

USAGE OF DISTANCE EDUCATION FOR STUDYING PHYSICS AND MATHEMATICS BY PHARMACY STUDENTS

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Abstract: *on the basis of analysis of scientific pedagogical literature the essence of the concept of distance education is expanded; characteristic features which distinguish distance education from traditional forms are determined; the examples of the usage of distance education in the physics training of pharmacy students are given.*

Topicality. Now distance education becomes very popular in the process of training of future specialists in different scientific and industrial areas. The distance education system is a new form of interactive training based on telecommunications technology, Internet resources. It allows solving a series of problems arising at Universities, in particular, it allows one to ensure access to knowledge in a learning subject without personal interaction with a teacher, possibility of wide spread of educational and other information in real time for any interested audience, it allows also to organize the educational process with the use of feedback for the operational control of the level of digestion of knowledge by students. Usage of the distance education is also important to improve the quality of education of extramural students. In particular, the usage of distance education is extremely important in the training of specialists for the pharmaceutical industry.

The analysis of the scientific literature has shown that the problem of distance education has been studied by the specialists in various scientific fields. In particular, the question of the didactic provision of the distance education is describe in detail in the works by A. Antipin, M. Bukharkin, T. Goriacheva, T. Desyatov, I. Isayev, M. Karpenko, V. Kremen, A. Mishchenko, M. Moiseeva, G. Mozhayev, A. Petrov, A. Polat, V. Slaston-

in, V. Tikhomirov, A. Shabanov, E. Shiyanov, A. Khutorskoy and many others. Unfortunately, the question of physical and mathematical training of pharmacy students in the process of distance training was not a matter of complex scientific research. This resulted to the choice of the subject of our publication.

Aim. Scientific substantiation of the essence of distance education and the usage of distance training during the study of physical and mathematical subjects by pharmacy students.

Problems:

1. to analyze the state of the problem under investigation in the pedagogical works in order to clarify the essence of the concept of “distance training”;
2. to determine the characteristic features that distinguish distance education from the traditional forms;
3. to consider the examples of the usage of the distance education in the process of physical and mathematical training of pharmacy students.

Materials and methods. To solve certain problems both theoretical methods of investigation (study and analysis of the pedagogical literature for the purpose of determination of the state of elaboration and theoretical substantiation of the research) and empirical ones (the introduction of the distance training in the educational process of physical and mathematical training of pharmacy students) were used.

Results and discussion. In the scientific and pedagogical literature, the concept of distance education is defined in different ways. Some scientists [2; 4; 5] note that distance education is a new tool for realization of the learning process which involves active communication between a teacher and a student by means of modern information technology and multimedia. According to the others scientists [3; 6; 7; 8], distance education is an organized learning process, during which students self-dependently study subjects according to training program developed by the teacher.

In our view, distance learning is a purposeful organized process of active mediated (through the usage of special pedagogical and technical means) joint activity of teachers and students, during which future specialists acquire knowledge, learn skills required for their professional activity. This form of learning gives the freedom to choose the place, time and pace of education, and also allows receiving education for the students from the regions where there are no other opportunities for professional training or receiving high-quality higher education, there is no university of the desired profile or teachers of required skill level. In addition, distance learning is an effective way to skills that allows harmoniously combine study and everyday life.

Distance education has certain characteristic features that distinguish it from traditional forms of training:

- flexibility (possibility to study at a convenient time, in a comfortable place and pace);
- modularity (possibility to form a curriculum corresponding to individual or group requirements from a set of independent course-modules);
- parallelism (in-service education);
- coverage (simultaneous access to many sources of educational information such as digital libraries, data banks, knowledge bases, etc. by a large number of students);

- efficiency (efficient use of training areas, technical aids, concentrated and unified presentation of educational information and multi-access to it reduces the cost of training of future specialists);
- manufacturability (the usage of the latest advances of information and communication technology promoting human advance in the global information space in the educational process);
- social equality (equal access to education regardless of the residence, state of health, elitism and material welfare of the students);
- internationality (import and export of world achievements in the educational market);
- the new role of a teacher (expansion and update of the role of a teacher which ought to coordinate the learning process, to improve its creativity and skills in accordance with the innovations [1, p. 7]).

