future internet

MDPI

Article

Study of the Organization and Implementation of E-Learning in Wartime Inside Ukraine

Liudmyla Matviichuk [1,*], Stefano Ferilli [2,*] and Nataliia Hnedko [3,*]

[1] Department of Informatics and Computing Tools, T.H. Shevchenko National University "Chernihiv Collegium", Hetmana Polubotka Str., 53, 14000 Chernihiv, Ukraine
[2] Dipartimento di Informatica, Università degli Studi di Bari Aldo Moro, Via Orabona 4, 70121 Bari, Italy
[3] Department of Information and Communication Technologies and Methods of Teaching Informatics, Rivne State Humanitarian University, Stepana Bandery Str., 12, 33000 Rivne, Ukraine
* Correspondence: matviychuk2012@gmail.com (L.M.); stefano.ferilli@uniba.it (S.F.); natalia.hnedko@rshu.edu.ua (N.H.); Tel.: +380-977426810 (L.M.); +39-080-5442293 (S.F.); +380-0962760272 (N.H.)

Abstract: The article provides a factual foundation for the possibility of organizing and implementing e-learning in Ukrainian higher educational institutions during the war. The current research topicality is supported by the urgent need for training experience, organization and implementation during wartime because of the fact that both the educational process and the opportunity to obtain an education should not be halted. The study's goal is to assess the current state of the e-learning organization and implementation, as well as to examine students' attitude towards the educational process during wartime. Methods such as scientific source analysis, generalization and systematization of the e-learning experience and its practical application were used to achieve the goal. Furthermore, empirical methods such as interviewing and observation were used. Questionnaires have been proposed as important research tools for this purpose. Four structured groups for the use of e-learning have been formed and identified based on the findings. We created an e-learning organization and support model based on them. Furthermore, we identified ten poignant factors as the sources of difficulties for teachers when implementing innovations, with limited resources and a lack of time being among the most significant.

Keywords: e-learning; war; web service; educational process; teaching staff

Citation: Matviichuk, L.; Ferilli, S.; Hnedko, N. Study of the Organization and Implementation of E-Learning in Wartime Inside Ukraine. *Future Internet* **2022**, *14*, 295. https://doi.org/10.3390/fi14100295

Academic Editor: Laurent Moccozet

Received: 3 September 2022
Accepted: 12 October 2022
Published: 15 October 2022

1. Introduction

Information and communication technologies (ICT), which have increased access to various fields and services, have nearly taken the first place in today's human life. Both human awareness of internet technologies and their capabilities allow people to feel free in today's modern society of rapid changes occurring at a tremendous speed. Educational internet technologies, used during the COVID-19 pandemic as well as during the war in Ukraine, have become even more desirable, mandatory tools, serving as the sole means of organizing the educational process. Prior to the COVID-19 pandemic outbreak and the start of the active phase of military operations (war) on Ukrainian territory, teachers only used ICT tools "from time to time" (as needed) and in a limited amount. Their arsenal has been far too limited. Moodle and Google Drive have emerged as the most popular among teachers.

In fact, we see how universities are stepping up their efforts to make all of their educational content available online. We come across the free use of educational and methodological resources developed by teachers in some places (seats of learning). However, there are still educational resources to which students of their own higher educational institution have limited or no access. Teachers continue to select platforms for hosting educational resources (Moodle, Classroom, Edmodo and so on) or use those provided by

the university administration. Accordingly, the demand for internet technologies and cloud technology tools (web services) has increased significantly [1].

Even during Ukraine's martial law, the importance of obtaining an education has been demonstrated. The war destroyed educational facilities, depriving students and their teachers of them. The majority of them lacked the resources necessary to complete their education. During the war, they found their studies uncomfortable. The difficulties that prevent students from studying properly have been described, and the need for significant improvements in distance learning has been highlighted. Opportunities to encourage students during the war have been revealed. They manifest themselves in the balance of time periods, which have been increased for completing educational tasks, reducing home (independent) tasks, extending sessions and so on. Following a mix of scientists' and personal experiences, recommendations for effective and useful web tools for teachers who lack special knowledge and skills in working with applications were made, as they are excellent for improving their own educational electronic environment.

1.1. Basic Studies and Contributions Analysis

Our education is brimming with new learning platforms, tools, techniques and approaches. A large number of research articles confirm their effectiveness. Blended, collaborative, micro- and adaptive learning, modified classes, e-learning [2], learning based on mobile technologies, massive open online courses, machine learning and other forms of the new learning transformation can be seen [3–9].

The scientific community is becoming more interested in blended learning. We highlight the research by Eka Yulia Syahrawati [10], who found that "the blended learning implementation requires some careful planning and understanding of students' personal needs, taking into account their availability for aids, and an infrastructure to organize their own learning" [10]. The rapidly changing learning environment (from classrooms to private residences) has necessitated the search for an infrastructure balance to fill the "voids" in the e-learning process.

M. Tayebinik and colleagues have proposed another intriguing idea in relation to the current issue [11]. They claim that "blended learning can be considered as an effective approach to distance learning." The "student-student" and "student-teacher" modes of interaction [12] will become the dominant models in future educational processes in terms of students' learning experiences.

R. Gaur [13], like other researchers, demonstrates that, thanks to the interactive collective learning and flexibility, "the current e-learning process has been rapidly developed and has gained the ability to provide a qualitative environment for future education" [13].

M. Maatuk [14] and colleagues have successfully investigated e-learning issues. They have conducted a survey and used the results to determine the levels of e-learning implementation, as well as its benefits and drawbacks. According to the findings, learning or teaching in any e-environment can reduce costs and opportunities. Students believe that e-learning contributes significantly to their studies, reduces the burden on teachers and increases the amount of work assigned to students. Slow internet has been identified as a significant barrier in the e-learning process [14].

Practically, the world is actively debating the impact of e-learning on students with minor disabilities [15,16]. The transition to e-learning [17] has sparked heated debate in the learning community, with questions such as "Will we return to the classrooms, and if so, when?"; "What knowledge level will our students receive?"; "What effect will such a type of education have on the personality?"; and "Will individual socialization be disrupted?" The COVID-19 pandemic promoted the first radical shift to e-learning, which created some uncertainty among teachers who are inexperienced with modern cloud technologies or do not wish to use e-learning. All of this has an impact on the teacher's motivation and efficiency [18]. An important contribution is due to K. Kulikowski and colleagues [18], who developed a model outlining the motivation of human activities and changes in the motivational characteristics of the teacher's activities during the e-learning process,

namely, the "task identity and significance, variety of skills, feedback, autonomy, and social dimensions". At the same time, they demonstrated that one of the most influential modern theories of work motivation is the problem of maintaining a high level of tastiness. It is also believed that the effectiveness of e-learning implementation is dependent on the teachers' ability to cope with personal difficulties and anxieties.

Potentially, e-learning challenges may have a negative impact on the quality of the teaching material [19]. They result in a lack of personal interactions, which are important not only for students but also for teachers and peers [20]. Furthermore, due to the challenges mentioned above, innovative teaching tools are still not widely available for many teachers.

In general, e-learning focuses on solving the problems raised by the peculiarities and differences of individual learners, on providing an opportunity to organize comfortable conditions for learning and, in some cases, on enabling education itself, e.g., when the country is at war or when there are simply no other options left. Ukraine is concerned about the age and competence of both technical support and teaching staff. Both are critical not only for the ability to organize, implement and support the educational process during critical situations (the pandemic and the Ukrainian war) but also for the teachers' motivation to possess and share the stable productivity of their knowledge that they provide to students [21]. These horrifying factors for any educational process are actually compelling reasons to join the community of 100% distance learning. A significant part of the teachers' work involves creating effective online courses, conducting classes through online video conferences (Zoom, Google Meet, etc.), recording video lessons, producing lecture (presentation) material, developing online tests [22], keeping electronic journals, etc. Furthermore, the teachers' experience and abilities in the e-learning process differ [23]. This transition has presented difficulties not only for teachers [24] but also for students, who are acutely aware of the lack of live communication [25]. This is a pressing issue that must be addressed as soon as possible by educational institution administrations, as it has the potential to negatively (and irreversibly) affect the students' psychological states.

The e-learning process creates a compulsion for new teachers' competencies based on the teachers' personal self-development and the search for new educational theories, methods and teaching techniques as the ICT foundation [22]. Undoubtedly, every modern teacher needs electronic tools, especially as popular web services expand opportunities and allow for the creation of a specific learning climate (environment) in which students study the learning material more easily and teachers work better with students who are not disinterested in learning subjects. Web services have a greater and more complex potential, and they are regarded as an important building block in the development of a modern competent specialist (teacher). Many scientists have proven this based on their findings. Such blocks aid in the resolution of educational issues. They help competitive specialists in developing important competencies. The teachers' opportunities to organize classes are constantly expanding as a result of them, while the students' opportunities to complete tasks assigned to them are increasing.

