create equal opportunities for all students, regardless of their individual needs;

- The E-journal platform provides convenient access to electronic journals, which simplifies the process of monitoring student performance and interaction between teachers, parents and school administrators;

- The All-Ukrainian School Online platform has become an important tool for providing access to quality educational materials for children who have been displaced or are living in difficult conditions due to the war;

- The Unified State Electronic Database on Education (USEDE) combines information on all educational institutions, students and educational programmes, which promotes transparency, management efficiency and reduces bureaucracy;

- Educational portals. The example of the Diia.Digital Education portal

shows that such electronic products are an important resource for improving universal access to education and increasing digital literacy, which is especially important in the context of the growing role of distance learning.

Together, these tools ensure the flexibility, accessibility and adaptability of Ukraine's education system. They facilitate the integration of innovative technologies into the learning process, increase the efficiency of education management at the state level, and ensure equal access to quality education for all citizens. Thanks to these solutions, the education system becomes less dependent on external challenges and can function even in the most difficult conditions. This creates a strong foundation for building a sustainable, innovative and inclusive education system that can ensure Ukraine's sustainable development in the future.

The resilience of Ukraine's education system is a key factor in ensuring its effectiveness in the face of modern

challenges, including war. It covers different levels, including institutions, organisations, technologies and tools. The developed resilience criteria are aimed at improving the quality of education, teachers' professional performance, and the effectiveness of educational process management and educational policy. Of particular importance is the monitoring and evaluation of the quality of education, which allows for timely response to changes and adjustments to educational strategies. The figure below illustrates the relationship between these criteria,

emphasising their role in building a sustainable education system (Fig. 6).

Thus, the resilience of Ukraine's education system is based on a comprehensive approach to improving the quality of education at all levels, from the classroom to the level of the ministry that shapes public policy. Effective governance, support for teacher professional development, innovative approaches to student learning, and transparent monitoring ensure that the system is adaptable to any challenges at the institutional, organisational, and technological

