W I S D O M

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DIGITAL TRANSFORMATION OF EDUCATION IN THE CONTEXT OF INFORMATIZATION OF EDUCATION AND SOCIETY AGAINST THE BACKGROUND OF RUSSIAN ARMED AGGRESSION: CURRENT PROBLEMS AND VECTORS OF DEVELOPMENT

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Abstract: Digital transformation is the basis of Ukraine's war tactics. The aim is to analyze the practice and context of the evolution of informatization of education, the contribution and focus on educational technologies of distance learning in the languages of war. The method of sociological research of open primary collection of information in Kamyanets-Podilsky Ivan Ohienko National University, Volodymyr Vynnychenko Central Ukrainian State Pedagogical University, and the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", described the problems of organization, forms, and tendencies of the educational process. The novelty - is the allocation of operational algorithms in the field of distance learning technologies, which allow teaching and supporting the participants of the educational process under conditions of armed Russian aggression. Practical significance - the analysis of the dynamics of development of informatization of society in modern conditions; in the search for digital transformations and updating of education during the war; in the description of modern practices and vectors of development. The results revealed: that educational trends in zones or without hostilities, indicators of technical development in conditions of war, and levels and principles of development of public informatization. In war conditions the educational institutions technically coped with the emergency situation.

Keywords: informatization of pedagogy, technological acceleration, warfare, technical problems, emergency distance learning.

Introduction

The informatization of pedagogy is a topical issue in educational systems. It was at the moment of Russian armed aggression that education faced unprecedented public and anthropological dynamics combined with the full development of technological acceleration. The problematics of such dynamics (Laurent, Dessus, & Vaufreydaz, 2020) led to transformations in teaching and learning that are still open. In the military period, we are experiencing, and after the pandemic, many perspectives have emerged, and analysis of recent research and publications illuminate the current trends and vectors of the digital transformation of education (Zhang, Wang, Yang, & Wang, 2020). In light of the philosophical concepts of individual and collective change and discontinuity (Rajab, 2018) appeal to the fact that once in crisis, humanity calms itself by eliminating imbalances through various transitions or transformations. For Sweller (2017), the experience of war and the sudden fear of its consequences is an experience with very strong destructive potential for the psyche on the moral, political, social, and economic levels because this experience deconstructs the imaginary structures, habits, rules of functioning and founding relationships in the society. Dobiesz et al. (2022), for their part, emphasize that the impact of war is measured only when it ends since the very achievement of peace allows us to comprehend the consequences in all areas and uncover ways to overcome them. Indeed, as long as war is an everyday reality, the public consciousness is somewhat clouded and barely able to recognize and understand the magnitude of the consequences. When peace comes, the possibility of retrograde awareness is revealed. Noting that the awareness of war during its experience is not complete, we should add that this applies to reflections in the field of pedagogy and, in particular, to distance education technologies.

Faced with the realities of war and new crisis possibilities, the aims of this work focus on two means for understanding the issue of digital transformation and emergency pedagogy proposed by Deleuze (Cole, 2019). The work is guided by philosophical notions of individual and collective consciousness or a possible combination of both. Assignment: to illuminate the algorithm of distance learning of teachers in war conditions; to present the pedagogical informatization of emergency distance learning; to highlight the main trends affecting the educational process in the war period; to describe the levels of informatization of society in emergency conditions; to suggest possible principles of development of public informatization in the post-war period.

Algorithm of Distance Learning for Teachers in War Conditions

The digital transformation of education and pedagogy in times of military aggression are actions devoted, in essence, to the distance learning format, but in extremely pragmatic and operational aspects. The effectiveness of a successfully selected distance platform by the educator affects the quality of education from kindergarten to higher education. In this context, the educator must address a number of organizational issues, aligning his or her actions with the students' capabilities and martial law conditions:

- find the key elements of a distance learning course;
- organize a distance learning course under martial law;
- choose pedagogical strategies for learning;
- develop a distance learning assessment;
- set up remote group work (synchronous asynchronous and individual mode);
- properly formulate synchronous virtual classroom tools and asynchronous platforms;
- create a quality video for self-study.