Web services have evolved into valuable and necessary tools for modern educators, allowing them to develop a creative level of ICT competence. It is safe to assume that some teachers have used web services.

It goes without saying that a substantial number of studies establishing the e-learning potential during the pandemic have already been conducted [26], but they have not investigated issues concerning the effectiveness of e-learning in war zones [27–30], as such type of learning is a promising means of expanding access to the educational system and improving student progress in higher educational programs [31,32]. However, any e-learning that engages students in project-based learning, teamwork and flipped learning shows an enhanced positive impact on student learning effectiveness as a modern field of interest, using playful and cooperative learning methods. The experiment has revealed the presence of some anxiety, social isolation, despondency, self-doubt and disappointment among students [33].

Our research may provide useful material for the discussion of the students' attitudes toward continuing their education in high-risk places and provides an opportunity to understand what is most important in times of war; it reveals the factors influencing training success and highlights the enormous potential of e-learning, which is extremely important for the implementation of education in dangerous places.

At the same time, the challenge of e-learning implementation in critical situations, particularly wartime, remains poorly studied. There are publicly available scientific studies that consider only one critical situation (a pandemic) [34,35], forcing educational institutions to use e-learning rather than traditional methods. In this case, the challenge of implementing e-learning in other critical situations, such as wartime, necessitates additional research.

1.2. Similar Works

Arafah et al. [36] conducted a study in 2022 that primarily focused on determining the instructor's level of competence in using e-learning methods that stimulate the students' own motivation for learning in peacetime [36]. This study's broad objectives also include determining teachers' levels of competence, which has a significant (and positive) impact on training effectiveness, and using e-learning to increase motivation. However, our results were obtained under combat conditions and are radically different, but they have undeniable significance and value for the scientific community. Furthermore, we discovered the breadth of e-learning opportunities in difficult situations that make learning impossible under normal circumstances.

It should be noted that the impact of war and violent conflict on education not only reduces the effectiveness of learning environment organization but also has a significant impact on student educational achievement. Thus, Brück et al. [37] presented the effects of war on education during a time of intense violence between Israelis and Palestinians. Despite the difficulties, the educational system is attempting to continue the learning process and gives young people the opportunity to gain knowledge, which pleases everyone. Brück et al.'s data [37] provide evidence that the war has an effect on the end result—knowledge. In addition, the quality of the learning environment is an important factor. The attention of scientists is focused on the consequences of war, which is the destruction of educational infrastructure, which causes the deterioration of psychological, physical, social, cognitive and emotional states and can demotivate participants in education. However, these are not the only disadvantages that war brings to children and students, and they will vary depending on the specific circumstances. Brück and his colleagues' work [38] focuses on the perseverance of Ukrainian youth who take a difficult path to education and attend schools and universities while their country is at war [38]. They investigate the implementation of the educational process during hostilities as well, pointing to the reduced effectiveness of the wartime environment and student anxiety.

The war disrupts people's normal rhythm and forces them to rethink their lives and priorities. As a result, education suffers greatly, and the loss of education dampens aspirations and lowers living standards. Thus, many young Liberians lost the opportunity to study and obtain an education during the civil war [39].

Being able to receive education in a secure environment is critical. As a result, the experience of researching the effectiveness of e-learning during combat remains the only true solution. Najran University has switched to e-learning due to the long war between Saudi Arabia, the Arab Coalition and Yemeni rebels and has concluded that this was one of the best decisions [40]. Thus, Rajab, in his study [40], describes the potential benefits of e-learning in war zones for a given region. He emphasizes the lack of a distinction between e-learning and traditional learning. With his findings, he demonstrated that e-learning can achieve its stated educational goals while also organizing a safe learning environment. Currently, scientists and teachers in Ukraine are debating the types, forms and methods of continuing the educational process in educational buildings during the country's hostilities. The administration of educational institutions is required to prepare

and set up safe conditions (bomb shelters) in the event of a rocket or bomb attack, allowing students and pupils to receive education safely.

Thus, Ihedioha [41] studied African parents' perceptions of education during the war and noted in his research the fear felt by parents when their children visited educational institutions. The parents' decision was radical: keeping their children away from the walls of educational institutions, which resulted in their closure [41]. This standard violation is the cause of educational decline. As a direct consequence, implementing educational activities through e-learning is a radical solution and, perhaps, not the only relevant solution.

Education was developed in Afghanistan during the war thanks to the efforts of ordinary residents who wanted to ensure an education for their children. As a result, they were able to make structural changes and modify the country's higher education structure, but the outbreak of new hostilities in 2021 "ruined almost all progress" [42]. This is a bad experience, but it should be thoroughly investigated and avoided in the future. Development and construction will undoubtedly have to wait as long as the war continues. During a war, it is critical for the education system to keep going and prevent the educational decline. An effective solution is the widespread use of internet technologies, which are now "sufficient" for the educational process.

It should be noted that there are also barriers to the creation and implementation of e-learning, as infrastructure is destroyed during hostilities, making training impossible. As a result, the Iraqi authors of [43] used Badrul Huda Khan's octagonal eight-dimensional model of e-learning as a foundation in their study [44,45] when developing their own e-learning system of higher education in Iraq [43]. Iraqi academics support e-learning and study Malaysia's e-learning implementation experience, viewing it as authoritative [46]. As a result, they concluded that an important factor that requires immediate changes and improves the prospects of modern Iranian education is, of course, the improvement of infrastructure and modern software, both of which are in disrepair as a result of the ongoing war [43].

It should be mentioned that war is a major source of stress for all of its participants, both combatants and noncombatants. The researchers conducted a study [47] in which they investigated the impact of war on a person's psychological state. Future learning deteriorates in young people who survived the war (mostly young students of school age), and this is passed on to future children.

Despite this, it is impossible to overestimate the value of education, as well as the challenges that today's youth face while receiving it. As a result, Miaari and colleagues [48] focused their research on conflict events that reduce the likelihood of Palestinians passing entrance exams, reducing the number of applicants to universities. This is a form of the "artificial content" of the learning opportunity. The best solution would be to use e-learning to organize exams, opening up opportunities for young people to receive education. So, in our study, we proposed a number of tools to help organize e-learning and solve this issue.

Of course, the educational process entails a variety of educational tasks that must be tailored to difficult circumstances (war, pandemic, natural disasters). We are talking about how to organize online exams. The organization and management of entrance master's examinations for the next academic year are currently important tasks for ensuring the educational process in Ukrainian educational institutions (2022–2023). Now, we can say that the entrance master's exam was held in a mixed format in Ukrainian educational institutions—specifically, the T.H. Shevchenko National University "Chernihiv Collegium" (online exam). With such a task, the T.H. Shevchenko National University "Chernihiv Collegium", was effective, allowing the goal of a sufficient enrollment of students into the master's program to be realized. Furthermore, experience in organizing online exams, particularly in areas where the war is still ongoing, is limited. Online exams are not a new concept, as some countries have been at war for decades. Finally, countries that use online exams are being researched in relation to other disasters, such as pandemics and natural disasters. The research in [49] examines the factors influencing the global adoption of online exams, as well as the outcomes when compared to the main features they employ.

As a result, it simplifies the selection of the appropriate online exam system for a specific country based on the existing e-learning infrastructure [49].

Our work differs significantly from comparable works in that it is restricted to the range of studied educational process problems and emphasizes the minor role of e-learning in the organization of the learning environment in combat zones.

2. Present Research Goal

The purpose of the work reported in this article is to study and describe the organization and implementation of e-learning, as well as to analyze the students' attitudes towards their educational process during the war, in order to support and optimize the educational process during the war.

The following tasks are expected to be accomplished by this research:

(1) revealing the scope of opportunities through the level of e-learning used by the teaching staff during the war;
(2) determining the students' attitudes towards their education during the war;
(3) identifying factors that affect e-learning success;
(4) providing tools to help organize the learning environment.

3. Research Methods

To achieve our research goal, we used the following methods: scientific source analysis, generalization and systematization of the e-learning experience and empirical methods of surveys and questionnaires.

The study included 230 teachers and 70 students from various Ukrainian educational institutions and lasted from February to June of 2022. The experimental study is based on the "What Is E-learning Like?" questionnaire. It consists of 23 questions and served as the primary tool for determining the proficiency levels of e-learning, which was organized and implemented during the war. The students' survey was based on a 17-question questionnaire titled "Your Attitude Towards Getting Education During Combat Operations." It was completed by 70 students. According to the data in research the majority of participants are from the Chernihiv region and have survived active hostilities.

Both questionnaires were sent to respondents via an e-mail and social media (Facebook, LinkedIn, Google+ and Viber).

