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RESEARCH ARTICLE

Methods of Teaching Certain Academic Disciplines to Higher Education Students in Wartime Conditions

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Abstract

The article highlights the experience of Ukraine's education system in the extreme conditions of war. The peculiarity of this period is the need to combine the fulfillment of important tasks that stretch back to the past and require their logical completion with the current tasks caused by the war. As a result of continuous, bloody hostilities and air bombardment, civilian critical infrastructure, premises of higher education institutions were damaged and destroyed, educational and research equipment was lost; there were significant losses of teachers and students who were forced to move to safer regions of the country and abroad. The war continues. The educational process has completely stopped. However, this is unacceptable. It is necessary to continue training specialists for the national economy, the security and defense sector, and the Armed Forces of Ukraine. Taken together, all of this has determined the need to substantiate a universal methodology for teaching certain academic disciplines to higher education students in wartime. The article analyzes modern publications on the topic of the study. The article highlights the unresolved aspects of developing the theoretical foundations of advanced teaching of certain academic disciplines to students. The existing decisions of the Ministry of Education and Science of Ukraine, namely the models of organization of education: full-time, distance, mixed and individual forms (external or family form), unfortunately, do not solve the problem of organizing education during air raid. The author proposes to base the methodology of teaching certain academic disciplines to higher education students in wartime on advanced learning. To do this, the main lecture topics are given by the teacher before the start of studying them in the program. The proposed solution has successfully passed field tests and ensured the safety of students' lives. Advance learning is effective both when studying a topic that is difficult to understand and when studying a topic that is closely related to other disciplines that have been studied before.

Introduction

Since February 24, 2022, Ukraine's education system, like the rest of the country, has been operating in extreme conditions. The peculiarity of this period is the need to combine the fulfillment of important tasks that stretch back to the past and require their logical completion with the current tasks caused by the war and the tasks that will determine the prospects for further development of the higher education system. As a result, the higher education system has faced new challenges [1]:

1. Damage and destruction of infrastructure and premises of Higher Education Institutions (HEIs), loss of educational and research equipment.

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2. Significant loss of staff of higher education institutions, the contingent of applicants/ students who are forced to move to safer regions of the country and abroad (including for study abroad).

Currently, military aggression continues, so we need to adapt to the reality of war, in which it is necessary to continue the educational process of training higher education students for the needs of the national economy. The teacher has been and remains an active person. The existing problem of the educational process of choosing pedagogical teaching technologies [2] was compounded by uncertainty in the organization of the educational process. Thus, during the 2 academic hours defined by the class schedule, the teacher is not only a full-fledged actor, but is also responsible for observing the regime of preserving the lives of students in case of an air raid alert. This requires not only educational managers to focus on creating safe conditions for staying in educational institutions, but also teachers, because the main priority is the life and health of each participant in the educational process, and the most important goal of teaching in war is to turn every educational institution into a safe territory. And although the methodological department of the Ministry of Education and Science of Ukraine has developed four models of education organization: full-time, distance, mixed and individual forms (external or family form) [1], they do not fully solve this problem.

Analysis of research and publications

From the point of view of our study, the information and analytical collection "Education of Ukraine under martial law" [1] is interesting, which summarizes the current state of education in Ukraine under martial law. However, the authors did not pay attention to many topical issues that are of particular importance under martial law, namely teaching (scientific and pedagogical) activities. The first practical proposals from teachers on the organization of the educational process under martial law in Ukraine were discussed in the context of the all-Ukrainian scientific and pedagogical advanced training [3]. Despite the full-scale war, most of the scientists not only did not leave the territory of Ukraine, although there was such a possibility, but on the contrary, by their own example, they fought on the scientific front (S.S. Zabara).

Highlighting aspects that are understudied

An analysis of recent studies has revealed that the chosen object of research, namely, the problem of ensuring the continuity of the learning process in educational institutions in the extreme conditions of hybrid warfare, has not been fully resolved. Therefore, we will highlight an insufficiently studied aspect, namely, the substantiation of the methodology for teaching certain academic disciplines to higher education students as the only means of ensuring quality education in wartime.

Purpose of the article

Thus, the purpose of the report is to test the methodology of teaching certain academic disciplines to higher education students in the extreme conditions of hybrid warfare.

Research objectives (goals)

To achieve this goal, the following tasks have been set:

1. Analyze current research.

2. Justify new decisions.

Methods

The methodology of scientific research is a set of principles, tools, methods and forms of organizing and conducting scientific research on a given problem.

In the present study, we use the concept of "Methodology" as a doctrine of activity organization [4]. This definition of A. Novikov clearly determines the subject of methodology - the organization of teacher and student activities. It is this methodology that we will use as the theoretical and fundamental basis for real scientific research.