Pedagogical Informatization of Emergency Distance Learning

In just a few days of the war in Ukraine, distance learning underwent changes that seemed like they could have evolved over the years in other calm conditions. In this context, it is worth mentioning (Burde et al., 2017) that the authors of the paper presented a field analysis of the deployment of pedagogical engineering in distance education taking place under critical conditions. From the same perspective, the authors (Zhang, Wang, Yang, & Wang, 2020) mention the changes in distance education that have occurred in

the last five years. The paper talks about "emergency" distance learning, giving the example of how in 2020, as a result of a pandemic, all educational institutions closed overnight, face-to-face classes were cancelled, and the whole world had to switch to distance education in a few days, at best in a few weeks. Three main elements influence "emergency" distance education: the speed of change (an insidious attack by an aggressor), the institutional obligations of the transition to emergency education (martial law provisions), and its historical and societal significance (keeping education on track despite geopolitical cataclysm). Very accurately writes (Sweller, 2017) about the concept of Instructional Design - it is one of the branches of educational engineering that began to develop in the 1940s and was used in a similar emergency situation. It refers to the use of all resources to support education, indicating the urgent and exceptional nature of the situation. The author described the events of World War II when it was necessary to provide quick and effective responses to military and technical needs for educational purposes. Today, in the same way, in the context of Russian armed aggression, educational informatization was intended to mobilize to meet the massive needs of society. Indeed, distance learning systems had to respond not to the traditional and internal intentions of institutions (to increase the number of personnel, find new audiences and market segments, save operating funds, etc.) but to act in defiance of the enemy's attempts to destroy Ukrainian society.

Methods

The method of sociological research was used to analyze the pedagogical response of teachers and students under conditions of war. Using a combination of scientific methods of collecting and processing information from three universities allowed us to implement the goals and objectives of the work, namely, to demonstrate the problems and vectors of the development of education and technological capabilities under conditions of war. The method of collecting primary information (observation and study of electronic documents) from the three universities, which are geographically located in different war zones: Kamyanets-Podilsky Ivan Ohienko National University, Faculty of Education, Department of Theory and Methodology of Primary Education (zone without combat operations), Volodymyr Vynnychenko Central Ukrainian State Pedagogical University (average activity of combat operations), National Technical University of Ukraine, "Igor Sikorsky Kyiv Polytechnic Institute", Faculty of Physics and Mathematics, Department of descriptive geometry, engineering and computer graphics (close to active combat operations) presented the main algorithm of enhanced and urgent distance learning activities Open observation of electronic documents (eznew - electronic journals), allowed to formulate a hypothesis about the trends and factors of digital transformation and response of universities in zones or without military action. By the beginning of the declaration of war in the MES of Ukraine, there were many requests to help create an algorithm of action, to promulgate additional resources for training, deploy systems of virtual classes, strengthen platforms, etc. Reinforced and emergency distance learning has shown almost paradigmatic practices in the above universities; after forced vacations (28.02.22-14.03.22), distance learning became a mass and anthropological scale. Actualized management of distance learning in the system of education received a new and surprising experience of the interdependence of factors of military aggression and collected work at the level of parents/teachers, teachers/administrators, teachers/students, teachers/engineers MES Ukraine. The sociometric method allowed for analysing the rapid organization of the selected educational structural units to analyze the scale of influence and changes in the universities depending on the zone of military aggression. To date, we can empirically observe four major trends affecting the educational process during the war period. In addition, based on the report and the availability of electronic logbooks in the above universities can be summarized the figure for student attendance depends on technical, physical, and military factors (Table 1):

Table 1.

The Intensity of Use of Distance Platforms in Educational Institutions
(Trends and Factors in or Without Combat Zones).

Institution	Percentage of attendance	Trends and factors in the region
Kamyanets-Podilsky Ivan Ohienko National University, Faculty of Education, Department of Theory and Methodology of Primary Education	100% attendance - zone without fighting, "comfort zone"	Technically, the region was able to handle the emergency situation; Even people who evacuated overseas were able to connect; Tendency to disrupt the training process due to air raids and being in the vault; Involvement of IDPs in training.
Volodymyr Vynnychenko Central Ukrainian State Pedagogical University	75% attendance - average combat activity	Technically, the region handled the emergency situation; Many people evacuated, loss of time to adjust and resolve technical issues; Tendency to disrupt the training process due to frequent air raids and staying in the vault; Involvement of IDPs in training.
National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Faculty of Physics and Mathematics, Department of descriptive geometry, engineering and computer graphics	13% attendance - close to active combat	Technically, the region handled the emergency situation; Many people evacuated, loss of time to adjust and resolve technical issues; Tendency to disrupt the training process due to frequent air raids and staying in the vault; Involvement of IDPs in training.