All measurement constructs in this study used a Likert Scale. Respondents (students) were asked to select answers. Gender, year of study, teaching experience, university type and position questions were scored as follows: "Yes"—4, "No"—3, "I hesitate to answer"—2, "I decided to leave my study"—1. Their responses provided an opportunity to testify to the respondents' diverse composition and balanced distribution, resulting in the validity of the sample design.

The study statistics were processed and calculated using SPSS Statistics 25.0 software. The data collection survey was conducted with Ukrainian students who have been or are currently involved in active hostilities and have expressed a desire to participate in the study. The sample is representative because the sample participants have diverse demographic characteristics.

A descriptive statistics plan was developed during the first stage of the analysis of the obtained statistical data, which aided in quantitatively and qualitatively analyzing the study's findings. Indeed, from a qualitative standpoint, the data obtained from the tests that were conducted during the experiment revealed that e-learning supports a multifaceted educational process, and, thus, students' opportunities for the educational process have increased. Education became not only diverse but also successful. The whole essence is that, during critical situations, students have free time, which they spend on preparation, and, based on this, a large number of educational elements have been transformed.

The Kaiser–Meyer–Olkin (KMO) test for the Bartlett sphericity test was used in our first sample (among educators) to establish scale levels for the use of e-learning during

combat. The resulting indicator was 0.957, which exceeded the allowable values and confirms the study sample's reliability and validity.

In the second stage, we obtained the results of students' attitudes toward continuing their education during the hostilities in Ukraine, thanks to the author's questionnaire. The descriptive statistic tests—mean, standard deviation and a two-way ANOVA test—were used to analyze the data collected in the study. The obtained indicator's statistical significance was $p = 0.321$, which is significantly higher than the allowable values and indicates statistical significance. This effect is consistent with the students' high stress levels.

Many correlations and difficulties were found while processing the results, which caused students to be unable to study at the appropriate level. Uncomfortable places for students to stay revealed a statistically negative relationship. This is psychological well-being, which has decreased as a result of the Ukrainian war and is a significant reason for a decrease in indicators that increase motivation for learning. These are as follows: mood = 0.10, activity = 0.150 and well-being = 0.09.

4. Insights from the Research

Students' needs are diverse and require highly qualified teachers, particularly those capable of organizing and implementing the e-learning process in Ukraine during a time of war. Thus, it has become a pressing issue for our research.

The research objectives achieved by our work are the following:

(1) revealing insights into the magnitude of opportunities as a result of the e-learning level used by teachers during the war;
(2) identifying factors that influence the success of e-learning;
(3) determining students' attitudes towards their education, which was expanded during the war;
(4) providing tools to help organize the learning environment.

The war, which began in Ukraine, has altered our lives and, to some extent, brought it to a halt. Under the influence of military operations, everyone's priorities have shifted. They have put their own safety ahead of everything else. Processes and types of activities, including educational ones, have been interjected. However, the Ukrainians banded together quickly, and, albeit slowly, practically all activity scopes were launched.

In cases of critical situations, e-learning is one of the few training systems still available for the educational process. Educational strategies have been modified to improve students' success. E-learning strategies are based on some of the well-known learning theories such as behaviorism, cognitivism and constructivism [50]. Their combination, which is present in all e-learning, works well in learning and teaching processes and is aimed at students with varying characteristics.

The research presented herein is divided into two stages. At the first stage, we revealed the extent of e-learning used during the war and developed the criteria that allowed its elementary, advanced and professional levels to be established. The current study included 230 members of the teaching staff from various educational institutions. In processing the questionnaires, we have made a selective distribution of all the respondents according to the demographic characteristics, as shown in Table 1.

In selecting groups and assessing the suitability of data for further statistical analysis, we have relied on the KMO test developed by Kaiser, Meyer and Olkin to test the sphericity under Bartlett's test. The KMO indicator (0.957) exceeds the permissible indicator (0.5) and means that the sample is sufficient for the factor analysis.

To check the validity of the constructions, their reliability and validity have been assessed based on Cronbach's α and the factor analysis. For this purpose, the following aspects have been determined: factor loadings (FL), mean value (MV) and common variance (CV). Cronbach's α value varied from 0.788 up to 0.865. This means that the obtained values are higher than the accepted value (0.70) for the reliability of the scales. Compositional reliability measures the shared variance among constructions. The results of the construction reliability and validity are shown in Table 2.

Table 1. The teaching staff's sample distribution.

Distribution Name	Quantity	Percentage
• Gender:		
male	121	52.61%
female	109	47.39%
Total	**230**	**100%**
• Teaching Experience:		
0–3 years	74	32.17%
4–10 years	51	22.17%
11–20 years	49	21.3%
21–35 years	28	12.17%
more than 35 years	28	12.17%
Total	**230**	**100%**
• Educational Level:		
student-teacher	143	62.17%
graduate student	74	32.17%
general secondary school teacher	3	1.3%
senior university teacher		
associate professor	8	0.87%
professor	2	3.48%
Total	**230**	**100%**

Table 2. Construction reliability and validity results.

Constructions	Measurement Object	FL	Cronbach's α	Mean Value	Common Display
E-learning Awareness	E-learning carried out in the educational institution	0.831	0.865	0.682	0.865
	E-learning elements implemented in one's own activities	0.829			
	Most common web services (Udemy, Edmodo, Coursmos, Peer 2 PeerUniversity, EduBrite, Moodle, Cornerstone, OnDemand, Versal, Basecamp, Stepic) used in one's own activities	0.820			
E-learning Self-sufficiency	I use online tools to create my own resources	0.768	0.788	0.508	0.755
	I implement social networks for e-learning	0.685			
	I apply colleagues' electronic resources for my e-learning organization	0.685			
Self-efficacy of Web Tools for E-learning Implementation and Organization	Learning Apps, mental maps (mind maps), applying for the educational material presentations	0.703	0.794	0.539	0.777
	Video lessons and presentations used in e-learning but created by other authors, colleagues and people	0.791			
	The cooperative participation with university colleagues relative to the content of websites, electronic courses, etc.	0.705			
Self-study of the E-learning Organization and Implementation	The rational use of one's own electronic tools	0.791	0.837	0.609	0.861
	ICT as a means of continuous learning	0.813			
	ICT as a means of the teacher's and student's interaction	0.765			

So, based on the findings, we identified four groups of constructions and ranked them using Cronbach's α:

(1) The e-learning awareness is the highest, as the Cronbach's α index is 0.865. This means that a teaching staff's great desire to master their own knowledge with the help of modern technologies is impossible without them, as educational activities in critical situations are impossible without them. It is worth noting that, in the present study, the vast majority of teachers are young specialists with little work experience (from 0 to 3 years), but this, as we can see, is not an obstacle. On the contrary, young people strive for the development of their competencies.

(2) The self-study of the e-learning organization and implementation construction has concluded, but after data analysis, it took the second place honorably due to its indicator (0.837). Teachers believe that they are able to rationally use their own electronic tools (video lessons, presentations, electronic tests, smart cards, simulators, blogs, Google Classroom) at each level; their percentage ratio was 57.1%. In addition, 42.9% of teachers answered "Yes", which means that the ICT is a tool for lifelong learning. This construction leads to the respondents' division into three groups. This can be explained by the fact that the other, larger half of teachers single out only hardware among ICT tools, which includes PCs, laptops, tablets, digital projectors and speakers. A significant component of this construction should also be considered as a modern tool that allows for the creation and maintenance of the teacher–student–teacher communication, with social networks (Viber, Telegram) as the best assistants.

(3) The self-efficacy of web tools for the e-learning implementation is demonstrated by the Cronbach's α index of 0.794, which is a good convergent indicator of this construction validity, as it exceeded the permissible level of 0.7. To analyze this construction, we have chosen several web services in order to find out their effectiveness in e-learning, and we have come to the conclusion that the teachers, who used them rarely in their work, consider them as quite successful tools because of their game elements (gamification) that are currently quite relevant and allow them to relieve some psychological stress as well as to develop creativity, adapt situations to real life, simulate production processes and use them in a role through a game. A special element that, to some extent, affects the design of the construction is the teachers' indifference to the use of their colleagues' electronic resources in their classes (57%). Filling websites and electronic courses in the team with their colleagues has shown a slightly different result: 66.7%.

(4) The e-learning self-efficacy construction has been determined as the most rational in the model (Figure 1) in terms of organizing, supporting and implementing e-learning, but it occupies the lowest niche (0.788) in our research. The indicator obtained herein is not lower than the permissible value and does not violate the model. Basically, teachers mostly use e-learning in their teaching process in the form of: testing; performance of laboratory work (animation of complex physical phenomena); watching video lessons of colleagues; placement of educational and methodical materials on the university website in open access; self-training; etc. This component creates the need for the implementation of this training system.

Unfortunately, within the limited publication scope, we have evaluated only some constructions that are directly related to establishing the level of the e-learning implementation by the teaching staff.

In addition, the mean value is greater than 0.5 for all the constructions, but other indicators are higher for them. It may be concluded that the construction validity is adequate, since the construction components have been adapted to the educational process in critical situations.

