

ORIGINAL RESEARCH



Motivational Aspects and Modern Innovative Technologies in the Formation of Professional Competencies of Future Specialists in Higher Medical Educational Institutions

Authors' Contribution:

A – Study design;

B – Data collection;

C – Statistical analysis;

D – Data interpretation;

E – Manuscript preparation;

F – Literature search;

G – Funds collection

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Background and Aim of Study:

Abstract

During the research the improvement ideas of the educational system were analysed. Accented attention on an advantages of the distance education, and also his roles and place in the system of higher education. As the demand to the quality of the students' knowledge has become the main criterion in employment. According to the new educational standards at the grant of educational services it is necessary to be oriented on the professional qualities of the future activity of the graduate.

The aim of the study: to represent the results of theoretical analysis and empirical study of the formation of oriented educational-scientific information-computer environment on the basis of the Department of Microbiology of Danylo Halytsky Lviv National Medical University.

Material and Methods:

Modern methods of scientific research used in process: an analysis of the systems, biblio-semantic, statistical, empirical observations and information processing of oriented educational information and computer environment in the process of students' educational and scientific activity.

Results:

According to the analysis of the obtained results, the key features of the motivational complex of students of higher educational institution was identified. The ways of organization of control and an analysis of students' success by means of information and computer technologies according to the state standards of higher education. It is offered, new approaches to forming of content of educational discipline.

Conclusions:

The innovative tools and interactive applications on the basis of ICT will increase the possibilities of studying the discipline of microbiology, virology and immunology in higher medical institutions. What is appropriate in the context of integration of the new strategy of education.

Keywords:

computer and information technology, distance learning, computer training, video conferencing, asynchronous e-zine, open virtual universities, healthcare system

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Introduction

The reforms taking place in Ukraine in the medical and social spheres are aimed at forming a competitively oriented medical market economy, providing the last sustainable development dynamics. The medical organizations have to act in a competitive environment, to find and expand their niche in the market of goods and services, to master a new type of economic behavior, to constantly confirm their own competitiveness. In turn, this requires an increase the contribution of each health care professional to the achievement goals of their enterprise.

Therefore, a modern university that trains of the health care professionals in accordance to the changing market conditions should improve the education system, focusing on the quality and accessibility of educational services, as this has become the main criterion in employment. According to new educational standards at the grant of educational services it is necessary to be oriented on the professional criteria of future graduating student. The most important means of ensuring the quality of professional training of a medical student are an open educational resources (OER), consisting of educational and scientific platforms, which are available freely or with special access. The open educational resources include: educational courses, separate materials or modules of courses, manuals, videos of lecture, educational video, simulation centers, software and other tools, materials or technologies. For example, practical classes at the Department of Microbiology of Danylo Halytsky Lviv National Medical University are a combination of traditional approaches with modern innovative technologies. In particular, the focus is on the main aspects of the work of a bacteriologist, namely, early diagnosis in accordance with modern standards and protocols by Order of Ministry of Education and Sciences of Ukraine (2019). The use of the open educational resources promotes activity of participants of educational process and creates an effective educational environment, develops the competencies of teacher at preparation of educational materials and realization of educational process. In addition, motivation is a crucial component in organizing of educational activity among medical students. Development of motivation needs the purposeful pedagogical influence and new effective methods of activation of student factor are search. Today, sociologists and educators debate: "Why do one students gladly go to the university, but other refuse to study and miss classes? Why is someone successfully fit into an educational society, and for someone in a university are the continuous problems? What can motivate a modern student?" Formation of motivation among medical students is at the heart of the pedagogical success of the modern teacher. Therefore, an actual are such instruments of the open education system, as: an electronic distance learning technologies (e-learning), global social networks, an educational information networks, online classrooms, technologies for supporting interconnection with the use of mobile devices and others (Bykov, 2013; Spirin, Demyanenko, Zaporozhchenko, Shyshkina, & Demyanenko, 2012). To date, among the scientific and pedagogical staff of

institutions of higher medical education, the most important task is to find models for building a motivational educational process context of informatization of medicine at different levels. In today's market conditions, this is not an easy task for the teacher of higher medical school, as he must constantly improve pedagogical and medical skills, look for new forms and ways of organizing students' educational activities forming motivational aspects, as well as develop new forms of assessing the quality of students' knowledge. In the future, the search for new rational ways of using the computer information technology in the organization of educational and research activities of students of institutions of higher medical education, and the development of methodological recommendations for students and teachers.