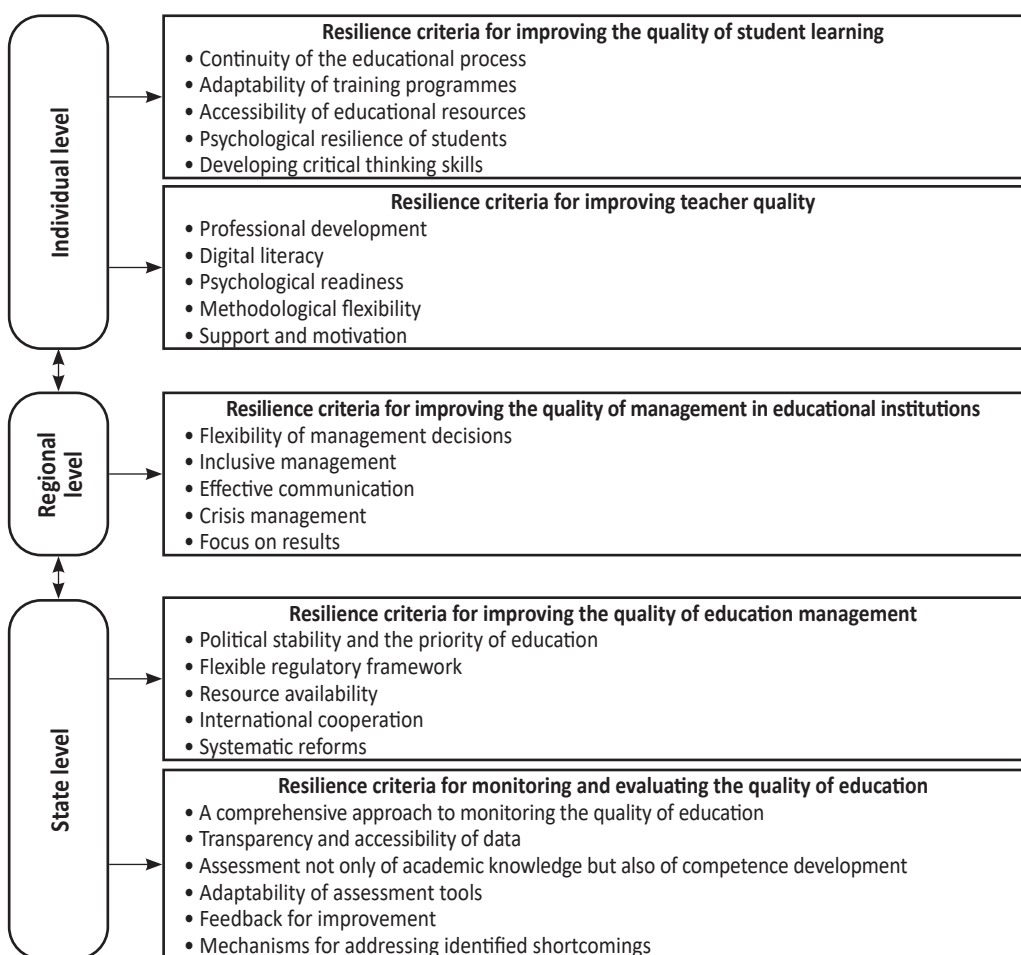


Fig. 6. Criteria for assessing the resilience of the education system

Constructed by the authors.

levels. Each criterion plays an important role in strengthening the educational environment, contributing to its flexibility and resilience. The systematic integration of these approaches allows for the creation of conditions for a continuous educational process even in crisis situations. Ultimately, a sustainable education system is the basis for the development of human capital that ensures the country's future.

It should be noted that EU countries also need to improve the resilience of education to ensure sustainable development. In particular, this has been revealed by the disturbances associated with Covid-19 [33].

Among the tasks formulated by the European Commission *in the institutional component of education* are:

- establishing mechanisms for coordinating EDC in educational systems, including needs and measures related to disaster prevention;
- ensure the development of an educational policy that guarantees access to online learning for students from low-income groups;
- establishment of ongoing monitoring and evaluation for continuous improvement of schools/vocational institutions/universities;
- regulate the facilitation and support of cooperation between stakeholders in the autumn process aimed at overcoming the consequences of the pandemic and ensuring sustainable development;
- designing and developing quality assurance systems for educational institutions to manage an institution-wide approach.

The tasks formulated by the European Commission *in the technology and tools component* include:

- development of teaching methods for education on sustainable development, development of competences and skills for sustainable development in the face of disturbances;

- development of a future European framework of core competences for sustainable development in the face of disruption, taking into account efficient technologies, clean technologies, artificial intelligence, etc;

- developing training courses and teaching on sustainable development issues with the integration of challenges related to the impact of the pandemic;

- a stable system of teacher training in ESD with clear priorities, incentives and a traceable specialisation in ensuring resilience of education and sustainable development in the short, medium and long term;

- the availability of a sustainable development information system for teachers in the EU to ensure effective professional orientation and adaptation of educational and training offers.

Another major disturbance, in addition to Covid-19, for EU education systems has been the massive influx of migrant students from countries where wars have broken out, including Syria, Ukraine, and some African countries. Migration processes have revealed new aspects of the lack of educational resilience. In particular, the European Union report points to a number of challenges that directly affect the resilience of education, ranging from providing such students with immediate access to education or educational resources to ensuring the continuity of migrant students' education and preparing them for future return to their country of origin [34].

The most frequently mentioned problems in school education in EU countries are:

- language barriers in the language of instruction;
- ensuring the well-being of students necessary for learning;
- a shortage of teachers;
- creating opportunities for families to keep in touch with their countries of origin through online learning, etc.

Important in this context is the need to create or improve a favourable legal framework (the institutional component of the education system). For example, refugee students are currently required to attend local schools only in more than half of the EU countries, while the other half is still preparing to introduce compulsory education for all children in the near future. Therefore, only about half of the EU countries currently organise reception or integration classes for refugee students, some of them specifically for students from Ukraine. EU countries are forced to urgently change their legislation (Poland), seek additional funding (Belgium), and launch an improved system of language (Czech Republic) and psychological (Estonia) support.

