Creating the Informational and Educational Environment of the University Based on the Distance Learning Platform LIKAR_NMU

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Abstract

The article considers the theoretical and practical aspects of planning, creation, and functioning of the informational and educational environment of the Bogomolets National Medical University based on the distance learning platform LIKAR_NMU. The definitions and some conditions met by the modern educational environment of the Medical (Pharmaceutical) Institution of Higher Education (M(P)HEI) were analyzed. The basic educational and methodical resources that ensure the formation and functioning of the informational and educational environment of modern M(P)HEI were identified. The functional structure of the educational environment based on distance learning technologies was determined by the system of educational process goals, and the educational activities consisted of problem-oriented blocks. The main features of the informational and educational environment of M(P)HEI in distance learning were established. The informational and educational environment model of the Bogomolets National Medical University was offered. The core of the informational and educational environment is the official portal of the university, and the system includes informational, educational information, and educational technology. The main advantages of using functional peculiarities of the automated control system and distance learning platform were analyzed. The comparison of activities on the distance learning platform and in the automated control system, depending on user roles, was covered. The area of responsibility of technical support was described and the structure of the distance learning platform LIKAR_NMU was demonstrated. The results of an online survey of the research department from teaching staff and students of different faculties on the quality of distance learning at the university are presented.

Keywords: Informational and educational environment, Distance learning technology, Automatic control system, Medical University

INTRODUCTION

Formulation of the problem

Nowadays, the vast majority of higher education institutions and other organizations offer their educational services on the Internet [1]. The issue of the effectiveness of distance learning for students of M(P)HEI has been relevant for a long time. Along with the global informatization of society, a number of new risks associated with the COVID-19 pandemic have emerged [2]. Therefore, to ensure the continuous functioning of higher education institutions, there is a need to use modern tools for managing resources of information and educational materials. The leading direction of modern research is the search for and implementation in the educational process of systems in which it is convenient and efficient to organize the structure of the training course with the provision of universality and mobility.

In accordance with paragraph 2.3. Section 6 «Regulations on distance learning» [3], the main types of classes in distance learning in higher education institutions are the independent study of distance learning material, lecture, consultation, seminar, discussion, practical training, and laboratory training. Of course, full-fledged practical and laboratory classes cannot be replaced by distance learning. However, the integration of remote technologies with a number of web-based services can solve a wide range of problems related to the study of theoretical blocks and self-control, preparation for classes and control activities,

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acquaintance with additional materials of the course, online teacher advice, and active communication between students on problematic topics. In particular, the use of distance technologies in the educational process leads to the intensification of independent work and interaction between teacher and student, as a result of which they become equal parts of educational activity.

Analysis of recent research and publications

Problems of design, implementation, and use of open cloud-oriented educational and scientific environments of higher education institutions were the subject of research by a number of authors, one of whom is V. Bykov. The research of A. Hurzhii and V. Lapinskyi is devoted to the analysis of informatization of general secondary and higher education in Ukraine. The study of some features of informative terminology is revealed in the publication of M. Zhaldak. N. Morse considers the issue of designing a model of an effective educational environment of the university with the use of information technology. O. Spirin's research is devoted to the definition of criteria and establishment of appropriate indicators for the selection of open web-based learning technologies, Y. Tryus's – to the problems of creating support systems for distance learning of health professionals. V. Franchuk analyzes and systematizes the most common web-based computer education systems in higher education institutions [4-10]. Scientific achievements of I. Nizhenkovska, T. Reva, N. Stuchynska dedicated to the problems of improving medical and pharmaceutical education in Ukraine [11-14].

The LIKAR_NMU distance learning platform operates at the University. The naming of the distance learning platform of the University was created by the rector, professor Iu. Kuchyn and deputy head of the educational and methodical department, associate professor I. Gashenko.

The purpose of the article is the design and creation of an informational and educational environment of the Bogomolets National Medical University based on the distance learning platform LIKAR_NMU.

