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BIOPHYSICS IN MEDICINE

Abstract. *The article provides information on the teaching of Biophysics in the field of medicine through the implementing of modern educational technologies. The role of the teacher in the process of teaching Biophysics is changing, providing information on modern pedagogical technologies in the sphere of Biophysics in medicine, so today the university teacher is not always the main source of information, they direct students' thinking to knowledge using various information and communication technologies. This given article outlines the optimal use of modern pedagogical technologies in the educational process of Biophysics in higher medical institutions. Additionally, article deals with the development of Biophysics and the development of students' knowledge through the use of various innovative technologies in the process of medical education.*

Keywords: *biophysics, medicine, innovation, information and communication technologies, medical equipment.*

In today's world, physics and medicine are scientific directions that complement and develop each other. Medical biophysics is recognized as the science that based future doctors' professional training according to medical equipment [1].

Biophysics is based on the early development theory. Therefore, the relevancy of the patterns in physics and chemistry for molecular, membrane and cellular interpretations of biological phenomena in the living organism allowed them to be defined in terms of physical, chemical, and biological regularities in the microorganisms, populations, biocenotic, and in biosphere levels [2].

Biophysics has its own patterns and methods even though it is in the strong correlation with other natural sciences. The development of biophysical theory and its

introduction into biology and medicine have been influenced by the creation of theoretical bases in biological sciences. Biophysics is recognized as the science of the 20th century. However, it cannot be said that until the twentieth century the aims of this science are not reached. This is evidenced by the many discoveries made by plenty of scientists in the 20th century and their research. One of them, Maxwell's experiments on color theory, showed that he had different colors using a dynamical top, while German physiologist Helmholtz discovered the velocity of nerve pulsing. The Dutch physiologist Einthoven, the founder of electrocardiography, made the heartbeat recorder and used it for the first time for diagnostic purposes. Known physiologist Sechenov by researching the dynamics of breathing discovered the patterns of melting gases in biological solutions. Here are some more examples. At present, biophysics has been transformed into fundamental issues such as inheritance and variation, ontogenesis, phylogenesis, metabolism and bioenergy, except the physical properties of the organism and its impact on physical phenomena. Recently, scientists have focused on biophysics. Its main reason is the widespread use of the achievements of physics in biology and medicine. There is an important role of domestic scientists such as Inyushin V.M, Tuleukhanov S.T and Abdrakhitova A.K on the development of biophysical research in Kazakhstan. Currently, the Kazakh Research Institute of Biophysics has been established by the Kazakh Research Institute of Oncology and Radiology (KazRIOR), Institute of Botany and Phytotherapy (IBPh), Closed Joint Stock Company "Biogen", Al-Farabi Kazakh National University (KazNU). Kazakh National Medical University named after Asfendiyarov (KazNMU). The ideas and methods of biophysics are not only widely used in the macromolecular and cellular processes of biological processes, but also spread in populational degree.

Methods used in biophysics include various optical methods, spectroscopy, electrometric methods, methods of microelectronic techniques, chemiluminescence, laser spectroscopy, targeted atoms [3].

One of the most important issues in the education system in developed countries is the informatization of education, it means the use of information technology in the learning process. Nowadays, in the education system of the country, it is known that



the creation of an information environment in the innovation sphere is a topical issue. [4].

It is important to expand the educational space to new requirements in the context of the growing role of human resources in education as a criterion of political and economic development in the field of education from the point of view of expanding the information space and joining the world community.

For modern pedagogical specialists, the main task of our time is not only the constant professional development of the teacher, but also psychological, political, economic and information literacy and historical knowledge. Today's teacher should work on improving the knowledge of students using innovative pedagogical technologies. In this regard, one of the most commonly used concepts that we use later is innovation. "Innovation" is a new outcome that has been achieved in reaching the specific goals [6, 7].

Understanding of modern innovative pedagogical technologies and wide use of knowledge in the field of education, especially in higher educational institutions, is the main condition for increasing students' knowledge, as well as the qualifications of young specialists. Overall innovation is recognized as a key factor in improving the quality of education.

The effectiveness of innovative technologies:

1) it identifies the process of learning innovative technologies and innovations in education, which is acquired in everyday life through television or the Internet and opens the way to a new world.

2) teaches a student to adapt to innovations and intelligence, to explain and express their views and opinions.

3) innovative methods are active teaching methods, which means that 80% of theoretical knowledge and 90% of practical knowledge is stored in student's memory by this method.