Note that the usage of Internet technologies in the process of training of future specialists has a number of advantages among which are such as possibility of access to information at any time comfortable to the student; the opportunity to be taught simultaneously at different faculties of the same university or different universities, even in different countries; possibility to organize the learning process in accordance with the needs of the student; opportunity to learn the material for limitless time; the existence of feedback between a student and a teacher; the possibility of rapid updating of training material; satisfaction of the needs of students for integration of information technology with the sources of knowledge; possibility of organization of quick access to the essential information.

It is necessary also to pay attention to a series of disadvantages in distance education. The elimination of them is essential for the effective training of future specialists. In particular, they include insufficient computer skills of teachers and students, lack of experience in distance learning; a small amount of methodical materials for preparation and introduction of distance learning; insufficient development of information and communication infrastructure; the problem of search of highly qualified staff; insufficient interactivity of materials for the distance learning courses [9; 10].

It is known that the distance learning system has been successfully used in the majority of pharmaceutical and medical universities of Ukraine. In particular, the electronic methodical materials for distance learning have been developed and are used in practice among both internal students and correspondence ones at the Department of Physics of the National University of Pharmacy (Kharkov). The materials are used both for self-study by future pharmacists and for testing of their knowledge during exams. The students have twenty-four-hour access to training materials, ongoing support and consultations by teachers and trainers, online video lectures, virtual simulators and other technology solutions to ensure effective learning.

Here is a fragment of one of the variant of a computer test task to check the level of knowledge of future pharmacists in Physics (the chapter is “Blood circulation biophysics”). The students are supposed to answer the tests, solve the problems and to fill special checkboxes. The theoretical material precedes the question list.

The blood flow through vessels is

- always laminar;

- always turbulent;
- mainly laminar and only in some cases turbulent;
- mainly turbulent and only in some cases laminar.

Among all blood vessel types the linear velocity of blood flow is minimal

- in the aorta;
- in arteries;
- in arterioles;
- in capillaries;
- in veins.

What blood vessel type has the greatest hydraulic resistance?

- Aorta;
- Arteries;
- Arterioles;
- Capillaries;
- Veins.

A pulse wave is propagation of periodic oscillations of

- rate of motion of blood particles;
- linear rate of blood flow;
- volume rate of blood flow;
- static pressure;
- blood pressure.

Calculate the blood viscosity η in case of normal hematocrit value (45 %) if it is known that the plasma viscosity is $\eta_0 = 2.0 \text{ mPa s}$.

The answer: mPa s.

Calculate the maximal minute volume Q_{\max} of blood at which blood flow in the aorta remains laminar. Diameter of the aorta is $d = 2 \text{ cm}$, the blood viscosity is $\eta = 5 \text{ mPa s}$, the blood density is $\rho = 1050 \text{ kg m}^{-3}$, critical value of the Reynolds number is $Re_{\text{cr}} = 2000$.

The answer: L min^{-1} .

Calculate the sedimentation rate v of individual erythrocytes considering them as spherical particles of diameter $d = 7 \text{ }\mu\text{m}$. The plasma viscosity is $\eta = 2.2 \text{ mPa s}$, the erythrocyte density is $\rho_{\text{er}} = 1080 \text{ kg m}^{-3}$, the plasma density is $\rho_{\text{pl}} = 1027 \text{ kg m}^{-3}$.

The answer: mm h^{-1} .

Conclusions. Taking into consideration the foregoing material we can conclude that the usage of the distance training in the educational process of physical and mathematical training of future pharmacists allows solving pedagogical problems taking account of the contemporary development of information technology. It also increases the efficiency of students' self-dependent work, provides a completely new possibilities for their creative inspiration, acquisition and consolidation of various professional skills. In addition, the distance education form allows one to individualize, differentiate the volume and sequence of submission of the academic material, promotes the development of professional communication skills of pharmacy students, education of information culture, formation of ability to make decisions in difficult situations quickly and correctly.

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