Thus, increasing the resilience of education in the current environment, characterised by excessive turbulence, is an urgent and common task for Ukraine and the EU. In Ukraine, new approaches are being created in conditions that are as close as possible to extreme practice – the conditions of a full-scale war – and the use of this experience will help optimise changes in the education systems of EU countries.

Therefore, Ukraine's education system has a significant experience of survival in difficult circumstances, which

represents a vast knowledge base for the global community on how to organise education in extreme conditions, ensuring access to education for all children and maintaining the quality of this education. This experience can be scaled up for many educational systems, including in the EU, which may find themselves in unstable conditions for various social reasons.

The scientific novelty of the study is to systematise and structure the components of the experience of strengthening the resilience of the Ukrainian education system in the context of war, as well as to identify the shortcomings of the EU education systems, for which this experience can be successfully used.

In particular, EU countries should learn from Ukraine's experience of rapidly implementing digital solutions to ensure continuity of education in times of crisis. The use of national platforms, such as the All-Ukrainian School Online, can serve as an example of a centralised approach to digital education. Ukrainian teachers and lecturers were able to quickly master new technologies, demonstrating the importance of systematic digital skills training. The capabilities of educational managers in Ukraine have been significantly enhanced by the development of national information systems AICEM and USEDE, and the Ministry's dashboard has been able to provide managers with up-to-date information on the most important indicators several times a month. This made it possible, even in the context of significant migration of parents with children, to make management decisions in the field of education based on evidence.

EU countries should also adopt the practice of creating mobile educational spaces, such as underground schools or learning hubs for displaced people. Ukraine has also developed mechanisms for rapid accreditation and recognition of educational documents, which could help EU countries in the event of mass migration. An important lesson is the introduction of psychological support through educational platforms and mobile applications for students and teachers. The effective use of chatbots, such as the Educational Chatbot, helps to keep the participants in the learning process informed.

Ukraine has shown how to ensure the integration of refugees into the education system without a critical gap in education, which is also relevant for the EU in connection with migration challenges. The Ukrainian experience also shows that cooperation between the state, business and international organisations is crucial for enhancing the information resilience of education in extreme conditions. Cooperation between scientists, managers, and educators in Ukraine and the EU will contribute to the further development of their educational systems and strengthen their resilience in the face of future challenges.

References

1. SSI "Institute of Educational Analytics". (2022). *Education in Ukraine under martial law*. Retrieved from https://iea.gov.ua/wp-content/uploads/2022/08/education-of-ukraine_2022.pdf [in Ukrainian].
2. UNICEF. (n. d.). *Situation Analysis of Children in Ukraine: 2024*. Retrieved from <https://www.unicef.org/ukraine/reports/sitan2024> [in Ukrainian].
3. Londar, S. (2012). Clarification of financial and economic definitions in the context of the post-crisis realities. *Finance of Ukraine*, 12, 69-78. Retrieved from https://finukr.org.ua/?page_id=723&aid=672 [in Ukrainian].
4. Verkhovna Rada of Ukraine. (2017). *On education* (Act No. 2145-VIII, September 5). Retrieved from <https://zakon.rada.gov.ua/laws/show/2145-19#Text> [in Ukrainian].
5. European Commission. (n. d.). *Eurydice: National Education Systems*. Retrieved from <https://eurydice.eacea.ec.europa.eu/national-education-systems>.
6. Google Trends. (n. d.). *Resilience of education*. Retrieved from <https://trends.google.com/trends/explore?date=today%205-y&q=resilience%20of%20education&hl=en-US>.
7. Web of Science. (n. d.). *Search for articles by keywords "resilience of education"*. Retrieved from <https://www.webofscience.com/wos/woscc/summary/972da252-52f3-40fe-869c-c48dbed1b0ad-014909cf5c/relevance/1>.
8. Londar, L., & Pietsch, M. (2023). Providing distance education during the war: the experience of Ukraine. *Information Technologies and Learning Tools*, 98(6), 31-51. DOI: <https://doi.org/10.33407/itlt.v98i6.5454>.
9. Rohova, V. B., & Londar, S. L. (2022). Management information-analytical tools for ensuring educational security. *Education in Ukraine under martial law: management, digitalization, Eurointegration aspects*, Proceedings of the 4th International Scientific and Practical Conference. Retrieved from https://iea.gov.ua/wp-content/uploads/2022/12/book-of-abstracts_ssiiea_2022.pdf [in Ukrainian].
10. Semenyuk, Y. (2024). The concept of sustainability of the education management system: foreign models and approaches to definition. *Theoretical and Applied Issues of State-building*, 31, 71-80. DOI: <https://doi.org/10.35432/tisb312024306538> [in Ukrainian].