Today quality of education in each educational institution unsatisfactory; inefficiency of results of reforms in education; insignificance at increase in number of



documents; lack of skills of self-education at students; there is not enough general creativity of students and teachers. The only way to solve this problem - to introduce the latest innovative approaches in educational process, to induce each pupil to training, to increase his motivation to study and to work independently. Thanks to the new innovative technologies directed to improvement of quality of education in researches and the analysis it is possible to draw the following conclusions: -

Today quality of education in each educational institution is unsatisfactory; inefficiency of results of reforms in education; insignificance with an increase in the number of documents; lack of students' self-education skills; there is not enough general creativity of students and teachers. The only way to solve this problem - to introduce the latest innovative approaches and methods in learning process, to encourage each student to learn, increase his motivation to study and work independently. Thanks to the new innovative technologies directed to improvement of quality of education in researches and the analysis it is possible to draw the following conclusions:

- improving the quality of student learning, teacher's professional competence, ability to apply various innovative technologies in the learning process and its results;
- systematic and targeted use of innovative technologies in education will allow to reach great achievements;
- the introduction of new innovative educational technologies is often incompatible with the modern requirements of the material and technical base of each educational institution, the lack or low level of knowledge of the staff is also problematic.

Qualitative education of the younger generation depends on the introduction and use of innovative technologies in the learning process of educational institutions. Therefore, the main task of each teacher is to research, implement and effectively use innovative educational technologies, not lagging behind scientific and technological progress.

All teachers are well aware that innovative training manuals are important for implementing innovative educational technologies into the learning process. One such

tool is e-learning. Using electronic textbooks, students can improve their knowledge of both subject and computer skills through electronic textbooks. With this textbook, students will have the opportunity to work independently and experience their theoretical knowledge in practice, which allows them to achieve great success through the use of electronic textbooks in the education system.

With regard to contemporary medical higher education, it is essential to train future professionals who is ready to master new knowledge, accustomed to multifaceted activities, and adapted to new requirements quickly, as well as to prepare them for a competitive environment that is fully fulfill to modern requirements [8]. In this regard, it is essential to improve the quality and level of diagnostic, therapeutic and clinical research conducted by future doctors in the practical laboratory, and also to enhance the quality of professional training in this area.

In the modern world, special medical devices are used in various fields in the health-care sector (such as therapy, surgery, gynecology, oncology, etc.), so future doctors cannot be treated separately from medical equipment. Aware of the availability of medical equipment and the correct relationship between medical devices and physical factors during diagnostic and treatment activities in the field of medical education, the ability of future doctors to improve their skills, ability to work with medical equipment plays an important role in enhancing cognitive functions. It should also be borne in mind that every student works with many medical devices based on physical phenomena in medicine (mechanical phenomena, oscillations and currents, molecular, electric field and electric current, magnetic field, electromagnetic oscillations and waves, optics, laser radiation).

The main purpose of teaching biophysics at medical universities is to teach future doctors how physiological processes are performed in the human body, and to use physical patterns and phenomena in medicine, such as diagnostics and the optimal use of therapy. In this regard, students of medical universities oblige to look for new ways of teaching the characteristics of medical equipment and practice in the field of professional training.



The content and purpose of vocational education in modern medical institutions of higher education is to demonstrate the results of the work of the teacher, as well as the nature and content of the work and how to implement them. Accordingly, it is necessary to identify indicators characterizing the ability of students to conduct diagnostic, therapeutic and laboratory tests. To this end, students can choose to use a medical device in accordance with their application; registration and registration of its influence; know the physical nature of the diagnostic or therapeutic effect of the physical factor used in the medical device; knowledge of the harmful effects of medical equipment on the patient and the method of its removal; Information on the development of modern medical equipment, etc. can be achieved through the use of innovative educational technologies and tools.

In conclusion, I note that virtual biophysics is a unique innovative approach in the system of medical education. 90% of the information we receive and perceive by vision, so the learning process should be carried out using visual aids. This means not only a static picture that reflects any physical phenomenon, but can also be seen in virtual motion. This resource allows teachers to teach basic patterns easily and freely, the basics of biophysics, as well as to conduct online laboratory work in many sections of the general education program. It is necessary to create an environment for the effective use of information and communication technologies (ICT) over the Internet using interactive whiteboards, projectors, computers, portable devices and tablets and smartphones for teaching biophysics. Using an innovative curriculum in the form of a playlist, with professionally developed multimedia concepts, visual materials and virtual solutions, the learning process can be made more understandable and meaningful. The complex structure allows you to make a new theme interesting and understandable, to perform various practical tasks, consolidate the knowledge gained, organize various tasks, and students' achievements. Also with the help of illustrations, videos, clear fonts, animated descriptions and much more you can memorize information easily. Explaining examples and concepts from real life will be easy and efficient. New models of the aforementioned training will allow students to participate



in the daily learning process if, for whatever reason, they are unable to continue their basic education. Of course, modern online education has a great future for most of the younger generation.

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