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OPTIMIZATION OF EDUCATIONAL ACTIVITIES OF THE DEPARTMENTS OF MORPHOLOGICAL PROFILE OF THE ZAPORIZHZHIA STATE MEDICAL AND PHARMACY UNIVERSITY

Zviahina H.O.  ✉, Pototska O.I. , Kirsanova O.V. , Makyeyeva L.V.  Optimization of educational activities of departments of morphological profile of Zaporizhzhia State Medical and Pharmaceutical University. *Morphologia*, Zaporizhzhia State Medical and Pharmaceutical University, Zaporizhzhia, Ukraine.

ABSTRACT. Background. The process of optimizing educational activities as a phenomenon that allows to achieve maximum results with minimal time expenditure is a widely used phenomenon in various fields of science. It has been used in pedagogy since the last century. But forms and methods of optimization constantly need improvement and selection depending on the specific learning situation. **Objective.** Departments of morphological profile working with students of the 1st-2nd year of medical universities during the martial law have developed their optimal teaching methods. It was their activity that formed the basis of our research. **Methods.** Among the methods used by us in the article, there are theoretical ones - the descent from the abstract to the concrete, complex ones - practical direction - analysis, synthesis, induction; among special - component analysis. **Results.** Application of the principle of optimality allows balancing all elements of the educational process. Such work has several main stages, such as: assessment of the state of the existing educational process; selection of the goal and tasks of optimization; selection of forms and methods of conducting lectures, practical classes, current and intermediate control, making corrections according to the goal. And, of course, evaluating the results from the point of view of the optimality of the time used and the efforts made. Therefore, organizational forms of work in the learning process can be adjusted. The methodical and educational materials used must correspond to the training program, be informative, logical and consistent. Only such materials will successfully complement the technical means of ensuring the educational process. Modern technologies, such as the Anatomage anatomical table, 3D Ogranon Anatomy VR, virtual laboratory simulator "Labster" play a major role in optimizing the learning process. **Conclusion.** Optimization of educational activities at departments of morphological profile of Zaporizhzhia State Medical and Pharmaceutical University is carried out systematically and continuously. Distance learning, which was implemented during the martial law, forced to review the forms and methods of optimization that were used in the learning process. Therefore, the improvement of the existing and the development of new methods of optimizing the educational process at the departments of morphological profile will constantly change according to the circumstances.

Key words: optimization, optimality principle, morphological profile, optimality criteria.

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Background

The problem of optimizing education at all levels and its application in the educational process of Ukrainian universities will never lose its relevance, especially in specific conditions. The coronavirus pandemic and the declaration of martial law became such challenges for Ukrainian education, which

forced to review the methods and forms of education, applying the principle of optimization.

According to scientists, optimization (from the Latin optimum - the best) is the process of choosing the best options from many possible ones [1].

Its task is to find the correspondence of the pedagogical system to the goals for which it was

created. This is the selection of all possible options for building, implementing and organizing educational activities to achieve the goal of learning by comparing possible options and evaluating available alternatives [2].

Disciplines such as histology, cytology, embryology and human anatomy, which are studied in the 1st-2nd year of a medical university, traditionally belong to the morphological profile, as they are related to knowledge of the structure, development, and functions of the organs and systems of the human body on a macro- and microscopic level levels. Traditional methods of checking what has been learned are oral, written survey and test control.

However, the change in learning conditions requires the optimization of educational activities of departments of morphological profile with the aim of "achieving the maximum possible results with the minimum required expenditure of time and effort" [1]. Therefore, **the objective** of our research is to consider the forms and methods of optimizing education in a medical university using *the example* of the educational activity of the departments of the morphological profile.

The aim of the article substantiates the *task* of the research: consideration of ways to optimize the educational process at the departments of morphological profile at the Zaporizhzhya State Medical and Pharmaceutical University during the martial law.

The **methods** chosen by us for research were both *theoretical* - going from the abstract to the concrete, and *complex* - practical direction - analysis, synthesis, induction; among *special* ones, we use the method of component analysis.