Results

The results of the analysis of the three universities show that they coped with the emergency situation under the conditions of war. This is due to the experience of the pandemic. The educational institutions already had their own system of certain algorithms for working remotely. Another issue was the evacuation of people during the first phase of active hostilities. Due to the relocations, there was no time to adapt and resolve technical issues, and not everyone had the opportunity to join the classes for technical reasons at the new place of residence. Moreover, starting from February 24, 2022, the tendency to disruption of the training process due to frequent air raids and staying in the storage room became extremely acute. According to the algorithm of actions during an airborne alert, the class should stop, and all participants should move to the vaults. Another trend is the involvement of IDPs in training. This is due to the relocation of universities to more comfortable areas of Ukraine or their complete destruction and cessation of work. In this case, students of different faculties and different universities were offered to be free listeners and take modules on selected subjects. In such a case, the problem of technical equipment of IDPs and the provision of learning conditions again arose.

Given the above trends, we can talk about digital transformations that are possible under blockade, war, and shelling. Most distance learning courses have been created by fairly minimal use of known information models and approach since, as mentioned above, educational institutions have already chosen to prioritize distance learning platforms. However, the destruction of infrastructure and Internet providers (in areas of active hostilities and in areas of missile arrivals) has become an acute problem, so we consider the main indicator of technical development in war conditions to be the equipment for the Internet provided to Ukraine by Elon Musk, namely SpaceX installations for StarLink (Table 2).

Table 2.

Providing High-Speed Satellite Broadband Internet Access in Places
Where Such Access is Unreliable or not Available at All.

Institution	Priority Remote Platform	Date of StarLink Area Provision
Kamyanets-Podilsky Ivan Ohienko National University, Faculty of Education, Department of Theory and Methodology of Primary Education	Zoom (moodle, ez)	Khmelnytskyi region (war-free zone, threat of missile attacks) SpaceX installation for StarLink is not yet available because the networks of Internet providers in the region are not damaged. Lanet, Datagroup, and Crazy Network are in use.
Volodymyr Vynnychenko Central Ukrainian State Pedagogical University	Google meet (moodle, ez)	Kropivnitsky, Kirovograd region - StarLink available from 20.04.2022
National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"	Microsoft Teams (moodle, ez)	Kyiv, Kyiv region - StarLink is available from 25.03.20222

It should be noted that (unlike other satellite Internet operators) to connect to Starlink, special terminals provided by Elon Musk's company SpaceX are required. Terminals necessary for the Starlink operation were delivered to Ukraine on Monday - February 28 - at the request of the Ukrainian Minister of Digital Transformation, Mikhail Fedorov. They could only be used at that time by the military, then medical institutions, and after their needs, education. It should be noted that Starlink was planned to be connected to a full-scale war only in 2023. Therefore, despite the devastating consequences of Russian armed aggression, Ukrainian society is confidently expanding its digital transformation thanks to the help and support of the whole world.

Forced Advantage of Synchronous Distance Learning in a Time of War

One of the main characteristics of distance education is the illusion of "deferred" learning, which is weakened by the technological problems of wartime learning systems. However, Ukraine has been prepared for such an emergency situation. Many institutions during the pandemic urgently purchased or selected free video-conferencing environments and virtual classrooms. This is what made it possible to quickly attract the maximum number of students to synchronous distance learning. The use of synchronous tools and new technological and functional capabilities for channel management allowed for seminars, lectures, and group work with large numbers of students, taking into account the attached students from destroyed universities from areas with active hostilities.

In a matter of weeks, the war made Ukrainians witness the triumph of synchronous distance education, as the conditions and skills of the teachers allowed it; at the same time, the asynchronous dimension also became very popular, as many students do not have the technical ability to work synchronously. Teachers at the above universities take into account the psychological state of students and do not allow their cognitive overload. Problems in education during the war, however, continue, and distance learning in these conditions changes its parameters and adjusts the students to the responsibility and autonomy in their work. After all, every citizen of Ukraine is now a valuable link in society and must work selflessly to defeat the aggressor. Reflections on the urgent phases of pedagogical activity in critical situations are relevant and open. Distance education in recent years has become relevant, along with the limitations of the pandemic (Zhang, Wang, Yang, & Wang, 2020). In this context, the authors (Machusky & Herbert-Berger, 2022) appeal to the fact that social emergencies are exceptional and temporary situations for everyone, particularly for teachers and students and for higher education institutions. In our

time, such situations set ever-widening time limits, so the informatization of society must take place on a global scale because, in view of the turbulent times around the world, distance learning is a new dimension of the education of the future and not just a temporary phenomenon. The informatization of society must take place at three levels:

1. At the macro level, it is necessary to make an inventory of available opportunities for distance learning and expect, that is, to correctly identify the necessary infrastructure changes and technology and, obviously, coordinate human resources and skills. Conduct monitoring of institutions and mass digitization of programs.