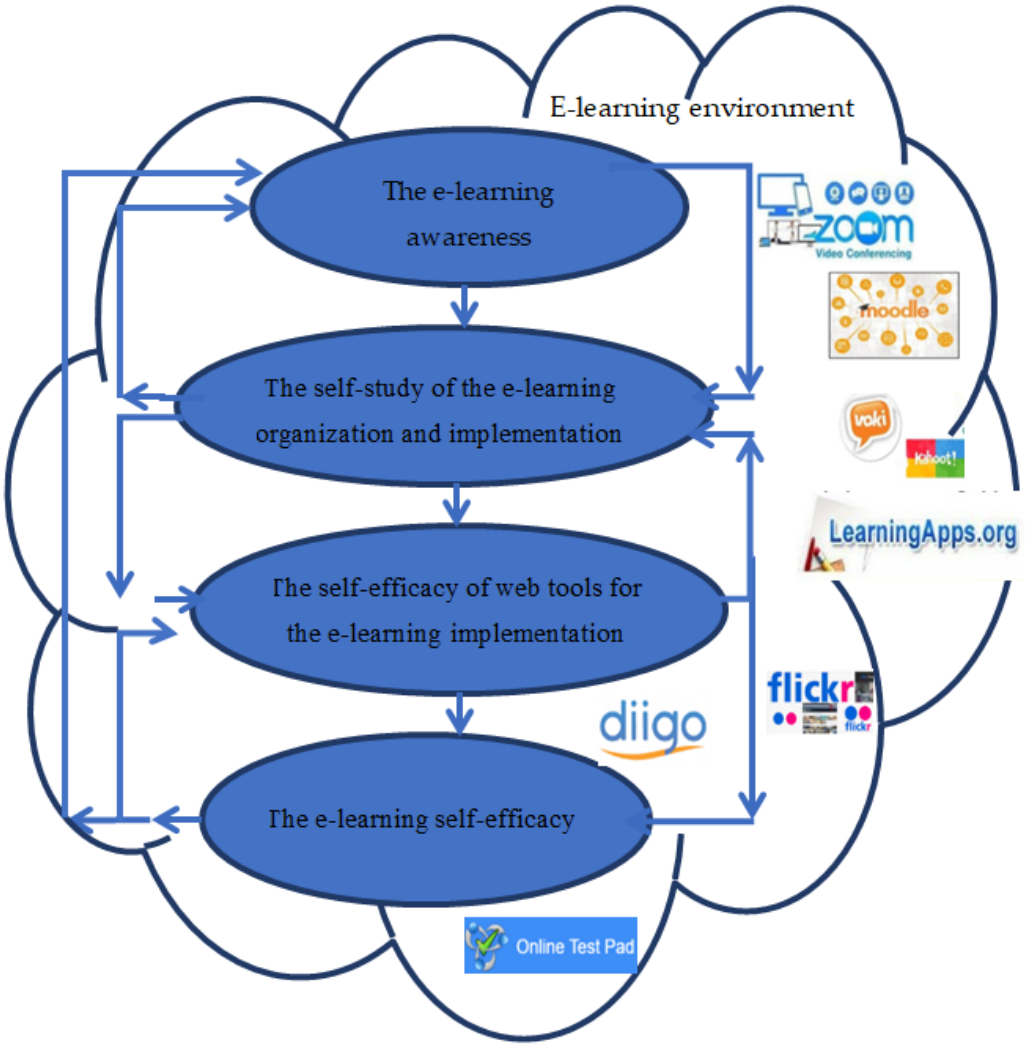

Figure 1. Model Organizing and Supporting the E-learning Process (image developed by the authors).

The proposed constructions have helped to assess the scope of the use of e-learning during the war in Ukraine. Based on the constructions, the tasks carried out in the first stage of the experimental study have revealed the following three levels of e-learning implemented by the teaching staff:

(1) Elementary: when its respondents have an idea about e-learning, know much about the existence of web services and the availability of electronic tools in a special field, are aware of the properties of information and communication technologies, occasionally use electronic resources (and only those which have been developed by other authors) for their training and have a desire to gain experience by developing their own web resources.

(2) Advanced: when its respondents have solid knowledge of ICT tools, web services and electronic tools, take possession of independently organized and supported e-learning methods, are aware of their didactic capabilities, have some experience in using some special electronic tools and web services, are interested in their colleagues' experiences and have a desire for and accept "from time to time" participation in various activities to increase their own competence in internet technologies.

(3) Professional: when its respondents have a thorough, clear understanding of the terminology related to ICT and e-learning, constantly use web services in the e-learning organization and implementation, select effective electronic tools for a specific task from the list presented herein, use the knowledge acquired from web services in practice and plan to apply them in their further practice, have their own websites

and blogs, are registered and have profiles for various web services, participate in marathons, contests, master classes, workshops and demonstration coaching classes, increase their own level by mastering new web services and are interested in their colleagues' experience.

It should be noted that the obtained statistical data are only the online judgments of the respondents; therefore, they may not correspond to the real possibilities of solving questions regarding specific examples. Nevertheless, we have no doubts as to the professionalism and the teaching staff's need to use e-learning.

The levels of the e-learning implementation during the war in Ukraine, according to the respondents' quantitative ratio, are shown in Figure 2.

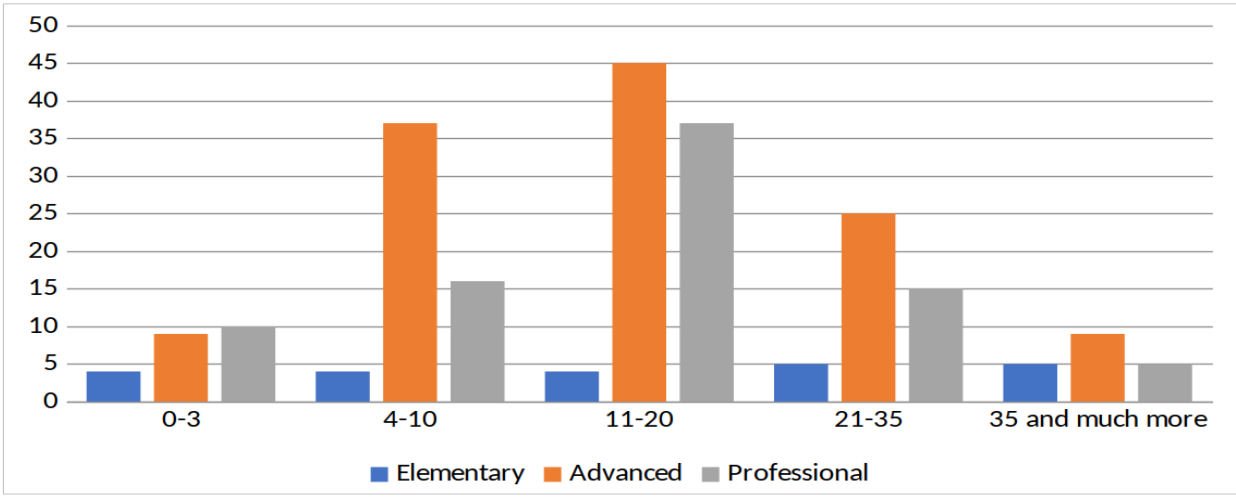

Figure 2. Levels of the E-learning Implementation in the War Time in Ukraine (image developed by the authors).

It should be noted that teachers do not know about the existence of many web services that are useful for their specialty. They learned about some of them only during the 100% transformation to e-learning. There are also those—5% of respondents—who do not know what web services are at all, or they are simply unsure what can fall under the term "web services": hardware and software or a separate web service (web application), or all of them together. The majority of teachers started to get acquainted with web services, which are helpful in creating and maintaining electronic records, only during crisis situations (25%).

Thus, the results obtained by our research allowed us to determine the level of e-learning implementation by the teaching staff: elementary, which is owned by 11.5% of respondents, advanced (53% of respondents) and professional (35.5% of respondents). At this stage, data analysis has been carried out using the research methods mentioned above. According to its findings, we can say that the majority of teachers organize their e-learning at an advanced level, regardless of their working experience in their educational institution. A greater number of respondents with advanced and professional levels have from 11 to 20 years of work experience. This may be evidence of their desire to realize themselves in their own professional activities.

For the effective self-realization of the teaching staff, a balance among the following conditions should be created:

(1) psychological,
(2) organizational,
(3) hardware and technical,
(4) motivational,
(5) material,
(6) financial.

The level and the state of the teaching staff's conditions in their educational institutions have been determined. According to the questionnaires of the respondents, all the specified conditions are unsatisfactory, as are the hardware and technical conditions (multimedia support) for 56.1% of the respondents.