11. Tashkinova, O., & Ponomaryova, L. (2024). Professional resilience of educators in Ukrainian higher education institutions during the war: pathways for support and development. *Social work and social education*, 2(13), 120-129. DOI: [https://doi.org/10.31499/2618-0715.2\(13\).2024.316717](https://doi.org/10.31499/2618-0715.2(13).2024.316717) [in Ukrainian].
12. Lavrysh, Yu., Lytovchenko, I., Lukianenko, V., & Golub, T. (2022). Teaching during the wartime: Experience from Ukraine. *Educational Philosophy and Theory*, 57(3), 197-204. DOI: <https://doi.org/10.1080/00131857.2022.2098714>.
13. Luthar, S. S. (2006). Resilience in Development: A Synthesis of Research across Five Decades. In *Developmental Psychopathology: Volume Three: Risk, Disorder, and Adaptation* (pp. 739-795). DOI: <https://doi.org/10.1002/9780470939406.ch20>.
14. Fergus, S., & Zimmerman, M. A. (2005). Adolescent resilience: A Framework for understanding health development in the face of risk. *Annual Review of Public Health*, 26, 399-419. DOI: <https://doi.org/10.1146/annurev.publhealth.26.021304.144357>.
15. Garmezy, N., & Masten, A. S. (1991). The protective role of competence indicators in children at risk. In *Life-span developmental psychology: Perspectives on stress and coping* (pp. 151-174). Retrieved from <https://www.scirp.org/reference/referencespapers?referenceid=822155>.
16. Wang, M., Haertel, G., & Walberg, H. (1993). *Educational Resilience in Inner Cities*. Retrieved from <https://files.eric.ed.gov/fulltext/ED399312.pdf>.
17. Masten, A. S. (2021). Resilience in developmental systems: Principles, pathways, and protective processes in research and practice. In *Multisystemic resilience: Adaptation and transformation in contexts of change* (pp. 113-134). Retrieved from <https://doi.org/10.1093/oso/9780190095888.003.0007>.
18. Cameron, L., Thomas, E., Amenya, D., West, H., Mugiraneza, J-P., & Page, E. (2024). *Education System Resilience*. Global Partnership for Education Knowledge and Innovation Exchange: Washington DC, USA, and Ottawa, Canada. Retrieved from <https://www.gpekix.org/knowledge-repository/education-system-resilience-gpe-kix-scoping-study-working-paper>.
19. GPE. (2023). *The Need for Climate-Smart Education Financing: A review of the evidence and new costing framework*. Retrieved from <https://www.globalpartnership.org/node/document/download?file=document/file/2023-12-climate-smart-education-financing-review-evidence-costing-framework.pdf>.
20. Fletcher, D., & Sarkar, M. (2013). Psychological Resilience. *European Psychologist*, 18(1). DOI: <https://doi.org/10.1027/1016-9040/a000124>.
21. Theron, L., Ungar, M., & Hölte, J. (2023). Student resilience to COVID-19-related school disruptions: The value of historic school engagement. *School Psychology International*, 44(2), 190-213. DOI: <https://doi.org/10.1177/01430343221138785>.
22. Kangas-Dick, K., & O'Shaughnessy, E. (2020). Interventions that promote resilience among teachers: A systematic review of the literature. *International Journal of School & Educational Psychology*, 8(2), 131-146. DOI: <https://doi.org/10.1080/21683603.2020.1734125>.
23. Linnenluecke, M. K. (2017). Resilience in Business and Management Research: A Review of Influential Publications and a Research Agenda. *International Journal of Management Reviews*, 19(1), 4-30. DOI: <https://doi.org/10.1111/ijmr.12076>.
24. Ma, Zh., Xiao, L., & Yin, J. (2018). Toward a dynamic model of organizational resilience. *Nankai Business Review International*, 9(3), 246-263. DOI: <https://doi.org/10.1108/NBRI-07-2017-0041>.
25. Hillmann, J., & Guenther, E. (2021). Organizational Resilience: A Valuable Construct for Management Research? *International Journal of Management Reviews*, 23(1), 7-44. DOI: <https://doi.org/10.1111/ijmr.12239>.

