The informational and educational environment «DIALOG» on the way to improve the educational process in the Higher Military Educational Institutions in the conditions of full-scale armed aggression russian federation against Ukraine

Kalachova Vironika1, Misiura Oleh2, Sizon Dimitry3, Pylypenko Vitalii4, Karmannyi Yevhenii5, Kolomiitsev Oleksii6, Dudenko Sergii7, Pavlii Vladyslav8, Tretiak Viacheslav9, Zakirov Zamir10, Honchar Roman11, Khover Oleksandr12

1 PhD in Engineering, Senior Researcher, Associate Professor, Leading Researcher of Scientific Research Department of Air Force Scientific Center; Ivan Kozhedub Kharkiv National Air Force University; Ukraine
2 PhD in Engineering, Senior Researcher, Head of Air Force Scientific Center; Ivan Kozhedub Kharkiv National Air Force University; Ukraine
3 Head of Scientific Research Department of Air Force Scientific Center; Ivan Kozhedub Kharkiv National Air Force University; Ukraine
4 Deputy Head of Scientific Research Department of Air Force Scientific Center; Ivan Kozhedub Kharkiv National Air Force University; Ukraine
5 PhD in Engineering, Associate Professor, Leading Researcher of Scientific Research Department of Air Force Scientific Center; Ivan Kozhedub Kharkiv National Air Force University; Ukraine
6 Doctor of Engineering Science, Professor, Honored Inventor of Ukraine, Leading Researcher of Scientific Research Department of Air Force Scientific Center; Ivan Kozhedub Kharkiv National Air Force University; Ukraine
7 PhD in Engineering, Senior Researcher, Senior Researcher of Scientific Research Department of Air Force Scientific Center; Ivan Kozhedub Kharkiv National Air Force University; Ukraine
8 PhD in Engineering, Associate Professor, Senior Researcher of Scientific Research Department of Air Force Scientific Center; Ivan Kozhedub Kharkiv National Air Force University; Ukraine
Abstract.
The full-scale armed aggression of the Russian Federation against Ukraine with the goal of destroying Ukraine and its people began on February 24, 2022. President of Ukraine announced martial law on the same day. The Ministry of Defense of Ukraine (MD) and the Ministry of Education and Science (MES) of Ukraine recommended the Educational Institutions of the country to use the wide opportunities of the distance learning technologies (DLT) for restoration of the educational process in these conditions. Involvement of the giants of the world-class digital industry in the provision of the distance educational process with digital content, devices, technologies and active use by Educational Institutions of own IT-developments, made it possible to return to learning in distance, mixed and intramural forms in extremely short period of time and to achieve decent results according to the indicators of the provision of educational services. The own DLT development of Ivan Kozhedub Kharkiv National Air Force University (KNAFU) specialists – the informational and educational environment «DIALOG» for distance learning in combat training of units and units of the Air Force of the Armed Forces of Ukraine opens up new opportunities for improvement the educational process in the Higher Military Educational Institutions in the conditions of full-scale armed aggression of the Russian Federation against Ukraine.

Keywords:
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distance course
Two years have already passed since the beginning of the full-scale invasion of the Russian-fascist occupation forces on the territory of Ukraine. The amount of direct damage caused to the infrastructure of Ukraine has already reached about 155 billion dollars, and indirect damage – five times more! And all this even without taking into account the colossal damage caused to the energy infrastructure of Ukraine in March 2024 during the most massive attack on critical infrastructure in all 10 years of the Russian-Ukrainian war!

By the end of February 2024, as a result of a full-scale war in Ukraine, almost 400 educational institutions were completely destroyed, more than 3.5 thousand – suffered one or another damage, some of which cannot be restored! Only for the beginning of August, 2022, according to operational information MES of Ukraine, the most damaged IHE were in the Kharkiv (21) and Donetsk (6) regions (together 58.7% of the total number of damaged IHE). They experienced the greatest amount of destruction and damage to their real estate objects: V. Karazin Kharkiv National University, "Chernihiv Polytechnic" National University, State Tax University (Irpin), G. Skovoroda Kharkiv National Pedagogical University, Mariupol State University, Azov Technical University (Mariupol), T. Shevchenko Luhansk National University (newly built building in Rubizhny, Luhansk region), M. Zhukovsky National Aerospace University "Kharkiv Aviation Institute" and others [1]. Research conducted by the United Nations Educational, Scientific and Cultural Organization (UNESCO) indicate that as of February 2024, the cost of restoring the state scientific infrastructure of Ukraine, destroyed during the Russian aggression, is more than US$1.26 billion. According to a new study published on March 12, 2024 by UNESCO and the Small Academy of Sciences of Ukraine, 1,443 buildings belonging to 177 scientific institutions were damaged or destroyed in the last two years. Restoration of these buildings will cost more than 1.21 billion dollars. Of them, 980.5 million dollars are only for universities, as they suffered the biggest losses, the report says. The scientific infrastructure of the Kharkiv region was the most affected, and the Yaroslav the Wise National University of Law (US$116.5 million) and O.M. Beketov
Kharkiv National University of Urban Economy (US$104.1 million) suffered the greatest losses. The temporary occupation of territories by Russian troops also had a significant impact: 18 scientific institutes were forced to relocate. Due to the war, funding for science in Ukraine was also significantly reduced. According to the UNESCO Institute of Statistics, gross domestic expenditure on research and development in the period from 2021 to 2022 decreased by 38.5% - from $2019.5 million to $1242.1 million [2].