The aim of the study. To represent the results of theoretical analysis and empirical study of the formation of oriented educational-scientific information-computer environment on the basis of the Department of Microbiology of Danylo Halytsky Lviv National Medical University; to express of experience of experimental researches of introduction and use of separate service systems of this environment in preparation of specialists of different specialties of medicine.

Materials and Methods

In this work the done attempt to estimate the influence information-computer environment on the process of studies and perspective of the use of digital technologies in higher medical school. Determination of progress of programmatic an open system trends on-line of resources came true in the context of analysis of modern experience in obedience to operating the standards and normative documents.

Modern methods of scientific research used in process: an analysis of the systems, biblio-semantic, statistical, empirical observations and information processing of oriented educational information and computer environment in the process of students' educational and scientific activity.

In order to increase the efficiency of their use and to influence the motivational aspects of future healthcare professionals the main scientific provisions based on large groups of research with the participation of faculty members, students of Medical Faculty, Faculty of Pharmacy, and Faculty of Dentistry of Danylo Halytsky Lviv National Medical University. Using of information and computer environment in the learning process and analysis of efficiency in a time segment were investigated.

Results

The digital competence of teacher in measuring of competitiveness of higher medical establishments in forming of modern specialist in industry of health protection

Along with the traditional forms of higher education, whose target audience is entrants, medical students, masters, graduate students, doctoral students, teachers, etc., there is a distance learning specializing in narrower areas. The specialized training market is more customer-oriented than the general market, so as he is more flexible, quickly reacts on the changes of demand. This

confirmed by the theoretical analysis data, since even a higher education institution that do not specify distance-learning programs are ready to develop individualized e-learning plans. A question consists in the following: or will occupy the controlled from distance studies among medical educational establishments, the special niche in the system of education or it will remain only addition and whether will have demand. For finding out of package of questions, first of all, it should be noted that

quality of education is begun with a teacher and it is a not overstatement. Firstly, a teacher carries out the role of explorer and role of adviser, due to own experience and wide knowledge. He can choose the greater useful information content from all variety that exists in an informative space and he helps for students correctly differentiate her. The motivational components reflected in Figure 1 that determine the discovery of educational activity among modern medical students.

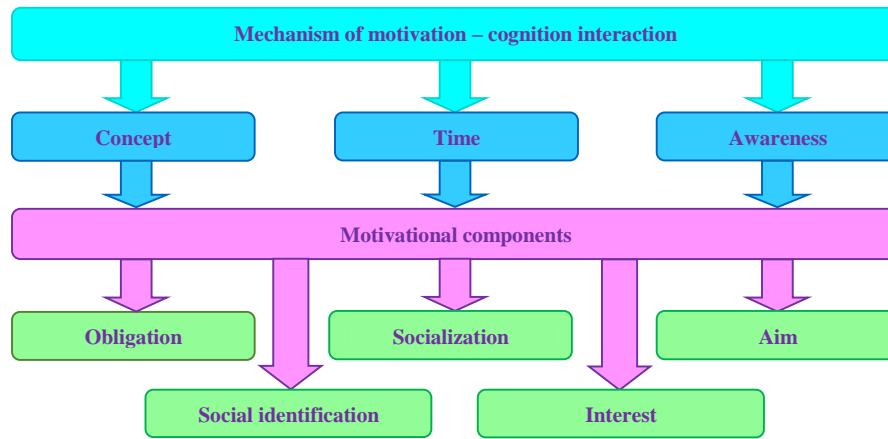


Figure 1. Motivational components in medical students.

Studying motivation as a condition for forming a successful learning activity, involves identifying factors that need to be cultivated among students, in particular: purpose, obligation, socialization, interest and social identity; is based on generally accepted standards. In our opinion, each of the motivation factors is evenly distributed (20%), although according to some scholars and educators, there is a clear hierarchy in the motivational structure. Where one of the components is dominant and other motivational factors have a subordinate position. We want to attract attention, that in each of above enumerated factors there are separate components such as: realization and conception, which are formed in the time interval of the educational process. It should be said that many scientists define certain techniques of motivation: persuasion; arousing interest; suggestion; delegation; securing a positive impression. But to our opinion, when a student realizes every factor of motivational of constituent so as a result the critical thinking is formed and the own conception of activity is formed, inclusively an educational. And motivation techniques such as coercive or pressure training have not justified themselves as a factor of motivation in today's society, because, a lot of students are unprepared for studying at the university due to a lack of understanding of their own need for knowledge and opportunities to apply them in practice. In most cases, students have for decades developed a well-known style of learning to "hand over and forget" without the pleasure of activity or without interest in the subject of teaching. Learning without self-interest and benefit leads to the inability of students to formulate the concept own applying the knowledge and practical skills received during training, because they are used to the test thinking and have problems with socialization. Although, it follows notices, that among motivational appear and other pedagogical problems for the teacher