26. Dülks, J., Fekete, A., Karutz, H., Kaufmann, J., & Posingies, C. (2023). Identification of methodologies to quantify education system resilience – A scoping review. *International Journal of Disaster Risk Reduction*, 97, 103967. DOI: <https://doi.org/10.1016/j.ijdr.2023.103967>.
27. Heinimann, H. R., & Hatfield, K. (2017). Infrastructure Resilience Assessment, Management and Governance – State and Perspectives. In *Resilience and Risk. NATO Science for Peace and Security Series C: Environmental Security*. Springer, Dordrecht. DOI: https://doi.org/10.1007/978-94-024-1123-2_5.
28. Ministry of Education and Science of Ukraine. (2022). *On the establishment of the Situation Centre* (Order No. 229, February 24). Retrieved from <https://mon.gov.ua/npa/pro-utvorenniya-situacijnogo-centru-mon> [in Ukrainian].
29. Ministry of Education and Science of Ukraine. (2022). *On some issues of organizing the work of professional pre-higher and higher education institutions during martial law* (Order No. 235, March 7). Retrieved from <https://zakon.rada.gov.ua/rada/show/v0235729-22#Text> [in Ukrainian].
30. Ministry of Education and Science of Ukraine. (2022). *On some issues of organization of general secondary education and the educational process under martial law in Ukraine* (Order No. 274, March 28). Retrieved from <https://zakon.rada.gov.ua/rada/show/v0274729-22#Text> [in Ukrainian].
31. Ministry of Education and Science of Ukraine. (2022). *On organizing and conducting a national multi-subject test in 2022* (Order No. 434, May 12). Retrieved from <https://mon.gov.ua/npa/pro-organizaciyu-ta-provedennya-u-2022-roci-nacionalnogo-miltipredmetnogo-testu> [in Ukrainian].
32. Ministry of Education and Science of Ukraine, Ministry of Foreign Affairs of Ukraine. (2022). *On approval of the Procedure for interagency cooperation on the delivery of documents on basic secondary education and complete general secondary education issued under martial law to students who are outside Ukraine* (Order No. 538/192, June 09). Retrieved from <https://zakon.rada.gov.ua/rada/show/v0538729-22#Text> [in Ukrainian].
33. European Commission. (2021). *EENEE Analytical report N°02/2021 – Impact of COVID-19 on Education for Sustainable Development (ESD) in the context of twin transition*. DOI: <https://doi.org/10.2766/89568>.
34. European Commission. (2024). *How countries are addressing the integration of children from Ukraine in EU education systems*. Retrieved from <https://education.ec.europa.eu/news/how-countries-are-addressing-the-integration-of-children-from-ukraine-in-eu-education-systems>.

Лондар С. Л.

доктор економічних наук, професор, перший заступник директора з наукової роботи
ДНУ «Інститут освітньої аналітики», Київ, Україна, londar.sergiy@gmail.com
ORCID ID: <https://orcid.org/0000-0003-1838-288X>

Босенко О. С.

кандидат економічних наук, науковий співробітник ДНУ «Інститут освітньої аналітики»,
Київ, Україна, bosenkooleksandr@gmail.com
ORCID ID: <https://orcid.org/0009-0004-3414-8908>

Гайдук І. С.