But, despite all this, the educational process in educational institutions of Ukraine continues, scientific institutions conduct research, and Higher Military Educational Institutions (HMEIs), even after their partial destruction, quickly restore the educational process, moving to temporary deployment points after the situation stabilizes. To help solve the problem of setting up the educational process in the educational institutions of Ukraine in the conditions of war, information technologies (IT) come, which have a huge potential for the organization and implementation of training in non-standard conditions, at a distance and provide, at relatively insignificant material costs, a high level provision of educational services in regular, mixed and distance formats, while making the process of obtaining knowledge as modern, visual and, most importantly, safe for education seekers’ lives.

At present, the main information technologies for automation of educational and learning process in KNAFU and developed by its scientific and pedagogical staff are: the informational and educational environment (IEE) «DIALOG» (Fig. 1); the universal system for the development and conducting of computer tests; the complex of designing the academic schedule «CASCAD»; an interactive educational and training complex for fire training "Learn to shoot accurately"); for the training of helicopter crews - a complex helicopter simulator, etc. [1-6].

As a result of conducting research on increasing the effectiveness of combat training (CT) through the use of distance learning technologies, the informational and educational environment (IEE) «DIALOG» has been developed by
KNAFU scientists in 2008 but remains as relevant today as ever, is learning management systems (LMS), an analog MOODLE, which allows: to plan training by distributing subjects by type of training; to study as a group according to the subjects for which they are studying; organize classes in accordance with the requirements of the orders of the Ministry of Defense Ukraine regarding the training of military specialists; to carry out automated control of testing of those who learn with automatic fixing of time and results of passing tests; control the process of learning by the average score for the group, the course through the system of statistical data generation. The «DIALOG» environment is presented in the form of web pages (site) based on html technology. The transition to any section of the environment is carried out through the menu system [1-6].

![Main window](image1)

**Figure 1**

**The IEE «DIALOG» for distance learning**

In the structure of the IEE for the basic center of DL, all blocks are combined into a single educational environment and are closely interconnected with each other (Fig. 2.) [6]
Figure 2
Structure of the IEE «DIALOG» for the basic center of DL

The educational resource storage block is intended for storing methodical materials organized in the form of distance courses and an electronic library for additional training.

The educational process control block is intended for
organization, planning and management of the educational process.

The statistical data processing block is intended for processing and storing statistical data collected by other blocks. Output of information is carried out in the form of event logs and in the form of processed information.

The system administration block defines user authentication tools, digital signatures, etc., configures audit tools (built-in in other blocks to record data in a single log system), distributes user rights, determines the appearance of the site. Manages backup functions, sets system variables (language, font, etc.)

The knowledge control block is intended for organize the testing of the knowledge and skills of those who study on the basis of tests created in the corresponding block using questions stored in the database of educational materials. Allows you to set settings for the rating system.

The block for creating distance courses and tests contains tools for creating distance courses and a bank of questions.

The block of interactive communication contains such means of communication of system users as chat (exchange of text messages between network subscribers in real time), forum (general teleconference in the network), e-mail, etc.

The communication block with other centers takes into account the subordination in the Armed Forces of Ukraine between units and units, which is not a standard for LMS in the civilian sphere. This block is responsible for the functions related to conducting distance inspection of the educational process, checking materials for the absence of information that is prohibited for open publication and can be used for prompt delivery of governing documents, instructions and activity plans to subordinate centers.

Environment blocks meet the following requirements:

Educational resources storage block.

According to the type of material presented, 4 types of training courses can be distinguished:
- text training course;
- hypertext training course (presentation in the form of a branched "tree" of mutual links);
- educational course of a reference nature (presentation
of the material in the form of a guide with free access to any part of the educational material);
- game training course (presentation of the material in the form of a business, role-playing game).

Electronic study guides are:
- informational (presentation in the classical educational form);
- "question - answer" (presentation with an emphasis on specific questions, problems and tasks);
- information and control (alternation of educational material and checking questions);
- with feedback (interactive training course, which involves constant assessment of the student's knowledge and issuing recommendations for further "movement" of the educational material);
- with threshold levels of control (transition to the next section of the educational material is possible only after positive control tests at the previous stage of training).