Consequently, respondents single out factors related to innovations implemented in the educational process. After analyzing the respondents' answers, we ranked the factors as follows:

(1) limited resources (PC, multimedia equipment, software);
(2) a lack of time;
(3) a lack of a mechanism by which pedagogical innovations can be implemented in the institution;
(4) some conservatism in education;
(5) a lack of motivation;
(6) an insufficient base of electronic resources (e-textbooks, guided lessons, simulators, computer tests, etc.);
(7) a lack of educational and methodological supporting elements;
(8) a lack of the necessary knowledge;
(9) a lack of some help and administration from colleagues;
(10) psychological unreadiness.

As is evident from the foregoing, the factors, mentioned above, have a significant impact on any success. Teachers have a serious impact on improving the quality of education. They must maintain and develop prestige and trendy knowledge, which are valued by employers. For this, important components must be considered. Due to the analysis conducted, Ben Souter [51] has noted that the observation of trends in other universities makes it possible to see what factors affect educational success. Accordingly, based on the results of the ranking of universities in the QS World University Rankings 2022 [52], we should use four components, namely:

(1) the academic reputation;
(2) article research citations;
(3) the h-index;
(4) the International Research Network (IRN).

All of them should be the results of any motivated teacher.

In the second stage of our study, we have determined the students' attitudes to the educational process during the war in Ukraine. This survey involved 70 students, and its results are shown in Table 3, reporting their demographic characteristics.

Table 3. Demographic Characteristics of Students.

Distribution Name	Quantity	Percentage
1. Gender:		
Male	21	30%
Female	49	70%
Total	**70**	**100%**
2. The Year of Study at University:		
The 1st year of the undergraduate education	25	36.5%
The 2nd year of the undergraduate education	23	33%
The 3rd year of the undergraduate education	13	18.5%
The 4th year of the undergraduate education	3	4%
The graduate student in the 1st year of study	5	7%
The graduate student in the 2nd year of study	1	1%
Total	**70**	**100%**

We have analyzed the data we collected over the course of our survey, which involved 93% of the full-time respondents (the majority). Regarding the respondents' place-of-study, their geographical distribution is shown in Figure 3.

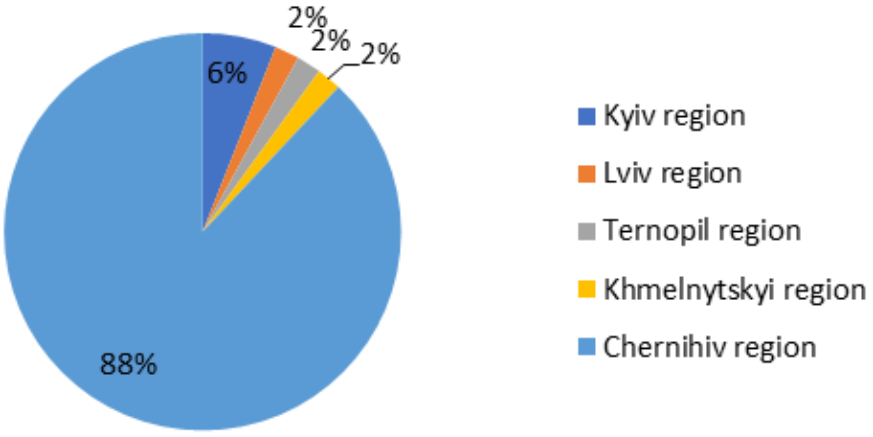

Figure 3. The respondents' place-of-study (image developed by the authors).

Accordingly, the task sample is representative, as 94% of the respondents have personally experienced the severe consequences of the military operation in Ukraine, which is still ongoing. The significant survey questions have been identified. Its results are shown in Table 4.

Table 4. The Students' Attitudes to Studying During the War.

Question	Yes	No	It is Hard for Me to Say	I Have Decided to Leave My Study/I Do Not Have Any Ability to Check
Do you wish to undertake your study in the war time?	60%	16%	24%	0%
Do you have a desire to continue your studies during the military operations in your territory?	25%	46%	29%	0%
Have you owned property that has been damaged in the war?	12%	83%	3%	3%
Have you had a chance to join the educational process during the war (military operations)?	46%	11%	39%	4%
Can students be encouraged to study during the war?	30%	16%	50%	4%
Are you in a safe area now?	59%	12%	29%	0%
Is it comfortable for you to study during the war?	26%	35%	34%	3%

The main task here was to discover the students' attitudes towards studying directly in their place of residence during the war. The data obtained from the survey show that 60% of the respondents want to continue their studies.

The war has largely left its mark on the psychological state of all Ukrainians; 64% of respondents consider it appropriate for the teacher to start the class with simple conversations, namely, "about the well-being of everyone present at the class . . . " and "about emotions that the student experiences."

Students are motivated to obtain an education, no matter what. However, because a larger proportion of respondents are from areas where military operations are or have been active, and they are aware of the danger involved, accordingly, they (46.4%) do not want to continue their studies in such "hot" places, where all thoughts are only about saving lives and ensuring their own existence, not about learning (completion of tasks, learning new material, etc.). Other respondents (12%) have had their property damaged; most of them have poor or absent access to the internet. There were painful answers from the respondents to the question "Can students be encouraged to study during the war?"; 50% of students hesitated to answer, 16% answered "No" and 5% have no desire to study. A total of 12% of respondents are still in a dangerous zone, and 30% of respondents are in an area that is difficult to call safe. This is explained by their fear for their own lives and a reconsideration of priorities.

Therefore, according to the conducted research, it has been established that students with a great desire to receive the education of their dreams do not have the proper conditions to study, and they feel uncomfortable while studying during the war.

During our research, we have identified significant difficulties, due to which students cannot study at the appropriate level. These reasons have been established from the respondents' results, as seen in Figure 4.

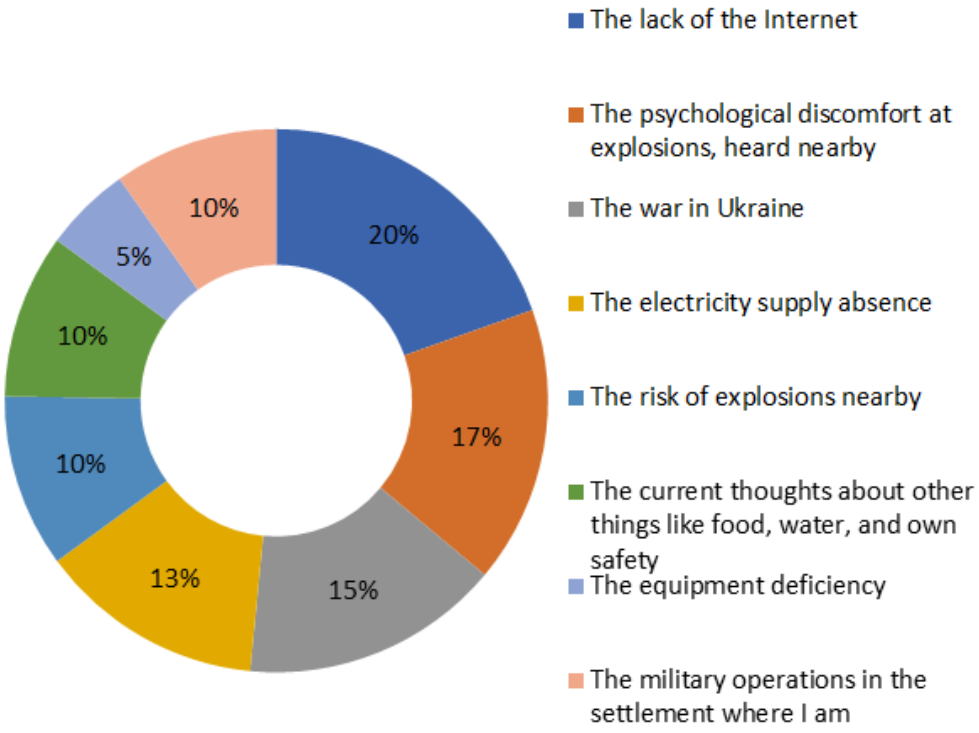

Figure 4. Significant difficulties, due to which students cannot study at the appropriate level (image developed by the authors).

Furthermore, students have expressed their attitude towards the training approach that was organized and implemented for them in wartime. Most respondents are inclined to distance learning in asynchronous modes. The rest of them think that it is impossible to carry it out by any means. Some of the respondents provide tasks with examples, as it is great for students to solve them in any possible time. Another group is against homework assignments, but they are asking to extend the deadlines so that they can pay off the educational debts due to them not completing all the homework tasks. Indeed, students who have completed all the homework tasks receive the exam automatically, and having more time to complete the tasks of debts allows them to automatically get the exam done. There are those who are requiring a test assessment once a month. We have found respondents who prefer the individual mode of training. Basically, all of the respondents ask teachers to be understanding regarding their absence during the online sessions. It is a good argument to say that we need e-learning as the only system of education at the moment.