кандидат економічних наук, науковий співробітник сектора організації автоматизованого
збору освітньої статистики ДНУ «Інститут освітньої аналітики», Київ, Україна,
gaiduk94ivan@gmail.com
ORCID ID: <https://orcid.org/0000-0003-3144-1469>

ЗАБЕЗПЕЧЕННЯ СТІЙКОСТІ УКРАЇНСЬКОЇ ОСВІТИ В УМОВАХ ВІЙНИ ЯК ДОСВІД ДЛЯ ВДОСКОНАЛЕННЯ ОСВІТНІХ СИСТЕМ КРАЇН ЄС

Анотація. Стійкість системи освіти в умовах війни визначається її здатністю швидко реагувати на зовнішні загрози, внутрішньо трансформуватися, адаптуватися до змін та забезпечувати доступ до якісного навчання для всіх учасників освітнього процесу. Це вимагає не лише законодавчих і нормативних змін, а й інноваційних технологій, нових підходів до управління та організації освітнього середовища. Метою статті є ідентифікація, вивчення й систематизація основних управлінських рішень, технологічних змін і стратегій, що забезпечили стійкість системи освіти України в умовах війни, задля їх можливого масштабування в інших країнах, зокрема державах-членах ЄС. У статті розглядаються ключові управлінські рішення, закріплені законодавчими та нормативно-правовими актами, освітянські підходи, які сприяли підвищенню стійкості української освітньої системи. Особливу увагу приділено аналізу розвитку інформаційних технологій, що на сьогодні вже застосовуються на всіх стадіях і рівнях української освіти та стали важливою складовою забезпечення її стійкості. Зокрема, розглянуто управлінські й навчальні технології з використанням інформаційних систем, електронних платформ, оперативних інформаційних дашбордів МОН, які стали важливими інструментами розвитку комунікацій, моніторингу ситуації та прийняття обґрунтованих рішень у сфері освіти. Їх використання також забезпечило впровадження дистанційного навчання, функціонування програм зі збереження україномовного контенту для дітей-біженців та реалізацію інших інноваційних педагогічних підходів. Проаналізовано результати цих рішень, а також їх вплив на якість освіти й психічний стан учнів і вчителів. Окрім того, ідентифіковано та узагальнено виклики стійкості в системах освіти країн ЄС. Пандемія COVID-19 і наплив упродовж останніх років школярів-біженців із Сирії, України, країн Африки виявили в освіті ЄС цілу низку недоліків, які потрібно виправляти. Система освіти України має цінний досвід виживання у складних обставинах, сформовано величезну базу знань, що може бути використана європейською спільнотою для організації навчання в турбулентних соціальних умовах із метою забезпечення доступу до шкільної освіти для всіх дітей і підтримання її належної якості.

Ключові слова: стійкість, система освіти, війна, інституції, організації, інструменти, цифрові технології, освітні системи ЄС.