The material of the electronic training course can look like:
- static (variable under the influence of the controlling student commands);
- dynamic (variable under the influence of software construction);
- single-color and multi-color;
- without sound support and with sound support.

Block requirements:
- access to courses by students;
- use of a single template for filling;
- use of a single structure for storing resources of the same type;
- the possibility of switching to module editing mode if the right exists;
- availability of navigation within the educational module;
- for each user, the list of courses is formed dynamically based on his membership in groups.

Educational process management block:
- a metadata system that can be adjusted according to the
training program of the specialty, the work program of the course, educational modules, etc.;
- the possibility of conducting a fully autonomous distance process without the participation of a teacher;
- the possibility of creating adaptive training programs (the content of training is determined by the consequences of the statistics of the training process, the passing of control points);
- control of various resources of the educational process;
- unified study schedule, personal organizer of the educational process;
- built-in competence management system;
- formation of student groups;
- student registration.
Electronic library block (as part of the educational resource storage block):
- availability of links to electronic resources of the educational environment;
- availability of links to Intranet network resources;
- structuring of sources by categories and topics;
- availability of a search system.
System administration block:
- registration in the system of new participants of the distance learning process and entering information about them into the database;
- user management;
- distribution of user rights in the system;
- adjusting the appearance and variables of the site;
- the ability to back up and restore various elements of the environment;
- viewing event logs.
Block of knowledge control:
- formation of a unique version of test questions for each student;
- analysis of answers and calculation of scored points;
- generating a detailed report on the attempt to pass the test and saving it on the server for further analysis;
- the possibility of automatic assessment.
Block for creating distance courses and tests:
- availability of a single template for design and organization of courses;
- editing of course settings;
- the possibility of embedding additional specialized software for work, for example, with software simulators;
- test profiling tools (collection of answer statistics for each question in order to exclude easy and change very difficult questions);
- the possibility of using weighting coefficients;
- a single database of test questions for repeated use;
- the possibility of autonomous preparation of tests (for example, in ASCII form) for further uploading to the server.

*Block of interactive communication:*
- advanced means of conducting synchronous training;
- availability of such means of interactive communication as chat, forum;
- the possibility of dividing forums by topic.

*Statistics block:*
- recording in the database of all references to informational materials located on the web server of the educational center, providing reporting on who read or viewed what, when and what;
- developed opportunities for preparation of various statistical reports;
- formation of reports to management.

Every person who uses a computer to access an internal information network is a user of this network. Any network user who enters the distance learning environment, implemented in the form of a web application, is a participant in the distance learning process.

Any participant in the distance learning process must have certain rights when working in the information and educational environment.

User rights are a list of tasks that a user is allowed to perform in the system. User rights are so-called permissions - a set of rules associated with a certain object and used to control access to these objects. Permissions are assigned by the owners of these objects - administrators.

Each user of IEE "DIALOG" can belong to any group of the system. Groups are necessary in order to give several users identical access rights to system objects. The group is
included in the electoral access control tables, which determine the type of access to the object.

In the distance learning environment "DIALOG" there are 8 groups (categories) of users: "CURATOR", "INSPECTOR", "CENSOR", "ADMINISTRATOR", "METHODIST", "TEACHER", "STUDENT", "GUEST" (Fig. 3).

The information and educational environment is operated in a web environment using Intranet technology. Intranet is a technology for creating a corporate network of increased reliability with limited access that uses network standards and network hardware and software similar to the Internet. Intranets can be isolated from external users by means of a firewall, which protects them from unauthorized access via the Internet, or function as autonomous networks with no access from the outside.

The second case is preferable, as it guarantees the absence of unauthorized access from external networks. Figure 4 shows an information network of this type. The already existing network of the Armed Forces of Ukraine of special
The purpose is used.

System and technical support of the LMS includes:
- hardware;
- telecommunication support;

- software;
- information support.

Hardware includes:
- servers for hosting distance courses, websites and relevant services;
- workstations for teachers, staff who ensure the distance learning process, and students;
- network equipment for combining servers and workstations into a single local system and connecting them to the Internet (Intranet).

The number and technical characteristics of computers for
servers depends on the number of distance courses hosted on them, the number of people enrolled in distance education and the number of people simultaneously participating in the distance education process.

The characteristics of computers for the workstations of teachers and staff that provide technological support for the distance learning process, as well as computers for students, are determined by the chosen technological methods of learning.

Telecommunications support provides access to the Internet (Intranet) to all participants of the distance learning process. The quality and bandwidth of the communication channels is determined by the number of participants in the DL process that are simultaneously in communication, as well as the type and amount of information resources that are used by them at the same time.