So, a question arises as to whether it is possible to encourage students to study in such a difficult time. The survey has shown that the vast majority hesitates to answer. Some of the respondents report that they do not have any motivation for this, but they might find motivations if the following aspects are supported:

(1) increasing the time for work;
(2) reducing the academic load;
(3) prolonging the session period;
(4) facilitating the learning process;
(5) reducing the lesson time;

(6) having social guarantees and being financially supported in the form of economic assistance;
(7) the teachers having a democratic attitude to the situation;
(8) having a mutual understanding between students and teachers;
(9) receiving feedback from teachers;
(10) having loyal teachers and more accessible versions of lectures in video and photo formats;
(11) getting higher grades.

To sum up our research, based on the statements of the students, the educational process was mostly conducted in a mixed form. The results of the respondents are shown in Figure 5.

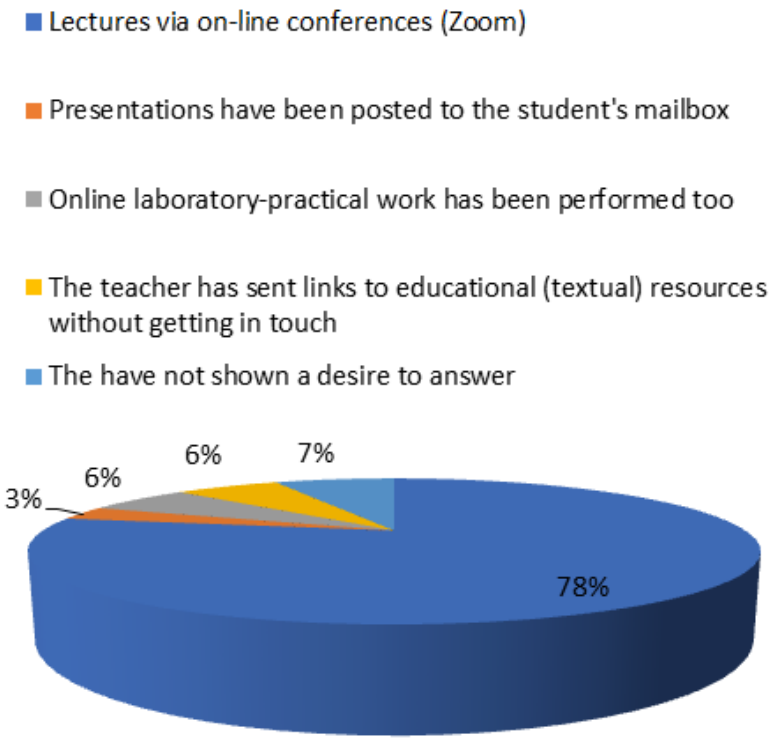

Figure 5. Forms of the learning process during the war (image developed by the authors).

First of all, teachers should be careful in deciding which teaching methods to use in the learning process. Due to the survey results, students want teachers to use the following teaching methods when organizing the educational process:

- demonstrational examples (24%);
- projects (16%);
- educational discussions (13%);
- business games (11%);
- problematic situations created for their resolution (10%);
- "immersion" (10%);
- "computational experiment" (7%);
- "pro" and "contra" debates (5%);
- programming (4%).

Having analyzed the experience of scientists [6,52–57] as to the e-learning organization, and guided by our own experience, we have found web tools that productively help the teacher in organizing the educational electronic environment.

(1) For an exciting activity and the interesting presentation of material con web service (author and his location): Canva (Melanie Perkins, Cliff Obrecht, Cameron Adams; Perth (Australia)), ThingLink (Ulla-Maaria Koivula; Palo Alto (USA), Cacoo (Nulab; Fukuoka (Japan)), Padlet (Nitesh Goel; San Francisco (USA) and Singapore), Geniall

(Genially Web SL; Cordoba (Spain)), Coggle (Andrew John Pritchard, James Crosby, and Steven James Ogborne; Cambridge (UK)) (in the form of interactive posters, diagrams, memory cards, etc.), Word It Out (Enideo (UK)), Word Cloud Generation (Jason Davies; London (UK)) (material plans with various contents), TimeToast (Daniel Todd; London (UK)), Sutori (Thomas Ketchell, Yoran Brondsema; Boston (Massachusetts, US)) (the repetition and generalization of materials).

(2) For practical works with unique and different types of adaptive learning contents (tasks): H5p (H5P Group; Tromsø and Oslo (Norway)), LearningApps (Project of the Center of Pedagogical College of Informatics of Education PH Bern; Zittau and Goerlitz (Germany)), Padlet, Cacoo, Genial, Flippity.

(3) For video tutorials: GoViewVideos (50Wheel (US)), Screencast-o-matic (Seattle, Washington (US)), Wink (Nathan Smith; Mountain View, California (US)), Geniall, Loom (Joe Thomas, Shahed Khan, Vinay Hiremath; San Francisco, California (US)), Screencastify (Jason Hu, Manuel Braun; Chicago, Illinois (US)).

(4) For testing: Classtime (Valentin Ruest; Kyiv (Ukraine), Zurich (Switzerland), Santa Barbara, CA (USA)), PollEverywhere (Brad Gessler, Jeff Vyduna, Sean Eby; San Francisco, California (US)), EDpuzzle (Jordi Gonzalez, Quim Sabrià, Santi Herrero Bajo, Xavier Vergés Parisi; San Francisco, California (US)), ClassMaker (Trent Williams; Sydney, New South Wales (Australia)), Kahoot (Alf Inge Wang, Asmund Furuseth, Jamie Brooker, Johan Brand, Morten Versvik; Oslo (Norway)), Quzizz (Ankit Gupta, Deepak Joy Cheenath; Bangalore, Karnataka (India)).

(5) For real meetings and exams: Zoom (Eric Yuan; San Jose, California (US)), CiscoWebEx (Subra Iyar, Ming Zhu; San Jose, California (US)).

The web-based tools offered herein readily fit into the learning process and require users to have few skills in order to master the arsenal of features that are included in the tool's free version. A significant disadvantage is the lack of a Ukrainian interface, but with built-in site translators, this disadvantage can be successfully avoided. There are also certain inconveniences when some of the functions are incorrect or do not work at all (regulatory works updated by the developer). The great advantages of web tools, as we mentioned above, are their independence from hardware and software and the possibility of using them on any device and at any time.

5. Discussion & Conclusions

It is worth summarizing the results obtained in this research. They indicate that the levels of the teaching staff are appropriate for carrying out the e-learning procedure developed for ensuring the progress of education in critical situations and that only a small number of teachers have a low motivation. Thanks to the conducted questionnaire, four constructions have been established, including e-learning awareness, the self-study of the e-learning organization and implementation and the e-learning self-efficacy, serving as the basis for the study. According to the obtained results, we have created a model describing the e-learning organization, support and implementation. It has helped to measure the scale of the e-learning use during the combat operations by establishing three levels: elementary, advanced and professional. It should be noted that a small number of teachers still do not know much about the existence of special web services that are useful in their specialty, and they can learn about individual web applications only during the forced transition to distance learning.

When comparing the outcomes of China's experience, Xiong [58] emphasized the importance of disseminating his own experience through online education. Xiong's [58] research reports on the positive development of online education and the international launch of university MOOCs, which present implementation data and their impact on educational process participants. These conclusions share characteristics with our research, which are determined by its relevance.

In general, for the teaching staff's effective self-realization, balanced conditions should be created, which are currently in an unsatisfactory state: psychological, organizational, hardware and technical, motivational, material, financial, etc.

Despite the fact that we live in times of rapid changes caused by information technologies and the internet, there are 10 educational process factors that make e-learning organization difficult. They involve:

- limited resources (PC, multimedia equipment, software, etc.);
- a lack of time;
- an absence of mechanisms for the realization of educational innovation in the institution;
- some conservatism in education;
- a deficit of motivation;
- a small database of electronic resources (e-textbooks, tutorials, simulators, computer tests, etc.);
- a limit for the educational and methodological support;
- a lack of necessary knowledge;
- a lack of help from colleagues and administration;
- psychological unpreparedness.

Elameer [43] encountered similar issues when comparing the outcomes of Iraqi universities' e-learning strategies. He emphasized the factors that affect the establishment of an e-learning network:

(1) a lack of infrastructure (due to hostilities);
(2) a lack of personnel;
(3) a lack of external assistance.

It should also be noted that, in the face of the military operations, Ukrainians have radically reconsidered their life priorities. One of the common consequences of war is a negative impact on children's learning outcomes (deterioration) and a decrease in educational achievement. As a result of these negative consequences, both the quality of the learning environment and the psychological state of young people suffer [38].

The organization of safe places (bomb shelters) for the resumption of the educational process has been entrusted to Ukraine's educational institutions. There are no safe places in times of war, according to logic. However, taking into account the positive experience of scientists [59], educational institutions should be required to take responsibility for the creation, implementation and management of open online courses, as well as increasing the level of information technology proficiency and popularizing e-learning [59].