of medical establishment, related to the use of computer technologies in the educational and scientific activities of medical students, planning of on-line tutorials, technology of creation of computer-assisted educational and scientific environment. A learning technology is a relating link between the theory of studies and her by practical realization in market conditions. There are most problems with the design of training computer programs. Because, there is a huge gap between quality of the computer educational programs based on the use of pedagogical methodology, that itself did not justify. But they are put into practice in the form of the typical test systems.ithin the framework of complex research taking into account the above mentioned problematic aspects of distance learning in the design of educational and scientific computer environment based on the Department of Microbiology, Danylo Halytsky Lviv National Medical University in order to analyze the influence of information computer technologies on the content and methods of designing students' educational and scientific activities and forming motivational factors during the educational process. An electronic educational materials include: electronic textbooks and video lectures, electronic methodological developments for practical and laboratory classes and a database of computer test systems for medical, dental and pharmaceutical faculties, video presentations and imitation models of the educational process. They also include a learning management tools such as electronic journals. This is quite convenient, because in an asynchronous mode the students work with an e-learning materials independently and they pass to testing knowledge at any time convenient for him. Question that arise up during the independent working of material he can set in the mode of off line chat option that is in the system informatively educational environment. It is also convenient for the teacher, because at any time he can

analyze the activity of students, to note the most pressing questions that arise during the educational process. Let's just say, 100% of students freely use the information and learning environment in their practice. The activity of students of different faculties during the academic year was analyzed (Figure 2).

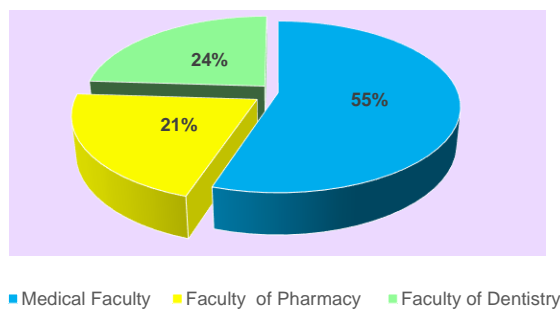


Figure 2. Students' activity in an information and communication educational environment.

Among the leaders of activity in the educational and information space was identified the Medical Faculty – 55%. Although, the result maybe was forecast as modern student society constantly is in the conditions of reflection and actualization. The Faculty of Dentistry has an active position of 24% and this is not surprising, the first, dentists' faculty worldwide, regardless of the health care system in the country, have the most experience in providing paid services to the public, second, in the early 1990th, many private dental organizations appeared in Ukraine offering paid dental services to the population (Klimenko & Smirnova, 2014). Therefore, specialists in this field care about their own educational and scientific potential. 21% an activity belongs to the Faculty of Pharmacy, on it is our opinion that due to the fact that the pharmaceutical market is one of the most dynamic and difficult in Ukraine. One of the key characteristics of this market is the high level of competition. The future pharmacy professionals are aware of the importance of using the information and communication computer environment to develop the practical skills and theoretical experience in the future employment perspective. The pharmaceutical market of Ukraine is one of the main factors in shaping the country's income, as it is quite powerful in the world market and holds the 5th position in the world in terms of maximizing the supply of domestic consumers with products. Also national exporters are highly estimated by producers on foreign markets and create a powerful enough competition to the leading world leaders (Kovinko, Stakhova, & Vovk, 2017). The modern world is characterized by the intensive development of contacts between different countries. There is an increase in the flow of young people from one country to another who are seeking higher education. According to statistics, Ukraine is ranked 9th in the world by the number of foreign students. The geography of countries from which foreign students came to the University varied: Poland, Bulgaria, Israel, Ecuador, India, Pakistan, Egypt, Morocco, Lebanon, Palestine, Nigeria, Ghana, Zambia, Kenya, Namibia, DR Congo, Cameroon, Angola, Syria, Tunisia, Iran and others. The

university enrolls 1.334 international students from 47 countries. Comparative analysis of activity in the information and educational environment of the Department of Microbiology of the Danylo Halytsky Lviv National Medical University was conducted during the academic year 2019, among students of 2-3 courses of Medical Faculty, Faculty of Pharmacy, and Faculty of Dentistry (Figure 3).