The main means of scientific and theoretical research. A set of scientific methods that are comprehensively substantiated and consolidated into a single system. Basic research tools:

Methods of theoretical historical analysis and generalization of scientific literature (including from Internet sources) on the research topic;

The method of analytical and comparative analysis in assessing the novelty of the research results;

Generalization - for formulating conclusions and recommendations on effectiveness.

Reliability and accuracy of results

The reliability of the research results is ensured by the correctness, logic and consistency of the use of scientific research methods to build methods for teaching certain academic disciplines to higher education students.

Methodological basis of the study

The object of scientific and theoretical research is not just a single phenomenon, a specific situation, but a whole class of similar phenomena and situations, their totality. The methodological basis of the study is the ideas of V. Bespalko, Y. Masbits, L. Vygotsky, Y. Babansky & S. Rubinstein (educational psychology); N. Wiener, K. Shannon, F. Rosenblatt, A. Kolmogorov, V. Glushkov, V. Mayer & D. Novikov, (cybernetics and mathematical modeling of the learning process); M. Nechkina & S. Lisenkova (advanced learning); J. Bergmann & A. Sams (flipped classroom).

Advance learning is a type of teaching in which the basics of a topic are given by the teacher before the start of studying them in the program. Advance learning is effective both when studying a topic that is difficult to understand and when studying a topic that is closely related to other disciplines that have been studied before.

Advanced education is based on a proactive approach to training specialists. The essence of the proactive approach is to provide students with knowledge focused on the future needs of the economy and society, given that the knowledge gained at university becomes obsolete before the graduate leaves the university. The economic knowledge acquired should become the basis for economic thinking and economic behavior, which in turn creates an economic culture and leads to the economic prosperity of the state.

It has been the focus of scholarly attention in recent years because of the benefits that result from the positive signs of proactivity that it provides to individual actors or communities in the face of the need to be ready and able to adapt quickly and successfully to social change and professional innovation. F. Cangiano and S.K. Parker note that proactive individuals are more professionally effective, more satisfied with their work and career. Therefore, it is rational to include a proactive presentation along with the lecture material. A proactive presentation allows students to analyze the information received, participate in the discussion of some issues that arise during the lecture, reduces nervous tension, makes it easier to perceive information and reproduce it more accurately in the future.

Results

The substantial autonomy of the educational institution provided by the Law of Ukraine "On Higher Education" allows for timely and dynamic adaptation of the educational process to the current conditions [1]. We have already seen this during the COVID-19 pandemic, when higher education institutions switched to distance or blended learning. It is thanks to the experience gained over the past two years in this work schedule that the university can now ensure the implementation of the curriculum. Distance or blended learning in martial law has become not an alternative, but an operational necessity. Under these circumstances, remote support of the educational process will depend only on the availability of online access to the Internet, which is usually available in the territory where active hostilities are not taking place. This approach will help to preserve human resources, communication with students, and most importantly, to ensure maximum safety of its participants.

Let us consider the essence of the methodology of teaching academic disciplines to higher education students in wartime. It is limited in its application in higher military educational institutions only if there is a complete absence of restricted information in the educational material. This is the phenomenon between higher military educational institutions and higher education institutions, and hence the use of distance learning.

A mandatory element of successful learning of the educational material of the educational components of higher education is the combination of forms of teaching. It should be noted that at present the choice of pedagogical teaching technologies is a key problem for the teacher, the subject of the educational process [2]. At the same time, the lack of recommendations for formalization in their choice expands the degree of freedom of the lecturer's pedagogical skills in creative search and experimentation. Reduction of classroom time (lectures, practices/seminars, laboratory classes) due to air raid alert leads to a violation of the logic of the educational process. To ensure balance, we propose blended learning based on the technology of "advanced learning" [5,6] or "Flipped classroom" [7]. The scheme of realization of