As one can see, even in such a difficult time, students primarily have a desire to obtain the education of their dreams, but the majority of students have been (or still are) in places where their motivation has decreased. Students do not have the proper conditions to study, and they are not comfortable with studying in the war. There are students who do not want to continue their studies when all thoughts are only about safety. Contrary to them, there are students who have refused to continue their studies in the future. Another fact is that 50% of students hesitate to answer the question "Can students be encouraged to study in the war time." It is clear that when shots are fired and you need to run for cover, it is simply impossible to think about anything other than your own safety. However, they consider that encouraging students to study in war time is still possible by reducing the workload, extending the session, deepening the "student–teacher–student" relationships, making the educational resources available in the format of video lessons, etc. Data, obtained in the process of the survey, have allowed for the consideration that, in general, most students are inclined to the method of demonstration examples and projects. Thus, from the analyzed experience of scientists and our own experience, web tools have been singled out, and their effective impact on e-learning organization has been proven. Additionally, they do not require special knowledge for working with web-tools.

Based on the survey results, we can conclude that students have formed their own vision about the organization and implementation of their education in war time. All the

students are inclined to distance learning [36], expecting loyalty, mutual understanding and feedback from teachers.

Thus, based on the results obtained by us and [40] in the implementation of educational activities for children and students affected by the war (which is still ongoing), we can confidently state that the prospect is e-learning. E-learning is less expensive; fewer employees are involved; the teacher performs all of the necessary duties for organizing and implementing the educational process; it can be done anywhere; and the only requirement is internet access [40]. As a result, [40] sees the potential for benefits that supplement our e-learning opportunities in war zones.

Author Contributions: Conceptualization, L.M., S.F. and N.H.; methodology, L.M. and S.F.; software, L.M., S.F. and N.H.; validation, L.M., S.F. and N.H.; formal analysis, L.M., S.F. and N.H.; investigation, L.M., S.F. and N.H.; resources, L.M., S.F. and N.H.; data curation, L.M., S.F. and N.H.; writing—original draft preparation, L.M., S.F. and N.H.; writing—review and editing, L.M., S.F. and N.H.; visualization, L.M., S.F. and N.H.; supervision, L.M., S.F. and N.H.; project administration, L.M., S.F. and N.H.; funding acquisition, L.M., S.F. and N.H. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Matviichuk, L. The place of cloud services in the education system during quarantine measures. *Autom. Comput.-Integr. Technol. Prod. Educ. Status Achiev. Dev. Prospects* **2021**, 158–160. (In Ukrainian)
2. Ma, W.; Yuen, A. E-learning system acceptance and usage pattern. In *Technology Acceptance in Education*; Teo, T., Ed.; Brill Sense: Paderborn, Germany, 2011; pp. 201–216. [CrossRef]
3. Alshmrany, S. Adaptive learning style prediction in e-learning environment using levy flight distribution based CNN model. *Clust. Comput.* **2022**, *25*, 523–536. [CrossRef]
4. Álvarez-Pérez, Y.; Perestelo-Pérez, L.; Rivero-Santanta, A.; Torres-Castaño, A.; Toledo-Chávarri, A.; Duarte-Díaz, A.; Mahtani-Chugani, V.; Marrero-Díaz, M.D.; Montanari, A.; Tangerini, S.; et al. Co-Creation of Massive Open Online Courses to Improve Digital Health Literacy in Pregnant and Lactating Women. *Int. J. Environ. Res. Public Health* **2022**, *19*, 913. [CrossRef]
5. Arkorful, V.; Barfi, K.A.; Baffour, N.O. Factors affecting use of massive open online courses by Ghanaian students. *Cogent Educ.* **2022**, *9*, 2023281. [CrossRef]
6. Ashour, H.M. Evaluation Patterns and Assessment Tools of E-Learning for High School Students in Palestine: Solutions and Suggestions. *Int. J. Educ. Psychol. Stud.* **2020**, *11*, 437–448. [CrossRef]
7. Ferilli, S.; Loop, L. Toward Reasoning-based Recommendation of Library Items—A Case Study on the e-Learning Domain. In *Central Europe (CEUR) Workshop Proceedings, Proceedings of the 18th Italian Research Conference on Digital Libraries (IRCDL 2022), Padova, Italy, 24–25 February 2022*; CEUR-WS: Saarbrücken, Germany, 2022; Volume 3160, p. 12.
8. Finlay, M.J.; Tinnion, D.J.; Simpson, T. A virtual versus blended learning approach to higher education during the COVID-19 pandemic: The experiences of a sport and exercise science student cohort. *J. Hosp. Leis. Sport Tour. Educ.* **2022**, *30*, 100363. [CrossRef] [PubMed]
9. Rudin, C.; Chen, C.; Chen, Z.; Huang, H.; Semenova, L.; Zhong, C. Interpretable machine learning: Fundamental principles and 10 grand challenges. *Stat. Surv.* **2022**, *16*, 1–85.
10. Syahrawati, E.K.; Susantini, E.; Indana, S. Profile of Blended Learning Implementation in Learning Activities. *IJORER Int. J. Recent Educ. Res.* **2022**, *3*, 45–60. [CrossRef]
11. Tayebinik, M.; Puteh, M. Blended Learning or E-learning? *Int. Mag. Adv. Comput. Sci. Telecommun. (IMACST)* **2012**, *3*, 103–110.
12. Matviichuk, L. Information and Communication Technologies as Tools for Improving Students' Motivation to Learning. *J. Inf. Technol. Educ. (ITE)* **2020**, *42*, 52–62. [CrossRef]
13. Gaur, P. Research trends in E-learning Poonam Gaur. *Shanlax Int. J. Commer.* **2018**, *6*, 36–39. [CrossRef]
14. Maatuk, A.M.; Elberkawi, E.K.; Aljawarneh, S.; Rashaideh, H.; Alharbi, H. The COVID-19 pandemic and E-learning: Challenges and opportunities from the perspective of students and instructors. *J. Comput. High. Educ.* **2022**, *34*, 21–38. [CrossRef] [PubMed]
15. Dhawan, S. Online learning: A panacea in the time of COVID-19 crisis. *J. Educ. Technol. Syst.* **2020**, *49*, 5–22. [CrossRef]
16. Hodges, C.; Moore, S.; Lockee, B.; Trust, T.; Bond, A. The difference between emergency remote teaching and online learning. *EDUCAUSE Rev.* **2020**, *3*, 1–12. Available online: https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning (accessed on 2 September 2022).
17. Punjani, K.K.; Mahadevan, K. Transitioning to online learning in higher education: Influence of Awareness of COVID-19 and Self-Efficacy on Perceived Net Benefits and Intention. *Educ. Inf. Technol.* **2022**, *27*, 291–320. [CrossRef]