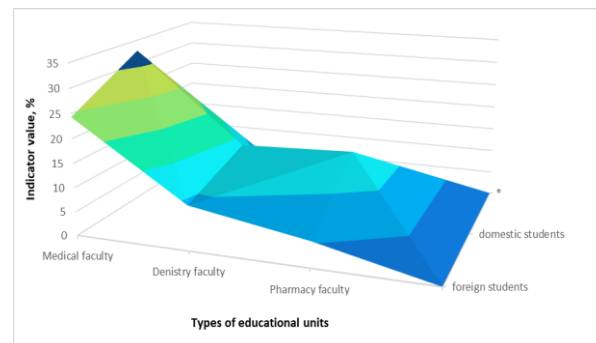


Figure 3. Comparative analysis of activity among domestic and foreign students in information and educational environment.

According to statistics, among the Medical Faculty a domestic students have the highest activity of 32.7% compared to foreign students 24.3%. A similar picture is observed at the Faculty of Pharmacy: domestic students 13.8% and foreign dentists 9.2%. Among the Faculty of Pharmacy domestic students gained 14.7% and foreign students 6.3% activity. According to the staff of the department, this is primarily due to the national and psychological characteristics of foreign students, which significantly affect the learning and success. Their adaptation to the new environmental conditions, namely: climate features, personal aspects, flexibility of the learning system, a living conditions and more. The Danylo Halytskyi Lviv National Medical University has created electronic journals of success and an attendance of classes for foreign students, and their families have the opportunity to follow the process of studies of the near in online – mode. That will significantly improve the individual educational process of each student, regardless of the direction of the faculty he has chosen. Although, it should be noted that staying in a country of foreign youth is related to the adaptation difficulties and the difference between the realities of the country from what was promised in the advertising leaflets. But if to mark, a level of cognitive activity that a foreign citizens purchased for itself on a motherland, by many parameters, there are considerable divergences in the methods of studies in the Ukrainian and foreign systems of education.

Current requirements in the training of future healthcare professionals

The Higher Education Standard is a set of requirements for the content and results of the educational activity of higher education institutions, including medical and scientific institutions for each higher education level within each specialty. The Higher Education Standart defines: the integral, general, and special competencies of the graduate, such as the ability to choose a communication strategy; ability to work in a team;

knowledge and understanding of the subject area and understanding of the profession. Among the professional competencies, distinguish a capacity to establish a preliminary clinical diagnosis of the disease, skills in collecting patient information, an ability to evaluate the results of laboratory and instrumental research, the ability to determine the principles and nature of the treatment of diseases. Particular attention is paid to using an information and communication

technologies skills. The most medical students evaluate themselves as a “confident ICT user”, who is able to work with lot of types of modern information systems. Our students systematically use the software to perform a various types of learning tasks and communicate with teachers, etc. The staff of the Department of Microbiology conducted an analysis of the qualification requirements of a clinical or medical microbiologist in Ukraine and abroad (Table 1).

Table 1. Comparative analysis of qualification requirements of clinical or medical microbiologist in Ukraine and abroad.