MATERIALS AND METHODS

Theoretical and empirical methods of scientific research were used to perform the set tasks, namely: method of system analysis, comparison, and generalization for theoretical substantiation and development of an informational and educational environment of the Bogomolets National Medical University based on the distance learning platform LIKAR_NMU; bibliosemantic method – for studying psychological, pedagogical, and scientific literature, normative documents on designing of information and educational environment, use of technologies of distance learning and automated control systems; empirical methods – conversations with students and teachers, analysis of ways to use learning materials

management systems; questionnaire – to determine the level of organization of distance learning at the university; modeling – to develop the information and educational environment of the university and analyze its functionality.

RESULTS AND DISCUSSION

We consider it necessary to emphasize that an important part of distance learning is its implementation through information technology, namely distance learning platforms, which should ensure the process of developing, managing, and dissemination of learning materials online shared with many users at once. First of all, it is necessary to define the concept of «informational and educational environment». The results of the analysis of scientific and pedagogical literature allow us to interpret this concept as a continuum of spatio-temporal, socio-cultural, activity-oriented, communicative, informational, and other factors that appear as conditions of interaction between the developing individual and the objective world of higher education that are purposefully created and arise spontaneously. Also, in the literature [15], there is another interpretation of this concept, namely as a system-organized set of tools, information resources, interaction protocols, hardware and software, and organizational and methodological supports, focused on meeting the educational needs of users. In particular, the educational environment of M(P)HEI is a necessary component of the holistic mechanism of professional socialization, life, and professional situations that ensure the entry of students into professional life.

According to domestic scientists [16], the modern educational environment of M(P)HEI must meet a number of conditions, namely:

- to have the aesthetic appeal of the elements of the environment;
- to ensure compliance of the content and means of education with modern requirements for medical (pharmaceutical) education;
- to provide professional, psychological, and pedagogical needs of scientific and pedagogical workers and students;
- to have a positive image that contributes to the successful positioning of M(P)HEI in Ukraine and abroad;
- to have a high level of pedagogical skills, general and social culture of the teaching staff;
- to provide conditions for the formation of a competitive specialist in the medical (pharmaceutical) industry.

Thus, the informational and educational environment M(P)HEI in distance learning can be understood as a systematically organized set of modern educational and other information resources focused on meeting the needs of participants in the educational process and its scientific and educational support, as well as a set of hardware and software for storing, processing, and dissemination of educational materials and communicational interaction to

achieve educational goals, in particular in order to form the necessary professional competencies.

The results of research on the organization of distance learning in domestic institutions of higher medical (pharmaceutical) education have established that important educational, informational, and methodological resources for the formation of the educational environment of modern free education are:

website or portal HEI;

structured media library;

thematic collection of photos, videos, audio materials, web resources, printed products that provide maximum visualization of educational, scientific, and methodological activities of the institution, satisfies the interests of real and potential consumers of educational services on the content of educational activities;

virtual library – electronic library with educational, educational-methodical, methodical literature, catalogs of other electronic libraries;

distance learning courses or their elements as a form of organization and implementation of educational activities and self-education of students using information and communication technologies.

The functional structure of the educational environment for higher medical (pharmaceutical) educational institutions using the distance learning platform is determined by the system of goals and objectives of the educational process, the functions of educational activities and consists of the following problem-oriented blocks:

information support of teachers and students (providing access to electronic catalogs, electronic textbooks, and glossaries on topics, electronic encyclopedias by subject areas and areas of domestic and world information networks, knowledge base, and data banks);

providing educational dialogue in the educational environment (peer-to-peer communication, subject-object communication, subject-subject communication);

telecommunication interaction of teachers and students in the process of cognitive activity;

automated learning and pedagogical control;

modeling of the studied phenomena (researched phenomena) and the mastered processes (demonstration and interactive introduction);

administration of the real educational process.

An important aspect of using the distance learning platform in M(P)HEI for the formation of the educational environment is that the latter is formed in such a way that the student at any time has free access from any course (discipline) to:

textbooks;

information support (reference books on relevant subjects, encyclopedias, consulting center);

necessary sections of courses in related fields of knowledge;

laboratory works, workshops, web quests, projects.

It's important to note that the effectiveness of the formation of the educational environment of higher medical (pharmaceutical) educational institutions using the distance learning platform significantly depends on the quality of the developed distance courses, scientific and methodological support, and the work of the tutor/teacher.