2. At the mesolevel, there is a need to change curricula: calculate the student load on the distance learning device, calculate the working time of distance learning, calculate the status of distance learning, develop teacher profiles, set up the management of distance modules, train teaching staff in digital literacy and information skills

3. At the micro level, we should assess the pedagogical practices of distance learning and be prepared for all possible scenarios of unfolding events in the country.

The most complex intersectional scenarios in society determine the quality of the learning experience (Hodges, Moore, Lockee, Trust, & Bond, 2020). European scholars are exploring new ways for teachers to deploy their own scenarios using simple and available artefacts according to technical capabilities (Laurent, Vaufreydaz, & Dessus, 2020). In the context of the informatization of education, scholars prefer hybrid approaches aimed at synchronous distance education in accordance with socio-technical engineering projects.

Pedagogical Response During the War: Potential Phases of Pedagogical Activity in the Postwar Period

Further use of the results will be appropriate in the transitional phase of distance learning after Russian military aggression. The significance of the results is that they can hypothetically adjust and update models of educational design. Faced with the weakening of classical models of dis-

tance learning in the context of a likely prolonged war, it is necessary to consider how its new vectors of development might be. We propose three basic principles for the development of public informatization.

1. Principle of predictability: informatization embedded in the country and culture; which integrates the three levels (macro, micro, and meso levels) and their participants (teachers, students, administrators, leadership)

2. The principle of progressivity: the development of pedagogical informatization. Observance of time frames and rhythms of development of tools, methods, and skills. Improvement of certain essential parameters (training, support for teachers and students, in particular in digital culture, etc.) and equipped with appropriate human and technological resources.

3. The principle of turnover: pedagogical informatization cannot be limited to a single model. Moreover, education cannot be satisfied with the old models of distance learning for long. In the context of emergencies, which are now becoming increasingly relevant, teachers must be able to deploy a learning system that allows synchronous and asynchronous modes.

Discussion

In any time of crisis and transition, there is a polemic between different viewpoints. Pedagogical informatization in higher education can be a lifesaver for education (Rumble, 2019). In this context (Ricard, Zachariou, & Burgos, 2020) emphasize that it is in emergencies that we need to take on the responsibility of education without distinguishing the urgency of this phase and the severity of the problems that arise. We agree with the author but add that, in fact, the success of a successful response depends on the collaboration of institutions, pedagogical teams, and informatization resources. In the transitional phase that is looming before us, predictability, progressivity, and reversibility will be salutary. Qizi (2021) continues this question by analyzing the strengthening of prescriptive models of digital transformation of education, namely: institutional choice, mass response, clarification of the educational process, and uniting participants around

classical practices with the involvement of the newest. In contrast (Qizi, 2021), the American school (Seaman, Allen, & Seaman, 2018) suggests the search for individual models to create microdynamics of communities in educational institutions. It is a question of independent construction of the algorithm of action in emergency conditions and self-organization of the educational process. It should be noted that it is this way that seems promising and new. After all, self-organization outlines the contours of the latest metamodels of education. Allowing the student to manoeuvre in learning, the teacher takes into account the rhythm and speed of students' perception, and the teacher follows the sequence proposed by Deleuze rather than organizing and planning known models. Also, in this context, reference should be made to framing (Palvia et al., 2018); the authors believe that students, despite the existence of institutional learning environments, constantly reproduce personal learning environments. We agree that promoting the dynamics of student self-organization within the educational system and the use of multi-technological environments are future vectors for education and society. However, according to (Hodges et al., 2020), the proposed pathways carry certain risks. It should be taken into account that the strategy of student self-regulation can be used in a distance learning environment, and the offline format still requires the introduction of educational initiatives from teachers and new approaches. So, in this context, we can talk about the institutional complexity of coordinating the necessary means, combining, and improving the skills of participants in the educational process.