Knows and uses in activity “doctor-virologist and microbiologist”	
Ukraine	Abroad
Health care legislation and regulations defining the activities of management bodies and health care institutions.	Consultation and advice regarding the appropriate initial investigation of pediatric and maternal patients suspected of infectious disease.
The rights, responsibilities and responsibilities of the microbiologist-virologist.	Interpretation of laboratory information derived from microbiology testing for the diagnosis and management of pediatric and maternal patients.
Basics of epidemiology, microbiology, immunology.	Identification of specialized microbiological testing appropriate for intensive care of patients in acute care clinical areas as well as patients with endocrine, cardiac, immunological, gastrointestinal, and renal disorders.
Pathogenic, conditionally pathogenic bacteria.	Assisting clinicians in development of test algorithms for diagnosis of infections in patients with complex disorders.
Microflora of the environment, its impact on human life.	Assist in the medical oversight and clinical direction of the antibiotic stewardship program. Provide clinical consultation for antibiotic stewardship.
Modern methods of microbiological and virological research.	Research & Diagnostic Test Development. Basic and applied clinically relevant research in the area of Clinical Microbiology/Virology in collaboration with internal and external scientists and clinicians. Continuing diagnostic test development to improve existing methods, replace outdated technology, evaluate new technology, and implement testing for emerging pathogens.
Diagnosis, prevention and treatment of infectious diseases.	Assist in monitoring the accuracy, precision, and clinical relevance of laboratory test results through the implementation of both internal and external quality control programs. Continuous review of the testing menu to identify obsolete tests and areas where introduction of new testing is warranted.
Principles of laboratory diagnostics of viral infections: rapid methods of isolation and determination of virus types, serological diagnostics.	Collaborate with national surveillance organisations and public health authorities and to provide services for these organisations.
Safety rules when working with microorganisms, viruses.	Participate in the training programs for medical microbiologists, infection control doctors and other experts in the field of microbial diseases.
Rules of registration of medical documentation; modern literature on the specialty and methods of its generalization.	Undertake research and development in the specialty of Medical Microbiology.

The research makes it possible to outline the essence of the problem and to adapt the information and educational environment of the department as a factor of future competitiveness.

Among the tasks and responsibilities in the requirements for the future specialists there are no differences both in Ukraine and abroad. A specialist follows a current legislation about a health protection and normative legal acts that determine an organization of medicare to the population, and an activity of organs of management, and an establishments of health protection. Applies modern methods of prevention, diagnosis, differential diagnosis, treatment, rehabilitation and medical examination of patients, gives them quick and an urgent medical care. Carries out a safety studies of medicinal products in which there is a predictable risk of certain types of severe adverse reaction. Plans work and analyses her results. Conducts medical documentation. Adheres to principles of medical deontology. Specialization is after certain speciality of medical profile (internship, specialization courses). Certificate of

a specialist without requirements to the experience of work. Because in today’s market conditions, the employer is more focused on the potential of the future employee. To get qualification of clinical microbiologist in abroad need to pass a specialization of microbiology not less than 60 months. Where one or more subjects such as a laboratory management, a health care and an infection control, practical clinical training, that can be flexibly integrated into a medical microbiology. In order to be able to cover the whole field of medical microbiology, the approximate duration of training should be medical microbiology (at least 24): bacteriology – 12 months, virology – 8 months, mycology – 2 months, and parasitology – 2 months. Laboratory management (up to 6 months), public health and infection control (up to 12 months), clinical medicine (minimal 12 months), scientific project (6 months). Direct stationary help and out-patient’s clinics from infectious diseases, HIV/AIDS, tuberculosis or related specialties (6 months).

Discussion

Medical education in today's market environment is an open social system that is in a state of continuous development. Are inherent certain tendencies her in particular globalization, integration, informatization. All these tendencies contain historical aspects of development, but there yet are many problems related to the creation of an information and communications technology in the higher schools of medical education. The peculiarities of introduction an information and communication technologies in an educational process were investigated by Bak (2014); Dyshlieva (2010); Shevchenko (2017); Vorozhbyt (2018) and others. The analysis of researches testifies to the high enough level and versatility use of ICT in modern home and foreign education as facilities: visualization, scientifically-searching activity, development of creative potential, testing and control of results, automation of process of studies and also as interactive facilities of cognitive activity (Sereda, Savinova, Stelmah, & Biliuk, 2019). However, despite the multivector, the use ICTs in the practical work of a modern teacher of higher medical school is abstract enough. In particular, it touches to distance learning at a higher medical institution. There is a lot of thought about the actuality and feasibility and costs of installing and maintaining a distance learning system. The speed and high quality of the provision of educational services with the help of computer information technology in the higher medical school, where the full-time learning cycle is traditionally kept, provides a convenient and effective level of assessment of the acquired knowledge and access to the system on the Internet, enabling you to participate in the learning process from any corner of the world. Assists providing of competitiveness of educational establishment, etc. (Horta, 2009; King Head, 2011; Zlámálová, 2007). The analysis the development of global higher university education in a world (Duderstadt, 2007; King Head, 2011) testifies that under act of modern computer and telecommunication technologies, and also with development of market relations in the field of education the new models of universities are forming (Jarolímek, 2008). Which have their own views of concepts on the competitiveness of healthcare professionals and different trends of their formation, this presented in the works of researchers, such as Filippova and Tverezovska (2010); Krymova (2015); Kubanov (2014); Nauholnykova (2016) and many others. Ability to use modern ICT is one of the important conditions for competitiveness of the modern specialist in the medical field. For the first time in the article "The Four Principles of Sufficient Reason" Schopenhauer introduced the term "motivation", which scientists would later use for explanation of behavior of people and animals (Ilin, 2011). Researches of motivation have been carried out by many domestic and foreign scientists in different directions. One of directions it is integrative approach when in the process of professional preparation of specialists forming of knowledge, abilities, competenses is provided and it carries in itself summarizing scientific constructions, come out of the system of pedagogical, psychological, methodical, special and other knowledge of teacher, that allow to

him successfully to carry out pedagogical activity. It is also being considered a contextual approach that creates learning conditions that foster the development of creative and critical thinking in which information that a student receives would be understood, perceived with their own experience, and their own analytical judgments would be formed.

Pedagogical and psychological aspects of training of future specialists were studied by Melnyk and Pypenko (2017; 2018), in the educational process in medical education – by Melnyk, Yekhalov, and Sedinkin (2020). By course of study, to the significant psychological factors in formation the motivational sphere of students medical, including the content of the value-semantic sphere of the teacher, experience in the main activities in higher education (experimental science, scientific and methodological, pedagogical), as well as personality qualities teacher, that accumulated in the professional mastery and competence (Dzjubenko, 2000). At present, there are about 50 theories motivation in foreign psychology, which confirms the multidimensionality of this phenomenon "The key to solving the problem of encouraging people to work effectively, orienting professionals to achieve professional goals is to determine their motivation", – Ivanova (2016) emphasizes. One of the best ways to generate motivation, according to the staff of the Department of Microbiology, Danylo Halytsky Lviv National Medical University, it is the use of information and communication learning technologies that include software, hardware, computer and communications, as well as the creation of modern virtual laboratory centers and innovative methods of their application to ensure high efficiency and informatization of the educational process. In today's market conditions, an automation of medical establishments it is of creating the unified medical information space, which in turn makes it possible to automate doctors' jobs, organize the work of the medical statistics department, to create databases, to keep electronic medical records and to unite all medical, diagnostic, administrative, economic and financial processes. Among the medical programs of the information and communication space of LPU, which have recently been developed, is the laboratory information system LIS MeDaP of BioHimMak, the Altey Laboratory system of Altey. The desire to combine different software complexes led to the creation of LIS MeDaP, Dexter and Laboratory Journal of the Laboratory Diagnostics Company. Feedback systems for diagnostics and corrective treatment are available, for example, cardio monitoring "Doctor A", Breath Maker program for the treatment of stuttering of NPC biocybernetics and computer monitoring tools "Doctor A", Holter monitor "Cardiotechnics 4000" from Ecomed + Software and hardware complex Integrator.

Conclusions

Review literature does not completely reveal the problem, but it does allow us to draw some conclusions of long-term researches and to determine the range of issues for discussion and the direction of further work. At present it is difficult to detect the trend of development of distance learning in higher medical institutions, because a universities use different formats

and, as a rule, as an auxiliary element in the educational process. Conducted the theoretical analysis made it possible to determine the organizational and pedagogical conditions for the development an information and communication surroundings for future healthcare professionals. It is possible to say, that an introduction ICT at different stages of the educational process for future professionals is the next step in the development of medical education. Organically combined use ICT for implementation of educational tasks by students and organization of the classroom work using ICT to forming of base skills and to helps to better shape the competitiveness of future healthcare professionals. Further research should be directed to the development a models and methodological basis for the development of information and communication environment for the preparation of future masters of medicine. This issue is topical, debatable and needs further consideration. Extending standardized interactive learning engages students in independent learning, thus forming a motivation for self-development and sustainable improvement of their skills in ICT. By influencing on the motivational component but in some circumstances, it is a decisive factor in the development of professionalism. Install difficult, yet achievable goals, adjust the selection as assignments to maintain optimal incentives for use of the potential student. The quality and professionalism of distance learning meets basic Pan-European principles such as transparency, objectivity, impartiality, impartiality and it is makes possible to recommend for implementation in the national medical education system.

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Ethical approval

Permission for this study was obtained from the ethic committee of institution and informed consent was obtained from students.

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