Results and discussion

Yu. Babansky proposed to introduce the principle of optimality into pedagogy, which requires the process to reach the best level of functioning for the given situation. The principle of optimality demands reasonableness, rationality, and a sense of proportion in the application of all elements of the educational process [2].

Since each topic of class has its own learning goal, task, features of the content of the educational material, the teacher's task is to select the necessary optimal method. At the same time, at each stage of the class, the method of student motivation and the necessary teaching tools are selected.

An important step in optimizing training is the choice of organizational forms that will help to achieve the goal as soon as possible. At the same time, attention is paid to the difficulties that may arise for students in the process of studying the topic. If necessary, forms and methods should be adjusted.

The last, already final stage is the analysis of the results of studying the discipline using the criterion of optimality.

A distinction is made between the theoretical

and practical levels of the optimization process, where the first is the calculation, and comparison of proposed forms and methods, and the second is the reorganization of the entire pedagogical system in order to fulfill the tasks in specific conditions.

Among the researchers of the first level of optimization, we can name Yu. Babanskyi, V. Beshpal'ko, A. Makarenko, I. Ogorodnikov, V. Sukhomlyn'skyi, M. Skatkin, N. Talizina, H. Shchukin and many other scientists, who were engaged in substantiating the theoretical foundations of the process.

The practical application of optimization due to the use of the latest technologies in the pedagogical process was considered by V. Beshpal'ko, P. Husak [3], A. Nisimchuk [4], O. Pehota, I. Pidlasya [5], S. Sysoeva, I. Smoliuk, I. Yakymanska, and others; principles, methods, forms, means, types in education: L. Vygotskyi, I. Zimnia, I. Lerner, S. Rubinstein, and others.

The methodological basis of the optimization of the pedagogical system is a holistic and systematic approach to the consideration of all components, taking into account all rules and laws, as well as the use of the latest technologies.

The solution of optimization problems begins with the selection of criteria. In pedagogy, they are always complex, since it is impossible to separate the causes and consequences of the processes that simultaneously exist in the pedagogical system. Optimality criteria are signs (indicators) on the basis of which evaluation of possible options (alternatives) of process development is carried out, their comparison and selection of the best among them [2].

The learning process is considered optimal if it simultaneously meets the following criteria: a) the content, structure and logic of the functioning of the process ensures an effective and high-quality solution to learning, and development tasks in accordance with the requirements of state standards; b) the achievement of the set goals is ensured without exceeding the maximum time expenditure.

At the same time, it is important to observe the following indicators: achieving maximum results under the condition of observing the established time standards, taking into account classroom and extra-curricular work.

Summarizing the opinions of scientists regarding the necessary pedagogical actions to optimize the educational process, we highlight the following: integration and specification of tasks; generalization (selection of the main); interdisciplinary coordination; selection of options based on their comparative evaluation; differentiation and individualization of the educational process; creating the necessary conditions; monitoring; operational regulation and adjustment of the process; evaluation of its results according to established criteria [6].

Work on optimizing the learning process takes place in several stages: assessment of the state of activity and principles of functioning of the educa-

tional process; formulation of the purpose and tasks of the work; selection of appropriate forms and methods of work and control; determining the sequence of their use, taking into account the working time, making corrections to the developed forms of activity; analysis of training effectiveness using the necessary criteria.

Of course, the methodical and educational materials used in the training process must meet all the requirements for this type of publications, namely, correspond to the curriculum, be informative, logical and consistent. Only such materials will successfully complement the technical means of ensuring the educational process and provide an opportunity to acquire the necessary knowledge, skills and abilities, all that form various types of competence, both general and professional.

During the coronavirus pandemic, and later, after the declaration of martial law, a system of distance or mixed education was introduced in Ukraine.

By definition, distance learning is a form of learning using computer and telecommunication technologies that provide interactive interaction between teachers and students at different stages of learning, and independent work with information network materials [7].

It is hard not to agree that such an education has many advantages, which have long been appreciated in many countries. Among them: *flexibility; topicality; convenience; modularity; economic efficiency; the possibility of simultaneous use of a large amount of educational information* by any number of students; *interactivity; greater opportunities to control* the quality of education; *absence of geographical boundaries* for obtaining an education.