Список використаних джерел

1. Освіта України в умовах воєнного стану : інформ.-аналіт. зб. / ДНУ «Інститут освітньої аналітики». Київ, 2022. 358 с. URL: https://iea.gov.ua/wp-content/uploads/2022/08/education-of-ukraine_2022.pdf.
2. Ситуаційний аналіз становища дітей в Україні: 2024 / UNICEF. URL: <https://www.unicef.org/ukraine/reports/sitan2024>.
3. Лондар С. Л. Уточнення фінансово-економічних дефініцій у контексті пост-кризових реалій. *Фінанси України*. 2012. № 12. С. 69–78. URL: https://finukr.org.ua/?page_id=723&aid=672.
4. Про освіту : Закон України від 05.09.2017 № 2145-VIII. URL: <https://zakon.rada.gov.ua/laws/show/2145-19#Text>.
5. Eurydice: National Education Systems / European Commission. URL: <https://eurydice.eacea.ec.europa.eu/national-education-systems>.
6. Resilience of education. *Google Trends* : вебсайт. URL: <https://trends.google.com/trends/explore?date=today%20-y&q=resilience%20of%20education&hl=en-US>.
7. Пошук статей за ключовими словами «resilience of education». *Web of Science* : вебсайт. URL: <https://www.webofscience.com/wos/woscc/summary/972da252-52f3-40fe-869c-c48dbed1b0ad-014909cf5c/relevance/1>.
8. Londar L., Pietsch M. Providing distance education during the war: the experience of Ukraine. *Information Technologies and Learning Tools*. 2023. Vol. 98, No. 6. P. 31–51. DOI: <https://doi.org/10.33407/itlt.v98i6.5454>.
9. Рогова В. Б., Лондар С. Л. Управлінський інформаційно-аналітичний інструментарій забезпечення освітньої безпеки. *Освіта України в умовах воєнного стану: управління, цифровізація, євроінтеграційні аспекти* : зб. тез доп. IV Міжнар. наук.-практ. конф. (м. Київ, 25 жовт. 2022 р.). Київ, 2022. С. 13–17. URL: https://iea.gov.ua/wp-content/uploads/2022/12/book-of-abstracts_ssi-iea_2022.pdf.
10. Семенюк Ю. Поняття стійкості системи управління освітою: зарубіжні моделі та підходи до визначення. *Теоретичні та прикладні питання державотворення*. 2024. № 31. С. 71–80. DOI: <https://doi.org/10.35432/tisb312024306538>.
11. Ташкінова О., Пономарьова Л. Професійна стійкість викладачів українських закладів вищої освіти під час війни: шляхи підтримки та розвитку. *Соціальна робота та соціальна освіта*. 2024. № 2 (13). С. 120–129. DOI: [https://doi.org/10.31499/2618-0715.2\(13\).2024.316717](https://doi.org/10.31499/2618-0715.2(13).2024.316717).
12. Lavrysh Yu., Lytovchenko I., Lukianenko V., Golub T. Teaching during the wartime: Experience from Ukraine. *Educational Philosophy and Theory*. 2022. Vol. 57, Iss. 3. P. 197–204. DOI: <https://doi.org/10.1080/00131857.2022.2098714>.
13. Luthar S. S. Resilience in Development: A Synthesis of Research across Five Decades. *Developmental Psychopathology: Volume Three: Risk, Disorder, and Adaptation* / D. Cicchetti, D. J. Cohen (Eds.). 2006. P. 739–795. DOI: <https://doi.org/10.1002/9780470939406.ch20>.
14. Fergus S., Zimmerman M. A. Adolescent resilience: A Framework for understanding health development in the face of risk. *Annual Review of Public Health*. 2005. Vol. 26. P. 399–419. DOI: <https://doi.org/10.1146/annurev.publhealth.26.021304.144357>.
15. Garnezy N., Masten A. S. The protective role of competence indicators in children at risk. *Life-span developmental psychology: Perspectives on stress and coping* / E. M. Cummings, A. L. Greene, K. H. Karraker (Eds.). 1991. P. 151–174. URL: <https://www.scirp.org/reference/referencespapers?referenceid=822155>.
16. Wang M., Haertel G., Walberg H. Educational Resilience in Inner Cities. 1993. URL: <https://files.eric.ed.gov/fulltext/ED399312.pdf>.