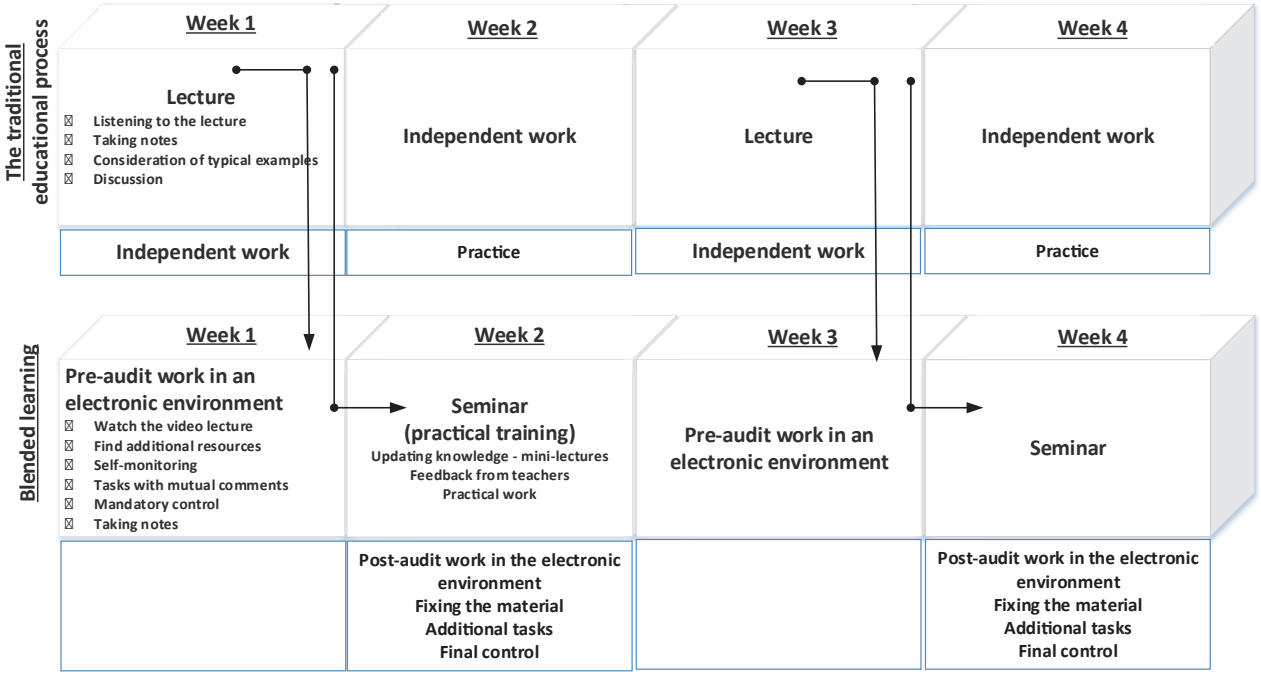

Figure 1 Scheme of the educational process implementation.

the educational process when transferring lectures to the electronic environment is shown in figure 1.

It requires an explanation of the process and method of distance learning used in the methodology.

And for the online part of blended learning, the teacher chooses a synchronous or asynchronous mode of interaction. Let's take a closer look at the features of synchronous or asynchronous mode of interaction.

Thus, the synchronous mode involves interaction between the subjects of distance learning, during which the participants are simultaneously in a safe place (bomb shelter) with access to the electronic learning environment or communicate through audio and video conferencing. In other words, it is a real-time classroom lesson in a selected digital environment. Both the teacher and students are present in the classroom at the same time, communicating in a similar way to a regular class.

Asynchronous mode refers to the interaction between distance learning subjects in which participants interact with each other with a time delay, using interactive educational platforms, e-mail, forums, social networks, etc. It can be said that this is a mode of more independent learning, which, at the same time, is supported by the teacher using appropriate digital tools. It is this mode that is effective not only in the context of the bombing of educational institutions, but rather in the absence of power supply, which affects the performance of information and communication equipment of providers, routers, laptops, audio and video conferencing.

What are the advantages and disadvantages of these learning formats?

Synchronous learning means quick and direct feedback from both the teacher and the students. Answers and reactions are provided in real time, much like in a regular classroom. Of course, there are technological limitations that mean that only one person can speak at a time, and not all participants can be seen on the screen at once if there are many of them. Only in a synchronous format can you organize direct interaction between students in small groups, quickly discuss issues and make decisions.

However, synchronous learning requires online presence at a clearly defined time. This can be a problem, especially when there is no power at home, or it is served according to a schedule that does not correlate with the teacher's time. A certain part of a synchronous lesson is spent on negotiating technical obstacles, asking questions and clarifying due to unforeseen connection interruptions and other organizational issues.

Instead, asynchronous mode allows you to work on your own schedule and at your own pace, and maximizes the benefits of blended learning. This allows you to learn the material based on your own understanding, not the pace of the rest of the group. At the same time, asynchronous mode can create a sense of isolation, as it reduces the sense of learning community if it is not specifically supported. In addition, it requires students to have a fairly high level of self-discipline and a developed ability to manage their time, which can be quite difficult, particularly if they have no previous experience of such work.

Thus, having considered the peculiarities of these learning formats, we can identify the types and forms of activities that will allow us to apply each of these modes as effectively as possible.

Organizational issues and consultations

Synchronous classes should be used to organize the learning process, answer questions about content, or solve problems with access to digital services that students have, perhaps by offering alternative ways to complete assignments.

At the same time, the scheme of setting aside certain periods of the school day for consultations works well - students know that they can contact at this time and get a direct answer. If a question arises at another time, it is worth establishing rules for answering outside of such consultations. For example, a question received by email or messenger between 9 a.m. and 3 p.m. can be answered within one hour.