However, in addition to the obvious advantages of distance learning, disadvantages were also identified, such as: - lack of direct contact between the teacher and the student; - the need for internal motivation for learning; - the problem of student identity identification; - insufficient level of mastery of modern distance learning platforms; - lack of social interaction, therefore learning becomes more individual [8].

Distance education is most common in the USA, Canada, Great Britain, and Germany. In the countries with the largest population (China and India), there are mega-universities with about 100,000 students.

According to J. Daniel, who is a specialist in the field of distance education, mega-universities are the best for the global education system. Such universities actively use distance educational technologies, are characterized by openness and accessibility of education, and high quality of education.

Mega universities have branches in different countries of the world - Great Britain, Germany, Belgium, France, Switzerland, Italy, the USA, etc. In order to improve the quality of educational services, universities join national and international consortia.

According to the analytical company Ambient Insight, the largest development of the distance education market belongs to India (55%), China (50%), Malaysia (40%) [9].

As shown by the coronavirus pandemic and confirmed by education in Ukraine during martial law, the life and health of both sides of the educational process must be brought to the fore in the educational process. Despite everything, the quality of education should not decrease.

After the declaration of martial law, medical universities in Ukraine chose a distance or mixed form of education, depending on the location. So, located not far from the combat zone, we were forced to switch to a purely remote one. Despite the full readiness for this form of work, having experience teaching during the lockdown, the new circumstances made it necessary to once again review the methods and forms of work, and optimize them.

The reason for choosing a combination of synchronous and asynchronous form was the location of both students and teachers of the Zaporizhia State Medical and Pharmaceutical University in the spring of 2022.

This same year, our university finally chose permanently a platform for learning – MS Teams, which has a number of advantages over others, and allows you to fully conduct classes with full visualization and involvement in addition to the main and additional programs.

In particular, in histology, cytology and embryology classes in offline mode, special attention was paid to working with micropreparations, students of the specialty "Medical diagnosis and treatment technologies" had the opportunity to prepare them.

During online classes, such work turned into looking through of color photos and atlases of slides, it became possible to work simultaneously with several groups, where students ask each other questions in blitz mode. This form of conducting the class helps to more actively involve all present students, to transfer the teacher's role from a managerial one to a controlling one, using the principle of optimality.

Students are particularly interested in preparing reports with presentations on one of the proposed topics followed by asking questions from fellow students and a general discussion. An example of such topics is: "Characteristics of pathological and physiological forms of erythrocytes". Undoubtedly, studying medicine for even 1-2-year students is impossible in isolation from social events taking place in the country, so topics such as "Regeneration of bone and muscle tissue in case of shrapnel injuries" are also present.

Modern technologies, such as the Anatomage anatomical table, which allows you to study the structure of the human body in 3D format, play a major role in optimizing the learning process. It is a state-of-the-art anatomical imaging system in medi-

cal education because it combines hardware and software, that is developed based on clinically accurate cases of real patient examinations. It also provides an opportunity to broadcast images on a large screen.

The latest 3D Ogranon Anatomy VR technology, which uses full virtual reality systems, in particular, a virtual ultrasound sensor, came to the aid of the anatomy department teachers. This technology is an interactive anatomical atlas, that contains 15 systems of the human body, and is enhanced by a human movement module with animation of joints and bones.

Virtual laboratory simulator "Labster" as a platform of an interactive educational environment also allows you to practice laboratory skills and visualize the theory, and certainly contributes to the optimization of the educational process. The platform contains more than 300 simulation scenarios from various educational disciplines of the medical and biological cycle, and 50 educational videos. Thanks to their combination, the teacher can create a small course-scenario from several simulations, containing theoretical information, a video instruction on execution, an algorithm of actions, that the student must perform in the virtual 3D laboratory to successfully complete the task, and several test questions to check his mastery of the simulation topic

Since 2018, Zaporizhzhia State Medical and Pharmaceutical University has operated an interdepartmental training center, which is partially used by departments of the morphological profile, but which will be useful for training in the disciplines of other profiles and senior courses. It houses several units, among them: obstetrics and gynecology; pediatrics and neonatology; resuscitation; hospital; functional diagnostics with the virtual patient simulator Body Interact; disaster medicine with a 3D simulation room of a natural disaster, disaster or war.