17. Masten A. S. Resilience in developmental systems: Principles, pathways, and protective processes in research and practice. *Multisystemic resilience: Adaptation and transformation in contexts of change* / M. Ungar (Ed.). 2021. P. 113–134. URL: <https://doi.org/10.1093/oso/9780190095888.003.0007>.
18. Education System Resilience / L. Cameron et al. Washington DC, USA, and Ottawa, Canada, 2024. URL: <https://www.gpekix.org/knowledge-repository/education-system-resilience-gpe-kix-scoping-study-working-paper>.
19. The Need for Climate-Smart Education Financing: A review of the evidence and new costing framework / GPE. 2023. URL: <https://www.globalpartnership.org/node/document/download?file=document/file/2023-12-climate-smart-education-financing-review-evidence-costing-framework.pdf>.
20. Fletcher D., Sarkar M. Psychological Resilience. *European Psychologist*. 2013. Vol. 18, No. 1. DOI: <https://doi.org/10.1027/1016-9040/a000124>.
21. Theron L., Ungar M., Höltge J. Student resilience to COVID-19-related school disruptions: The value of historic school engagement. *School Psychology International*. 2023. Vol. 44, Iss. 2. P. 190–213. DOI: <https://doi.org/10.1177/01430343221138785>.
22. Kangas-Dick K., O'Shaughnessy E. Interventions that promote resilience among teachers: A systematic review of the literature. *International Journal of School & Educational Psychology*. 2020. Vol. 8, Iss. 2. P. 131–146. DOI: <https://doi.org/10.1080/21683603.2020.1734125>.
23. Linnenluecke M. K. Resilience in Business and Management Research: A Review of Influential Publications and a Research Agenda. *International Journal of Management Reviews*. 2017. Vol. 19, Iss. 1. P. 4–30. DOI: <https://doi.org/10.1111/ijmr.12076>.
24. Ma Zh., Xiao L., Yin J. Toward a dynamic model of organizational resilience. *Nankai Business Review International*. 2018. Vol. 9, Iss. 3. P. 246–263. DOI: <https://doi.org/10.1108/NBRI-07-2017-0041>.
25. Hillmann J., Guenther E. Organizational Resilience: A Valuable Construct for Management Research? *International Journal of Management Reviews*. 2021. Vol. 23, Iss. 1. P. 7–44. DOI: <https://doi.org/10.1111/ijmr.12239>.
26. Identification of methodologies to quantify education system resilience – A scoping review / J. Dülks et al. *International Journal of Disaster Risk Reduction*. 2023. Vol. 97, 103967. DOI: <https://doi.org/10.1016/j.ijdr.2023.103967>.
27. Heinemann H. R., Hatfield K. Infrastructure Resilience Assessment, Management and Governance – State and Perspectives. *Resilience and Risk. NATO Science for Peace and Security Series C: Environmental Security* / I. Linkov, J. Palma-Oliveira (Eds.). Springer, Dordrecht, 2017. DOI: https://doi.org/10.1007/978-94-024-1123-2_5.
28. Про утворення Ситуаційного центру : наказ Міністерства освіти і науки України від 24.02.2022 № 229. URL: <https://mon.gov.ua/npa/pro-utvorennya-situacijnogo-centru-mon>.
29. Про деякі питання організації роботи закладів фахової передвищої, вищої освіти на час воєнного стану : наказ Міністерства освіти і науки України від 07.03.2022 № 235. URL: <https://zakon.rada.gov.ua/rada/show/v0235729-22#Text>.
30. Про деякі питання організації здобуття загальної середньої освіти та освітнього процесу в умовах воєнного стану в Україні : наказ Міністерства освіти і науки України від 28.03.2022 № 274. URL: <https://zakon.rada.gov.ua/rada/show/v0274729-22#Text>.
31. Про організацію та проведення у 2022 році національного мультипредметного тесту : наказ Міністерства освіти і науки України від 12.05.2022 № 434. URL: <https://mon.gov.ua/npa/pro-organizaciyu-ta-provedennya-u-2022-roci-nacionalnogo-miltipredmetnogo-testu>.

32. Про затвердження Порядку міжвідомчої взаємодії з питань вручення здобувачам освіти, які перебувають за межами України, документів про базову середню освіту та повну загальну середню освіту, виданих в умовах воєнного стану : наказ Міністерства освіти і науки України, Міністерства закордонних справ України від 09.06.2022 № 538/192. URL: <https://zakon.rada.gov.ua/rada/show/v0538729-22#Text>.

33. EENEE Analytical report N°02/2021 – Impact of COVID-19 on Education for Sustainable Development (ESD) in the context of twin transition / European Commission. 2021. DOI: <https://doi.org/10.2766/89568>.

34. How countries are addressing the integration of children from Ukraine in EU education systems / European Commission. 2024. URL: <https://education.ec.europa.eu/news/how-countries-are-addressing-the-integration-of-children-from-ukraine-in-eu-education-systems>.