In the asynchronous organization of the learning process, the systematic content of the digital learning platform chosen by the educational institution is of particular importance. Clear instructions should be provided and various communication channels (email, accessible feedback form, messenger, phone, etc.) should be provided in case of technical problems.

Teaching new material

In the traditional approach, the teacher presents new material in the classroom, and the student works on it at home (asynchronously) by completing exercises and tasks. This approach is justified in some cases when the student has no previous experience of working on the material independently, or the material is completely new or of high complexity. More often, it is more appropriate to try to implement the flipped classroom approach, when the new material is studied asynchronously, and the online classroom is used to discuss and practice it.

Discussion of Research Results

According to the developed methodology, the lecture course of the discipline is given to students in advance for studying before the classroom (distance learning) sessions. At the scheduled classroom (distance learning session), the lecture material is discussed and clarified. The methodology needs further improvement if it is necessary to conduct laboratory or practical classes using stationary equipment of the HEI and it is not possible to practice it at home.

As can be clearly seen from table 1 the following learning methods are the most accepted for the formation of knowledge: didactic games; practical training; teaching others (mutual learning) and independent work [8].

Assessment and feedback mechanisms are essential components towards effective teaching in higher education and are continuously monitored [9].

Independent work is the main means of mastering educational material in the time free from standardized educational classes, that is, lectures and practical classes (auditory work). During independent work, students should pay attention to: work on processing and studying the recommended literature; preparation for discussions and other tasks proposed by the teacher; work on an abstract (educational article, theses, report); work on an individual research project, etc.

A large reserve of time budget allocated for independent work will allow students to deeply study the educational material, prepare for the lecture and, as a final result, acquire educational quasi-professional experience for future activities [5-7]. This is confirmed by the results of the study. Student success in studies depending on the time spent on extracurricular activities [10].

Conclusion

Thus, the use of distance learning and proactive learning will not only ensure the implementation of the curriculum for mastering the educational component, but also maximize students' ability to preserve life and health in war conditions.

Table 1: Comparative characteristics of different teaching methods.

Teaching methods		Solved tasks						
		form			develop			gaining experience
		knowledge		skills	thinking	memory	language	
Verbal	(Lecture)	5%	++	–	–	–	++	
	Reading	10%						
	Listening	20%						
Visually	Work with multimedia (audiovisual)	20%	+	++	+	+	–	
	Viewing the drawing	30%						
	Demonstration	30%	+	+	+	++	–	
	Video viewing	50%						
Practical	Working with a book (reading)	10%	+	+	+	+	+	
	Educational discussions	50%	++	–	++	+	++	++
	Didactic games	70%	++	–	++	+	++	++
	Practical training	75%	+	++	++	+	–	++
	Teaching others is the application of what has been learned	90%	++	–	++	+	++	++
Independent work		80%	++	++	++	+	+	
Oral and written control			++	–	+	+	++	

Note: Note: ++ – solve very well; + – solve partially; – – solve poorly.

As a result of its application, a large reserve of time budget allocated for independent work will allow students to study the educational material in depth and prepare for the lecture class.

The proposed technique is fully ready for practical application as advanced anticipatory learning.

Scientific novelty. Scientific substantiation

For the first time, the possibility and practical aspects of the methodology of teaching certain academic disciplines to higher education students in the extreme conditions of hybrid warfare on the basis of advanced learning have been substantiated and developed. It was tested in the teaching of the discipline of the educational component to students of the (master's) level of higher education of the educational program "Computer Science" of the field of knowledge 12 Information Technology, specialty 122 Computer Science of full-time and part-time forms of education and ensured the continuity of the educational process and the preservation of human life.

Expanding the boundaries of the scientific field

The scientific result obtained in the work expands the scientific boundaries of pedagogical sciences in the field of education, namely in the development of methodology and methods of teaching certain academic disciplines to higher education students in the extreme conditions of hybrid warfare. This expansion takes place in the systemic unity of the philosophy of education and the theory and methodology of vocational education.

Since the Ukrainian education system, like the rest of the country, has been operating in extreme conditions since February 24, 2022, it is necessary to adapt to the realities of war, during which it is necessary to continue the educational process of training higher education students for the needs of the national economy. Professor I. Kozubtsov & associate professor V. Lishchina was one of the first at the Department of Computer Science of Lutsk National Technical University applied the developed methodology of teaching disciplines of educational components to

students of the (master's) level of higher education of the educational program "Computer Science" of the field of knowledge 12 Information Technology, specialty 122 Computer Science of full-time and part-time forms of education on the basis of advanced learning, ensuring the continuity of the educational process and preservation of human life.

Prospects for further research

The theoretical results obtained in the course of scientific research form the basis for further research and substantiation of the criteria and indicators of the minimum requirements for the implementation of technical reliability of the means of implementing distance learning in educational institutions.

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Declaration of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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