During the wartime, the center provided ample opportunities for training various categories of specialists, from teachers to police officers, to practice the skills of triaging victims, and determining the

priority of providing medical assistance.

Conclusion

Therefore, the methodological basis of optimization in general is a systemic approach, which is based on the general theory of management of complex dynamic systems. Applying this concept in the educational process, we consider all components of education in the unity of their natural relationships.

Criteria indicating the correct application of the optimization principle can be considered: the effectiveness of the learning process; quality (as a match between results and tasks, as well as between results and the capabilities of each student); optimal ratio of time expenditure, and efforts of the subjects of the educational process.

Optimization of educational activities at departments of morphological profile of Zaporizhzhya State Medical and Pharmaceutical University is a systematic, and constantly implemented phenomenon. Forced online training, which took place under unfavorable circumstances for medical education, forced to carefully consider the forms and methods of optimization, that were used in the training process.

The modern high-tech equipment, that is available at our university contributes to the optimal results of the study of morphological disciplines such as histology, cytology and embryology, and human anatomy, and topographical anatomy.

Prospects for further development

The optimization process cannot be considered a finite phenomenon, as it is associated with many variable factors. Therefore, we see the improvement of the existing, and the development of methods of optimizing the educational process in medical universities in the departments of the morphological profile, which are appropriate to the learning circumstances, as a perspective for further research.

Information on conflict of interest

There are no potential or apparent conflicts of interest related to this manuscript at the time of publication and are not anticipated.

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Звягіна Г.О., Потоцька О.І., Кірсанова О.В., Максєва Л.В. Оптимізація навчальної діяльності кафедр морфологічного профілю Запорізького державного медико-фармацевтичного університету.

РЕФЕРАТ. Актуальність. Процес оптимізації навчальної діяльності як явище, що дає можливість досягати максимальних результатів при мінімальних витратах часу є широко застосовуваним явищем у різних галузях наук. Саме у педагогіці він застосовується ще з минулого століття. Але форми і методи оптимізації постійно потребують удосконалення і відбору залежно від конкретної ситуації навчання. **Мета.** Кафедри морфологічного профілю, що працюють зі студентами 1-2 курсу медичних університетів під час військового стану виробили свої оптимальні методи навчання. Саме їх діяльність лягла в основу нашого дослідження. **Методи.** Серед використаних нами у статті методів присутні як теоретичні – сходження від абстрактного до конкретного, комплексні – практичного спрямування – аналізу, синтезу, індукції; серед спеціальних – компонентного аналізу. **Результати.** Застосування принципу оптимальності дозволяє збалансовувати усі елементи навчального процесу. Така робота має декілька основних етапів, таких як: оцінювання стану існуючого освітнього процесу; виділення мети та завдань оптимізації; вибір форм і методів проведення лекційних, практичних занять, поточного та проміжного контролю, внесення коректив відповідно до мети. І, звісно, оцінювання результатів з точки зору оптимальності використаного часу і докладених зусиль. Тож організаційні форми роботи в процесі навчання можуть бути скориговані. Використані методичні та навчальні матеріали мають відповідати програмі навчання, бути інформативними, логічними та послідовними. Лише такі матеріали вдало доповнять технічні засоби забезпечення навчального процесу. Велику роль в оптимізації процесу навчання відіграють сучасні технології, такі як анатомічний стіл Anatomage, 3D Organon Anatomy VR, симулятор віртуальних лабораторій «Labster». **Підсумок.** Оптимізація навчальної діяльності на кафедрах морфологічного профілю Запорізького державного медико-фармацевтичного університету проводиться системно і постійно. Дистанційне навчання, яке було впроваджене під час військового стану, примусило переглянути форми і методи оптимізації, які були використані в процесі навчання. Тож вдосконалення існуючих та напрацювання нових методів оптимізації навчального процесу на кафедрах морфологічного профілю постійно змінюватиметься відповідно до обставин.

Ключові слова: оптимізація, принцип оптимальності, морфологічний профіль, критерії оптимальності.