Thus, the information and educational environment M(P)HEI in terms of distance learning has the following distinctive features:

1. Client-server architecture, which makes it possible to systematize the learning process.
2. Software-hardware independent runtime environment that provides universal interaction with the software shell, regardless of the type of user operating system.
3. Ability to implement a full cycle of distance learning, with the help of advanced telecommunications and specialized modules and extensions such as forum, automated reception of abstracts, online testing, reporting, etc.
4. Ability to work remotely using the global Internet.
5. Personalization of training.
6. Distribution of educational material over time so as to combine different types of work, collective and individual forms of employment, reproductive and creative activities.
7. Rational selection and presentation of educational material with a clear separation of basic knowledge of the topic, basic and additional literature, the introduction of hyperlinks to these sources of information.
8. Ensuring the logical continuity of new and previously learned information, active use of new information for repetition, and deeper learning of the material passed.
9. Establishing interdisciplinary links between medical and pharmaceutical disciplines.
10. Structuring educational material for multilevel analysis and integration of new information.

Based on distance learning technologies, it is possible to provide access to a wide range of information resources – from assistance in performing specific practical work and autonomous training courses downloaded to the student's mobile device, to fully networked training courses with problem-oriented software running on the server. It is also important that distance learning solves the problem of professional development of those who live and work in remote areas and helps to solve cost problems. Distance learning is currently impossible to imagine without systems of software products (distance learning platforms), through which remotely, via the global internet, the student can master the material, and the teacher in turn can create distance learning courses and conduct distance learning. The use of such platforms provides an interactive connection between teacher and student; distribution and verification of control tasks; keeping an electronic journal of records of assessments and visits; setting up various course resources; integration with cloud technologies. Using the latter opens

up new learning opportunities, provides almost unlimited storage space, and most importantly – provides access from various devices to server resources and does not «tie down» the user to the workplace.

Given the functionality of the distance learning platform LIKAR_NMU, such as classes and control activities, a wide variety of choice of questions for testing, as well as the possibility of interaction student-teacher-administration, this platform was chosen as promising for distance learning at the Bogomolets National Medical University.

The informational and educational environment of the university should be flexible and in turn, consist of many functional tools **(Figure 1)**.

The core of the information-educational environment is the official portal of the university, also the system includes such blocks as informational, educational-informative, and educational-technological. The information block includes social pages and messengers, such as a Facebook page, an Instagram page, and a Telegram channel of the Bogomolets National Medical University, they have only one-sided interaction, publication of materials from the official portal of the university.
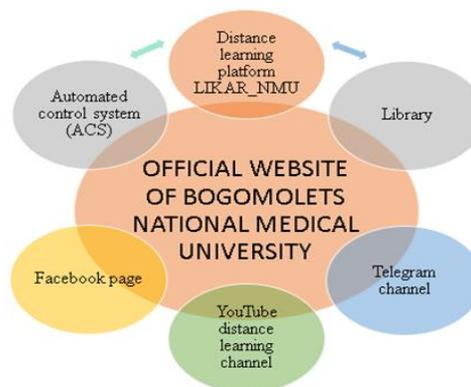

Figure 1. Model of organization of information and educational environment of the Bogomolets National Medical University