Conclusion

During the period of Russian military aggression, Ukrainian society has transformed at all levels (individual, collective, institutional) and has certainly realized the role of informatization and the feasibility of distance learning for opening new ways in the fundamental dimensions of education. A new trajectory is being formed in Ukrainian education, changing the perimeter and nature of the learning system. Adopt the interdependence of collective and individual existential perception of the present in the name of overcoming the crisis of war. Through technological and social developments as well as the individual and collective practices of students and teachers, education in war is not only possible oil is strengthened and developed. The analysis of practices and the context of the known evolution of the informatization of the educational process, the contribution and focus on educational technologies of distance learning in the languages of war, three analyzed universities operating in different zones (with or without hostilities) showed the pragmatic focus of the evolution of teaching methods, planning programs and modules, the time sequence of teaching The use of new generation devices to train and support participants in the educational process in the conditions of armed Russia is described The research study using the method of sociological research collected relevant material that showed the dynamics of the development of informatization of society under conditions of war. The factors and trends in education are demonstrated, and new ways that would allow teachers to respond urgently in crisis situations, using the available devices and platforms according to the technical capabilities under conditions of war, are explored.

The practical significance of the work lies in the application of the findings to the settlement of the educational process in the post-war period. The final stage of the Russian armed aggression draws new perspectives for educational development and the correction of the negative lacunas created by the war.

References

Burde, D., Kapit, A., Wahl, R. L., Guven, O., & Skarpeteig, M. I. (2017). Education in emergencies: A review of theory and research. *Review of Educational Research*, *87*(3), 619-658. https://doi.org/10.3102/0034654316671594

Cole, D. R. (2019). The designation of a Deleuzian philosophy for environmental education and its consequences… *Australian Journal of Environmental Education*, *35*(3), 173-182. https://doi.org/10.1017/aee.2019.16

Dobiesz, V. A., Schwid, M., Dias, R. D., Aiwonodagbon, B., Tayeb, B., Fricke, A., Pham, P., & Erickson, T. B. (2022).

Maintaining health professional education during war: A scoping review. *Medical Education*. https://doi.org/-10.1111/medu.14808

Hodges, C. B., Moore, S., Lockee, B. B., Trust, T., & Bond, M. A. (2020). *The difference between emergency remote teaching and online learning*. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Laurent, R., Dessus, P., & Vaufreydaz, D. (2020). Design spatial sociotechnique: Le rôle des classes sensibles au contexte. *Distances et Médiations Des Savoirs*, *30*. https://doi.org/10.4000/dms.-5228

Laurent, R., Vaufreydaz, D., & Dessus, P. (2020). Ethical teaching analytics in a context-aware classroom: A manifesto. *ERCIM News*, *120*, 39-40.

Machusky, J. A., & Herbert-Berger, K. G. (2022). Understanding online learning infrastructure in U.S. K-12 schools: A review of challenges and emerging trends. *International Journal of Educational Research*, *114*, 101993. https://-doi.org/10.1016/j.ijer.2022.101993

Palvia, S., Aeron, P., Gupta, P., Mahapatra, D., Parida, R., Rosner, R., & Sindhi, S. (2018). Online education: Worldwide status, challenges, trends, and implications. *Journal of Global Information Technology Management*, *21*(4), 233-241. https://doi.org/10.1080/1097198x.-2018.1542262

Qizi, S. Z. M. (2021). Pedagogical mechanisms of the formation of the social outlook of future teachers in the context of the in-formatization of education. *The American Journal of Applied Sciences*, *03*(04), 203-207. https://doi.org/10.375-47/tajas/volume03issue04-28

Rajab, K. D. (2018). The effectiveness and potential of e-learning in war zones: An empirical comparison of face-to-face and online education in Saudi Arabia. *IEEE Access*, *6*, 6783-6794. https://-doi.org/10.1109/access.2018.2800164

Ricard, M., Zachariou, A., & Burgos, D. (2020). Digital education, information and communication technology, and education for sustainable development. In *Radical Solutions and eLearning* (pp. 27-39). Springer Singapore. https://doi.-org/10.1007/978-981-15-4952-6_2

Rumble, G. (2019). Planning and budgeting. In *The Planning and Management of Distance Education* (pp. 141-160). Routledge. https://doi.org/10.4324/978042-9288661-8

Seaman, J. E., Allen, I. E., & Seaman, J. (2018). *Grade increase: Tracking distance education in the United States*. Babson Survey Research Group.

Sweller, J. (2017). Instructional design. In *Encyclopedia of Evolutionary Psychological Science* (pp. 1-5). Springer International Publishing. https://doi.org/10.10-07/978-3-319-16999-6_2438-1

Zhang, W., Wang, Y., Yang, L., & Wang, C. (2020). Suspending classes without stopping learning: China's education emergency management policy in the COVID-19 outbreak. *Journal of Risk and Financial Management*, *13*(3), 55. https://doi.org/10.3390/jrfm13030055