18. Kulikowski, K.; Przytula, S.; Sułkowski, L. E-learning? Never again! On the unintended consequences of COVID-19 forced e-learning on academic teacher motivational job characteristics. *High. Educ. Q.* **2021**, *76*, 174–189. [CrossRef]
19. Yengin, I.; Karahoca, A.; Karahoca, D. An E-learning success model for instructors' satisfaction in the perspective of interaction and usability outcomes. *Procedia Comput. Sci.* **2011**, *3*, 1396–1403. [CrossRef]
20. Somayeh, M.; Dehghani, M.; Mozaffari, F.; Ghasemnegad, S.M.; Hakimi, H.; Samaneh, B. The effectiveness of E-learning in learning: A review of the literature Ph.D. of Nursing, Instructor, Department of nursing, Lahijan Branch, Islamic Azad University, Instructor, Department of Operating Room, Faculty of Medical Sciences, Birjand Un. *Int. J. Med. Res. Health Sci.* **2016**, *5*, 86–91.
21. Kianto, A.; Shujahat, M.; Hussain, S.; Nawaz, F.; Ali, M. The impact of knowledge management on knowledge worker productivity. *Balt. J. Manag.* **2019**, *14*, 178–197. [CrossRef]
22. Matviichuk, L. The method of introducing an educational computer program into the educational process of training future software engineers. *J. Inf. Technol. Educ. (ITE)* **2015**, *23*, 60–69. (In Ukrainian). Available online: http://ite.kspu.edu/issue-23/p-60-69 (accessed on 2 September 2022). (In Ukrainian).
23. Marek, M.W.; Chew, C.S.; Wu, W.-C.V. Teacher experiences in converting classes to distance learning in the COVID-19 pandemic. *Int. J. Distance Educ. Technol. (IJDET)* **2020**, *9*, 40–60. [CrossRef]
24. Kerres, M. Against all odds: Education in Germany coping with COVID-19. *Postdigital Sci. Educ.* **2020**, *2*, 690–694. [CrossRef]
25. Gillett-Swan, J. The Challenges of Online Learning: Supporting and Engaging the Isolated Learner. *J. Learn. Des.* **2017**, *10*, 20–30. [CrossRef]
26. Looi, K.H. Overcoming challenges to make e-learning a panacea for present and future crises. *Int. J. Inf. Learn. Technol.* **2022**, *39*, 227–239. [CrossRef]
27. Daryanto, E.; Siregar, B.; Januariyansah, S. A meta-analysis of the e-learning influence on Vocational Education and Training (VET): Preliminary study of virtual to actualization. *Int. J. Educ. Math. Sci. Technol.* **2022**, *10*, 710–721. [CrossRef]
28. Mastan, I.A.; Sensuse, D.I.; Suryono, R.R.; Kautsarina, K. Evaluation of distance learning system (e-learning): A systematic literature review. *J. Teknoinfo* **2022**, *16*, 132–137. [CrossRef]
29. Pallavi, D.R.; Ramachandran, M.; Chinnasamy, S. An Empirical Study on Effectiveness of E-Learning Over Conventional Class Room Learning—A Case Study with Respect to Online Degree Programmes in Higher Education. *Recent Trends Manag. Commer.* **2022**, *3*, 25–33. [CrossRef]
30. Saba Qadhi, D.; Ashraah, M.; Yousef, W. Effectiveness of E-Learning Experience in Gulf universities Region: Students' Perceptions. *J. Posit. Sch. Psychol.* **2022**, *6*, 8308–8328.
31. Al-Azawei, A.; Parslow, P.; Lundqvist, K. Barriers and Opportunities of E-Learning Implementation in Iraq: A Case of Public Universities. *Int. Rev. Res. Open Distrib. Learn.* **2016**, *17*, 126–146. [CrossRef]
32. Jaggars, S.; Bailey, T.R. Effectiveness of Fully Online Courses for College Students: Response to a Department of Education Meta-Analysis, 2010, 1–16. Available online: https://ccrc.tc.columbia.edu/publications/effectiveness-fully-online-courses.html (accessed on 2 September 2022).
33. Umar, M.; Ko, I. E-Learning: Direct Effect of Student Learning Effectiveness and Engagement through Project-Based Learning, Team Cohesion, and Flipped Learning during the COVID-19 Pandemic. *Sustainability* **2022**, *14*, 1724. [CrossRef]
34. Al-Hussaini, K.; Al-Qozani, H. A review of E-Learning in Higher Education. *Kut Univ. Coll. J. Humanit. Sci.* **2021**, *2*, 470–482.
35. Mahadi, I.; Ariska, D. The Effect of E-Learning Based on the Problem-Based Learning Model on Students' Creative Thinking Skills During the COVID-19 Pandemic. *Int. J. Instr.* **2022**, *15*, 329–348.
36. Arafah, L.N.; Susita, D.; Wolor, C.W. Effect of e-learning training methods and instructor competencies on the effectiveness of training mediated by training motivation. *Int. J. Soc. Sci. World TIJOSSW* **2022**, *4*, 204–215.
37. Brück, T.; Di Maio, M.; Miaari, S. Learning the hard way: The effect of violent conflict on student academic achievement. *J. Eur. Econ. Assoc.* **2019**, *17*, 1502–1537. [CrossRef]
38. Brück, T.; Di Maio, M.; Miaari, S. Learning the hard way: The effect of conflict on education. Global Economic Consequences of the War in Ukraine Sanctions. *Supply Chain. Sustain.* **2022**, *32*, 175–180. Available online: https://cepr.org/voxeu/columns/learning-hard-way-effect-conflict-education (accessed on 2 September 2022).
39. Liu, S.X. How war-related deprivation affects political participation: Evidence from education loss in Liberia. *J. Peace Res.* **2022**, *59*, 353–366. [CrossRef]
40. Rajab, K.D. 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* **2018**, *6*, 6783–6794. [CrossRef]
41. Ihedioha, A. The impact of war on the education of children in war-torn African regions: Parents' perception. *ProQuest Diss. Theses* **2009**, *284*, 3399058. Available online: http://search.proquest.com/docview/305140168 (accessed on 2 September 2022).
42. Hayward, F.M. Building Higher Education Amidst War in Afghanistan. In *Fostering Institutional Development and Vital Change in Africa and Asia*; Palgrave Macmillan: Cham, Switzerland, 2022; pp. 117–156. [CrossRef]
43. Elameer, A.S.; Idrus, R.M. National E-Learning Strategy to Enhance and Enrich the Iraqi Universities. *US China Educ. Rev. A* **2011**, *4*, 481–496. Available online: https://files.eric.ed.gov/fulltext/ED526803.pdf (accessed on 2 September 2022).
44. Khan, B.H. *E-Learning Quick Checklist*; Information Science Publishing, IGI Global: Pennsylvania, PA, USA, 2005.
45. Khan, B.H. *Flexible Learning in an Information Society*; Information Science Publishing, IGI Global: Pennsylvania, PA, USA, 2006.
46. Idrus, R.M. Educational media in Malaysia. In *Educational Media in Asia*; Reddi, U.V., Mishra, S., Eds.; Commonwealth of Learning: Vancouver, BC, Canada, 2006; pp. 25–33. Available online: https://www.academia.edu/781671/Educational_Media_in_Malaysia (accessed on 2 September 2022).

47. Bharati, T. The long shadow of the Kargil War: The effect of early-life stress on education. *Econ. Hum. Biol.* **2022**, *44*, 101097. [CrossRef]
48. Miaari, S.; Lee, I. Obstacles on the Road to School: The Impacts of Mobility Restrictions on Educational Performance. *J. Hum. Resour.* **2022**, *13563*, 920-11166R2.
49. Muzaffar, A.W.; Tahir, M.; Anwar, M.W.; Chaudry, Q.; Mir, S.R.; Rasheed, Y. A Systematic Review of Online Exams Solutions in E-Learning: Techniques, Tools, and Global Adoption. *IEEE Access* **2021**, *9*, 32689–32712. [CrossRef]
50. Mödritscher, F. The impact of an e-learning strategy on pedagogical aspects. 2006. Available online: https://www.itdl.org/Journal/Mar_06/article06.htm (accessed on 2 September 2022).
51. TopUniversities. QS World University Rankings by Subject. Available online: https://www.topuniversities.com/subjectankings/2021 (accessed on 3 July 2022).
52. Hassan, A. E-learning and Its Application in Universities during Coronavirus Pandemic. In *Technologies, Artificial Intelligence and the Future of Learning Post-COVID-19*; Hamdan, A., Hassanien, A.E., Mescon, T., Alareeni, B., Eds.; Studies in Computational Intelligence; Springer: Cham, Switzerland, 2022; Volume 1019, pp. 67–101. [CrossRef]
53. Naim, A. Realization of diverse Electronic tools in learning and teaching for students with diverse skills. *Glob. J. Enterp. Inf. Syst.* **2020**, *12*, 72–78. Available online: https://gjeis.com/index.php/GJEIS/article/view/451 (accessed on 2 September 2022).
54. Ferilli, S.; Redavid, D.; Di Pierro, D.; Loop, L. Functionality and Architecture for a Platform for Independent Learners: KEPLAIR. In *Intelligent Systems Design and Applications (ISDA 2021)*; Abraham, A., Gandhi, N., Hanne, T., Hong, T.P., Rios, T.N., Ding, W., Eds.; Lecture Notes in Networks and Systems; Springer: Cham, Switzerland, 2022; Volume 418. [CrossRef]
55. Hortsch, M.; Finn, E.; Ayres, F.; Goldberg, S. Brave New E-World: Medical Students' Preferences for and Usage of Electronic Learning Resources during Two Different Phases of Their Education. *FASEB J.* **2022**, *4*, 298–308. [CrossRef]
56. Khalid, A.; Lundqvist, K.; Yates, A. A literature review of implemented recommendation techniques used in Massive Open online Courses. *Expert Syst. Appl.* **2022**, *187*, 115926. [CrossRef]
57. Ssekitto, F. Staying safe while teaching and learning online in Library and Information Science training schools in Uganda: The case of Makerere University. *Libr. Philos. Pract.* **2022**, *7085*, 1–13.
58. Xiong, Y.; Ling, Q.; Li, X. Ubiquitous e-Teaching and e-Learning: China's Massive Adoption of Online Education and Launching MOOCs Internationally during the COVID-19 Outbreak. *Wirel. Commun. Mob. Comput.* **2021**, *2021*, 1–14. [CrossRef]
59. MOE; The Ministry of Education of the People's Republic of China. Guiding and standardizing educational apps to promote the orderly and healthy development of "Internet+Education". 2019. Available online: http://www.moe.gov.cn/jyb_xwfb/s271/201909/t20190905_397585.html (accessed on 2 September 2022). (In Chinese)