As for the educational and informative block, this includes the electronic resources of the library and the YouTube distance learning channel of the Bogomolets National Medical University. Materials on these resources are posted independently on the official web portal and are educational in nature. Materials posted on the platform of distance learning and video lectures, which are posted on the YouTube channel of the Bogomolets National Medical University are the property of the university and are available only by following the links on the relevant courses to students and teachers registered at LIKAR_NMU. Thus, only registered authorized users have access to the created electronic catalog of video materials of the departments **(Figures 2 and 3)**.
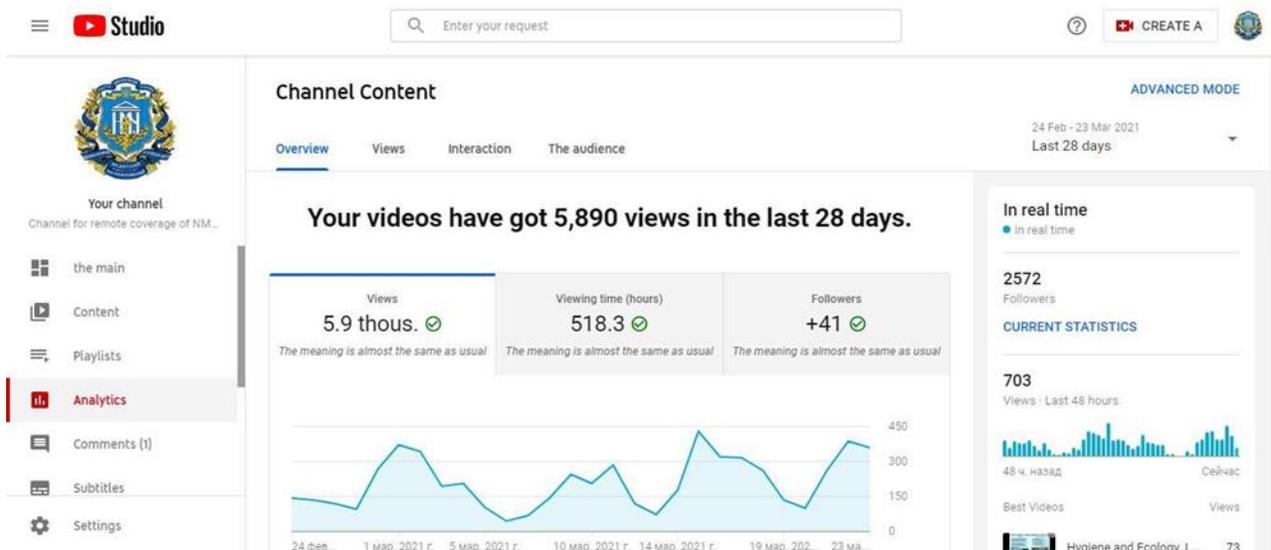

Figure 2. Coverage of the YouTube distance learning channel of the Bogomolets National Medical University

There are almost 1,500 video recordings of lectures and video recommendations for practical and laboratory work on the YouTube distance learning channel of the Bogomolets National Medical University.
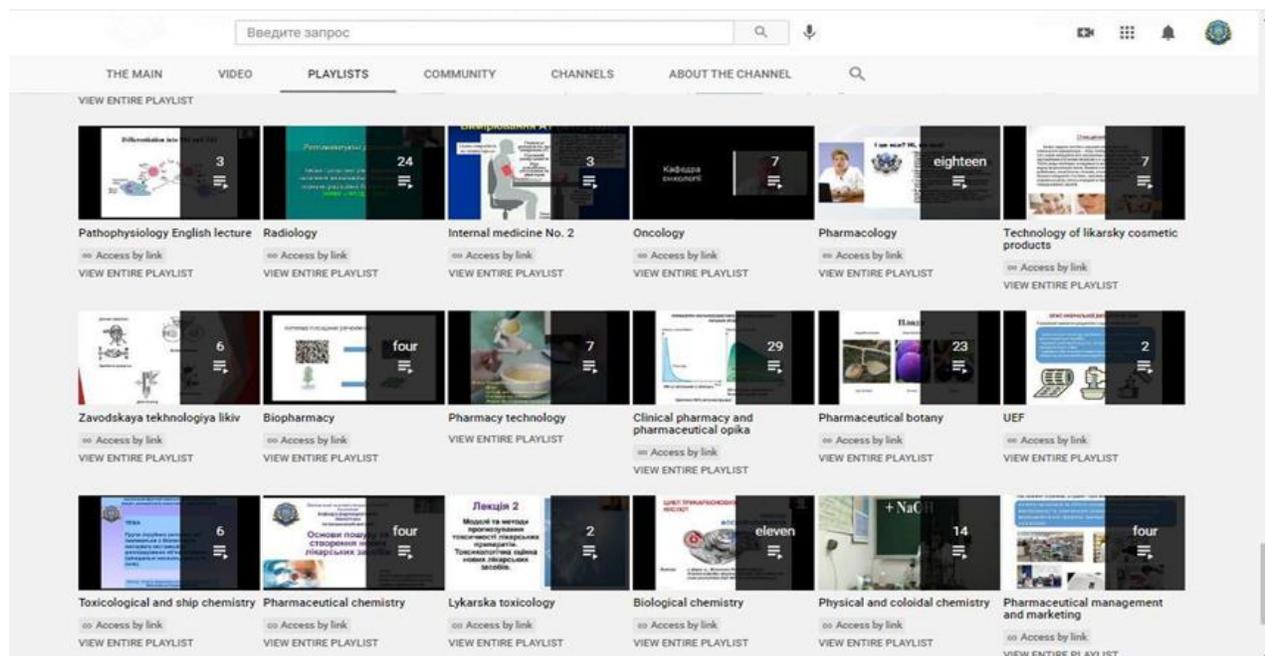
Figure 3. Fragment of the YouTube playlist of the distance learning channel of the Bogomolets National Medical University

The educational and technological unit includes an automated MCR control system and a distance learning platform LIKAR_NMU. You can switch to these platforms from the «Distance Learning» tab of the university web portal. The MCR and LIKAR_NMU operate synchronously. Students register at the LIKAR_NMU distance learning platform only if they have a correctly created account in the MCR because all the processes related to the movement of the students and registration in the distance learning system are connected to the automated management system of the educational institution.

The main advantage of the automated management system MCR over the «manual» management methods is that to make the necessary decisions, the staff is provided with more complete, timely, and reliable information in a user-friendly form. With the help of MCR, you can perform automated data collection and processing, its storage in computer memory, the use of regulatory, reference, source, intermediate, and source documentation. The structure of any automated control system can be divided into the following components:

the main part − includes informational and technical supports.

functional part − specific management functions and a number of interrelated programs.

Systems can be simple or large-scale and complex. It is accepted to distinguish two structural varieties of such systems − the automated control system of technical process and system of organizational management. The main functions of MCR are as follows:

automatization of all the components of the organizational process. With the help of this action, the

time is saved and the accuracy and safety of the corresponding process improves;

collection, registration, processing, and issuance of information data;

providing the necessary data to the user in the form of graphic and numerical data;

registration of all user actions and their storage in databases. All data have a strict chronological reference, which allows, if necessary, to establish the cause of the problem situation and draw appropriate conclusions;

multilevel data protection using appropriate systems. Access to automated system data is limited. Administrative access is provided only to specially trained employees with higher technical education. Access of a certain level to the current operators of deans' offices, departments. An individual password is entered for each employee, which gives him full responsibility for the technological process.

To ensure the full-fledged activity of the educational environment of the university, it is impossible to ignore the organization of the distance learning platform of the university. At first glance, there is nothing complicated about this, if the contingent of the university is small. But with the increase in the number of people, there is a greater number of appeals and the coordinated and organized work of all participants in the educational process at the university will ensure high-quality educational services.

The number of registered users of the Bogomolets National Medical University was 26,829 users on the distance learning platform as of February 2021. These include the teaching staff of the university, domestic full-time students,

part-time students, foreign students, interns, students of advanced training courses (representatives of other institutions of health care). In the categories of the distance learning system, and in the courses of the category, there are clearly defined roles that are assigned to the users of the course:

    manager – has access to the course and its modification;

    author of the course – creates new training courses;

    teacher – can do everything on the course, including changing tasks and assessing students;

    assistant – without the right to edit, can teach the course and evaluate students, but cannot change the resources of the course;

    student – usually has the least rights on the course.

With this platform, you can add resources to the training course, such as Label, Text page, Hyperlinks, File access, IMS package (Information Management System). You can also use this system to add the following activities: Big Blue Button (open-source application for web conferencing), Questionnaire, Classroom Training, Wiki, Database, Glossary, Tasks, Polls, Workshop, Test, Lesson, Forum, Chat, etc.

In particular, the distance learning platform LIKAR_NMU has the following functionalities:

1. Support of the organizational staff structure of the university (**Figure 4**):

    work with the hierarchy of faculties, departments, academic groups;

    tracking of personnel movements;

    differentiation of teaching positions;

    the ability to configure the restriction of privileges of different types (for example, by departments) at the level of roles and individual users;

    work with users in terms of faculties, departments, divisions.

2. Flexible and fast report dashboards:

    constructors of reports on passing courses, tests, multimedia SCORM courses, etc;

    constructors allow administrators to customize the list of required filters and sets of fields (columns) that should be displayed in reports;

    each report has 30+ possible fields, including such popular ones as position, role, department, group, name, results, and dates in different formats, deadlines, and many others;

    reports are optimized for fast construction even with a large amount of data.

3. Support the interactive format of H5P courses:

    built-in designer and player of interactive H5P courses compatible with mobile devices. It allows course authors to easily and quickly create more than 49 types of interactive tasks;

    interactive video, branched script, 360° locations.

4. Blocks for the home page:

    animated slider for interactive banners;

    assigned training;

    voting.

5. Additional opportunities to expand integration with MCR:

    class schedule for students and teachers;
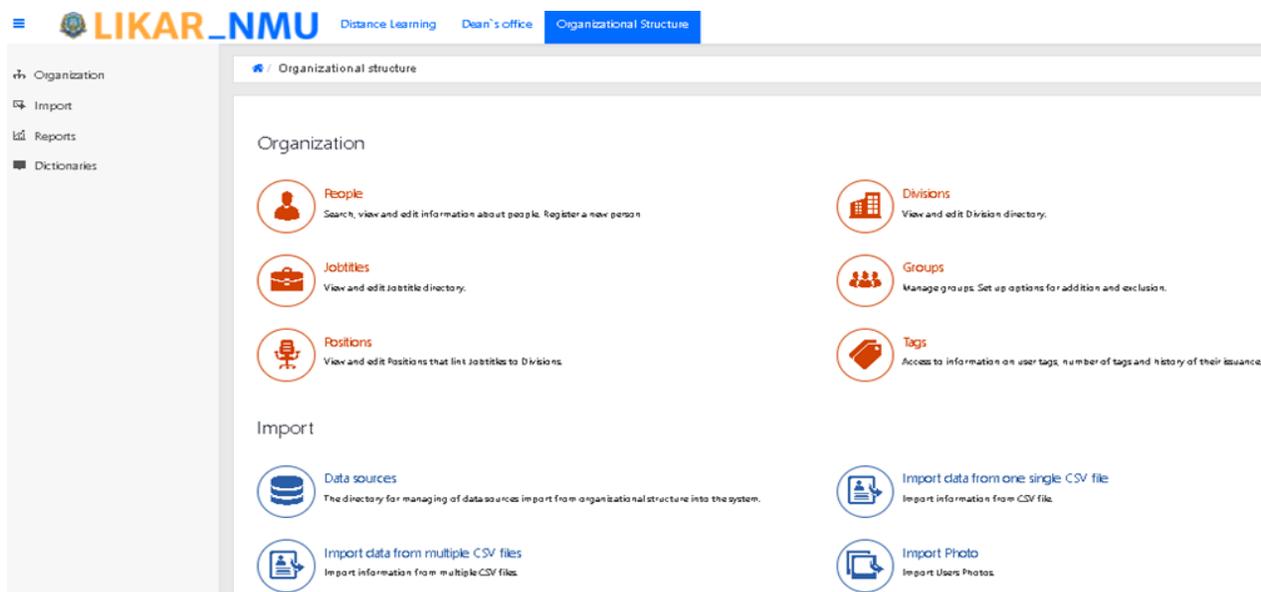
    journal of assessments.

Figure 4. Part of the web page «Organizational structure»

Technical support plays an important role in the functioning of the distance learning platform, as both students and teachers turn to technical support administrators. The area of responsibility of technical support of the distance learning platform LIKAR_NMU is as follows:

registration of participants in the educational process on the platform LIKAR_NMU (assistance to students in case of difficulties with registration through the MCR system, manual registration of teachers, interns, students of advanced training courses);

control of forms, methods, and means of training (appeals regarding the download of materials, review of the compliance of materials with the allowable size, structure, and content; recommendations for improving the capabilities and optimization of the process of placing educational materials);

advising teachers, and constant feedback on issues of academic integrity of students during the test.

To optimize the counseling of higher education students, teachers, course managers, and dean's staff responsible for educational work, support chats were created in Viber and Telegram messengers. In addition to writing guidelines for working with the distance learning platform, step-by-step instructions for teachers have been developed, which are posted in the «Distance Learning» section on the official portal of the university. **Table 1** shows the comparison of the activities of different structural units of the university on the distance learning platform and in the automated control system.

Table 1. Activities on the distance learning platform LIKAR_NMU and in the automated control system of MCR

	Activities in the MCR	**Activities in LIKAR_NMU**
Administrators of MCR	Registration in the MCR. You must enter personal information imported from State electronic database on education: - individual tax number; - Name; - E-mail address. When canceling registration: - passport number	Student account is automatically created on the platform LIKAR_NMU
Dean's Office Personnel	- Imports data from the state database for registration of students in MCR; - Checks the registration of students in the MCR; - Contingent movement in the MCR; - Checks the curriculum	Monitoring student performance
Department (course manager)	- Consolidates the flow of students in the MCR for distance learning courses in LIKAR_NMU according to the student's curriculum	- Enrolls groups in fixed courses; - Fills courses in LIKAR_NMU with information
Technical support	- Assistance of the dean's office in the elimination of technical errors at registration of students in State database; - Assistance to students in registration in MCR and LIKAR_NMU	- Assistance to teachers in case of technical problems during downloading materials, testing students, etc.; - Assistance to students in case of technical problems

The need to process large amounts of data has led to the automation of certain processes. For example, the registration of students on the distance learning platform LIKAR_NMU is carried out automatically through the MCR, and the registration of interns and trainees is not synchronized with the MCR. Therefore, software was developed that solved the problem of fast data transfer from the spreadsheet and registration of users absent in the MCR **(Figure 5)**.

The following is a description of the main functionalities of the application to optimize user registration:

«Register» − registration of users with a separate name and record their passwords in the table;

«Register full name in one line» − for users with a full name the entry is made in one field, with space;

«Register full name with sending password» − does not enter the password in the table, but sends authorization data to users' emails.

If there is a situation when registering an account, when the e-mail address is already in use, the user's login and ID are entered into the table and marked as already existing.
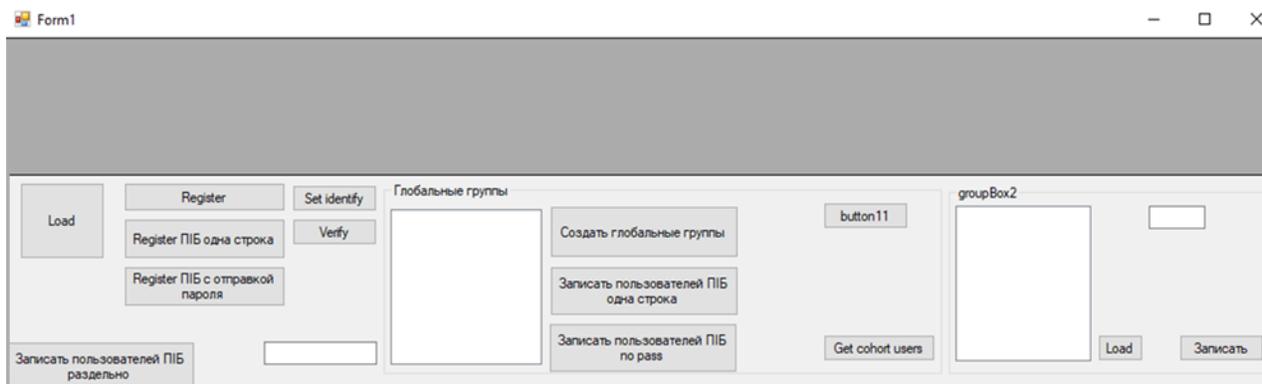
Figure 5. The application window to optimize user registration without an account in the MCR

Considering the structure of the distance learning platform LIKAR_NMU, we can highlight the following elements:

Hierarchy of the section «Student education»:
1. Form of study;
2. Training course;
3. Term of study, name of the stream;
4. Disciplines.

Hierarchy of the «KROK» section:
1. Name of the exam;
2. Language of instruction;
3. Specialty.

This structure allows distance learning students not to get lost in a variety of courses, before the session, meaning they enroll in courses. In addition, part-time students can take access courses provided during the training sessions and view the necessary materials: contacts of the department, tasks for control work, etc.

To establish the quality of distance learning at the university, an online survey of research and teaching staff and students of various faculties was conducted.

A total of 4,610 respondents took part in the survey, including 428 faculty members, 3,989 full-time students, and 193 part-time students.

The following results were obtained during this survey. To the question of the questionnaire «How would you assess the quality of education at the Bogomolets National Medical University» 78.8% of respondents answered positively, 15.6% considered the level of education rather low or very low and 5.6% did not decide on the answer. To the question «How would you assess the quality of education in general at the Bogomolets National Medical University by distance learning in the conditions of adaptive quarantine?» the following answers were received: 45.3% – very high and high, 35.3% average quality assessment; 16.2% – low and very low, and 3.2% of respondents did not decide on the

answer. Analyzing the question «How important do you think is the problem of improving the quality of distance learning in the Bogomolets National Medical Universy?» it can be stated that 57.2% of respondents believed that this issue is a priority, 22.4% – indicated that there are more pressing problems, 11.5% of respondents considered these problems secondary, and 8.9% did not decide on the answer. Having studied the attitude of respondents to distance learning at the Bogomolets National Medical University in connection with the COVID-19 pandemic can be noted that 55.7% fully support, 22.8% – rather support, and 6.6% – strongly did not support distance learning **(Figure 6)**.
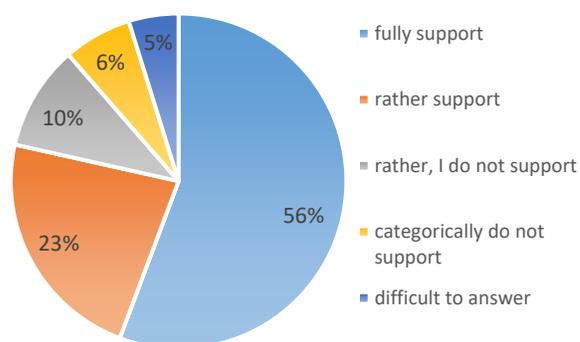

Figure 6. Distribution of respondents' answers on distance learning due to the COVID-19 pandemic

Answering the question «Do you agree with the statement that distance learning puts everyone on an equal footing?», the opinion of the respondents was divided: 30% – indicated that they completely agree, 29.6% – mostly agree, 13.5% – mostly disagree, 16.2% – completely disagree, and 10.6% did not decide on the answer. In particular, 68.9% of respondents were satisfied with the organization of distance learning, 13.1% – rather dissatisfied, and 17.9% found it difficult to determine the answer. Answering the question

«Can distance learning affect the reduction of corruption?», 64.1% of respondents chose «rather yes», 16% − «probably not», and 19% − did not decide on the answer.

Conclusion

1. LIKAR_NMU is a unique, private distance learning platform, which is an integral part of the information and educational environment of the university, focused on providing interactive interaction between participants in the learning process, and is used to organize and support both blended, part-time, and distance learning.

2. The use of a distance learning platform allows you to design both standardized and individual learning structures, which is quite convenient for full-time and part-time students because the system is adapted to their educational needs. In addition, technical support constantly analyzes the contingent and corrects system errors. Almost every day the platform supports more than 20,000 users, the university departments have created more than 1,900 categories of courses, video lectures of which are posted on the YouTube distance learning channel, and it is obvious that the student learning will be more effective when all teaching materials are concentrated on one platform, the so-called informational and educational environment of the university.

The considered approaches to designing the informational and educational environment need constant improvement and, in our opinion, the results of the conducted sociological research will contribute to the creation of new opportunities for adjustment, development, and functioning of the informational and educational environment of the university.

ETHICS STATEMENT: All measures accomplished in this scientific trial containing human supporters remained in similarity through the ethical principles of the institutional advisory group.

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