The LMS software includes:
- system software to support the operation of servers and workstations;
- application software to support websites and information resources;
- application software for support of the DL platform, i.e. functions that provide general support and administration of the DL process;
- application software for Teachers and students, with the help of which specific decisions of the organization and management of the educational process are implemented in a distance form;
- application software for creating educational materials of distance courses (text editors, graphics, video, sound, animation packages, etc.);
- other software recommended or distributed by the educational institution of the DL for its use in distance learning by students.

The information support of LMS includes information resources used in the process of distance learning (separate distance courses, electronic libraries, legal framework related to distance learning, other databases and data banks).

World and domestic experience shows that the most promising technology that provides open access to LMS to both
education seekers and teachers at any level of information resources - national, global, etc. - is network Internet technology.

Modern means of information technologies allow the use during learning of various forms of presentation of the material: verbal and figurative (graphics, sound, animation, video). Computer training and monitoring programs help the student, on the one hand, to learn the educational material faster and more deeply, on the other hand, they give the teacher the opportunity to monitor the level of assimilation of the educational material.

All main types of information services are used in the process of distance learning:
- e-mail;
- teleconference;
- data forwarding (FTP servers);
- hypertext environments (WWW servers);
- resources of the global Internet network;
- video conferences.

One of the requirements for the implementation of the LMS CT AF was the possibility of its implementation in an information network built according to the principles of the Internet and intended only for internal use. Networks of this type are called Intranets. The most suitable environment for implementing such a system is Web technology.

The Web is an ideal environment for the distribution and use of educational materials for the following reasons:
- web technologies and infrastructure are rapidly expanding the possibilities of educational technologies;
- web content can be distributed and used in any environment (for example, autonomous systems and/or network environments);
- all operating systems currently support web formats.

The basis of LMS implementation is the integration of databases with the Web environment (Fig. 5).

The advantages of integrating database management systems (DBMS) into the Web environment are:
- advantages of using DBMS functions;
- ease of implementation;
- platform independence;
- graphical user interface;
- standardization;
- cross-platform support;
- transparent network access;
- deployment scalability;
- innovativeness.

Figure 5
Diagram of an Intranet application with access to a database

The tools for developing Internet/Intranet applications, which is also the IEE "DIALOG", are very diverse and include (Fig. 6):
- hypertext editors;
- graphic editors and image converters;
- tools for marking image maps;
- multimedia tools (audio, animation, video);
- means of generating virtual reality;
- client application programming systems;
- means of programming server applications;
- programming systems for creating client and server extensions.
The distance learning system for combat training is implemented in the Web environment. From the well-known technologies, the .NET technology developed by Microsoft was selected, which is one of the most progressive and continues to develop.

.NET technology is neutral in relation to programming languages, the main thing is that they are compatible with .NET. It can be, for example, Visual Basic C#, C++, etc. But the C# language was specially developed for .NET technology and therefore its designs are more adapted to .NET.

ASP.NET technology offers quite a few new tools for developing web applications, including client-side code compilation, separation of server-side and client-side logic, extending the model of server controls, a well-thought-out and easy-to-use data binding model, etc. Moreover, ASP.NET
unifies everything possible: languages, tools, libraries, deployment models, development and diagnostics tools, etc. Building web applications has now become similar to building any other software (Fig. 7).

The ADO.NET mechanism is used to access database tables, which can replace outdated technologies such as OLE DB.

The OLE DB engine uses a universal data access strategy and requires programming tools that always perform the same operations regardless of the capabilities supported by the physical data provider. However, such an approach, aimed at obtaining abstract universal functionality provided by a set of common interfaces, causes a decrease in productivity.

ADO takes into account the peculiarities of each DBMS and provides a programming model that takes these peculiarities into account. When working with ADO.NET, the user code interacts with the DBMS more directly. This model is more efficient and more understandable to the programmer.

But ADO has one drawback. Developers must know in advance the data source they will access. Therefore, it becomes more difficult to create a universal code that will work with different data sources.
The DBMS was chosen in favor of MS SQL Server 2000, which was the optimal choice for building medium-level databases at the time of development of IEE «DIALOG».

The choice of means and technologies is also justified by the fact that they all belong to the products of the same campaign, which eliminates problems when they are used together.

Thus, Higher Military Educational Institutions of Ukraine in the conditions of the full-scale armed aggression of rf against Ukraine continue to provide quality educational services by applying of modern technical equipment and software from the best world manufacturers of the digital industry - partners of Ukraine in its fight against russian aggression and also to use of own IT-developments (for example, IEE «DIALOG» for distance learning) while making the process of obtaining knowledge as modern, visual and, most importantly, safe for education seekers’ lives.

TOGETHER TO VICTORY!!! GLORY TO UKRAINE!!!

References:


