EDUCATIONAL MODEL OF PERSONAL SELF-IMPROVEMENT OF STUDENTS BY MEANS OF DIGITAL TECHNOLOGIES

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Abstract. Today a number of theoretical problems of self-development, in particular professional self-improvement of the personality of future highly qualified specialists, requires a balanced pedagogical approach. The aim of the article is to consider theoretical and methodological foundations and develop an educational model of the use of digital tools in the system of professional self-improvement of students on the example of institutions of higher medical education. The conducted pedagogical experiment allowed to check the effectiveness of the structural model of professional self-improvement of students developed by the authors by means of digital technologies. A number of methods of mathematical statistics were used, which made it possible to obtain qualitative indicators and determine the increase in the percentage of students by the levels of formation of professional self-improvement in comparison with the formative and final section. An educational model for the development of professional self-improvement of future specialists has been developed and its effectiveness in the educational process of medical university has been experimentally tested. We see prospects for further research in the development of theoretical and methodological foundations for training future professionals in various fields of professional activity through digital technology.

Key words: IT technologies, higher education, self-development, professional analysis, educational model.

Introduction. Today a number of theoretical problems of self-development, in particular professional self-improvement of the personality of future highly qualified specialists, requires a balanced pedagogical approach. It is important to identify the special nature of self-improvement of the future specialist, its essence and content in modern conditions; determining the place of professional self-improvement among other processes of personal self-development; substantiation of the main determinants of self-improvement of personality.

Analysis of foreign scientific literature gives grounds to conclude that attempts by scientists to comprehend the phenomenon of self-improvement of the individual intensified in the late twentieth century. At the beginning of the XXI century, foreign researchers formed two directions in the study of the problem of self-improvement of personality: psychological and pedagogical (E. Erickson (1996), J. D. Levinson (1997), etc.) and general science (W. Godwin, J. Passmore (2000)).

Philosophers emphasize the need to separate the concepts of self-education and self-improvement, giving preference to the mechanisms of self-improvement, their practical implementation in a particular area. Consequently, the concepts of self-education and self-improvement are considered by them as synonymous.

Scientists are studying the patterns of self-improvement of adults, since it is at the time that the most complete self-actualization of the individual is achieved. Given the active introduction of digital technologies in all spheres of our lives, self-improvement of the personality of future professionals by means of information technology is no longer just an anthropological problem, but becomes one of the most important and significant socio-pedagogical components of training, the educational process in particular, which requires adequate understanding and implementations. Therefore, the aim of the article is to consider theoretical and methodological foundations and develop an educational model of the use of digital tools in the system of professional self-improvement of students on the example of institutions of higher medical education.

Methodology. To achieve the aim of the article we used the complex of theoretical and empirical research methods. In the course of the research we analyzed pedagogical, methodological, professional literature and literature on the introduction of digital technologies in the educational process (comparison and juxtaposition of different views on the problem of the introduction of digital technologies in the educational process for the training of highly qualified specialists of higher education institutions, establishing the basic principles of development of professional and self-improvement of future specialists by means of digital technologies); synthesis (development and implementation of professionally oriented tasks of medical direction with the use of digital technologies in the educational process); b) empirical – observation, survey (questioning, testing, performance of professionally oriented tasks in which digital technologies are neces-
In view of the presented research, we have concluded that the development of professional self-improvement by means of ...

Results. Having carried out a thorough analysis of the scientific literature (Sendelj 2020; Bertholet et al., 2021; Lin et al., 2021; Schmitz, 2018; Chelongar et al., 2021; Abuvatfa et al., 2021), considering modern trends in the development of education and the needs of society for highly qualified specialists, we can offer our own definition of this pedagogical problem. Thus, we define the self-improvement of future professionals as a continuous, systematic and conscious process, which consists in self-deepening the level of own professional competence and development of professionally significant qualities and skills in accordance with social requirements, professional conditions and human moral qualities (Haborets, 2021).

S. Rubinstein (1999) argued that the process of personality development – is the process of ascent of man to his ancestral essence. Considering the life path of a person, the scientist noticed that this is not only a forward movement, but also an upward movement, to higher, more perfect forms, to the best manifestations of human essence. The scientist was one of the first to draw attention to the importance of reflection, associating with it a special way of human existence and his attitude to the world. It, in his opinion, seems to stop, interrupt the continuous process of life and take a person mentally beyond its limits. Consciousness performs at least three interdependent functions: regulation of mental processes, regulation of activity and the whole life of the subject, regulation of relations.

In the context of our study, it is important that the structure of personality, developed by S. Rubinstein, presents the needs, abilities, orientation. During the period of life a person shows his orientation, realizes abilities, improves personal and professional qualities and character. Activity harmonizes not only the internal structure of the personality, but also its integrity, consistency and features of worldview. Through systematic activity, a person changes the world and himself in this world, building his relationships with it, other people, life as such (Rubinstein, 1999).

The study of a large amount of literature on the process of formation of self-improvement of the individual, gave the opportunity to conclude that not all its aspects are sufficiently studied, the phenomenon of self-improvement as an independent philosophical category has not yet acquired its full and systematic understanding. A lot of research has been accumulated, but they mostly focus on the functional characteristics of the processes of conscious self-development of the individual, does not consider the process of self-improvement of the individual in its fullness, does not determine its nature, content characteristics, essential features, mechanisms of implementation in social practice. Such an analysis of the phenomenon of self-improvement of the individual is possible when self-improvement is studied as a philosophical and anthropological phenomenon. At the same time, the features of the formation of an information civilization determine the fact that self-improvement of a person is not only an anthropological problem that depends on a particular individual, the level of his or her spiritual development and self-development, but today it is an important social problem that awaits adequate understanding, practical significance and social implementation.

Consider the place of digital technologies in the professional self-improvement of the future specialist on the examples of students of higher medical education. Currently, there are many areas of using IT in medicine, the knowledge of which and the corresponding high-quality skills a modern doctor should have, as well as constantly develop them, for example: methods of intracellular nanotechnologies, molecular diagnostics, biosensors and software; visualization of biostructures at the submicron level; study of biosignals of different nature; computer simulation of complex biological processes, 3D modeling of tissues and organs, interaction with patients through the medcard24 mobile application, development of artificial life support methods, etc.


Continuing the position of scientists, we note that the conditions for the doctor's activity, taking into account the development of biomedical science and modern IT, in particular, the world's most common web technologies, the importance of improving health practices in Ukraine and the world, the provision of medical services, the need to move to continuous medical education, continuous professional development of doctors requires the creation of a new model of professional readiness of the future doctor. Thus, the components of this model, according to researchers, are:

- possession of health-correcting, health-preserving technologies related to biologization, chemicalization, greening, technicization, informatization, psychologization of the doctor's activity, which allows to carry out an informed partnership of the tandem "doctor-patient";
- ability to professional thinking of a family doctor, which contains different styles (professional-ethical, clinical, environmental, genetic, information-technological);  
- readiness for professional activity in all institutions and establishments of the health care sector: primary health care, family medicine;
- readiness to use modern web technologies in professional activities (teleconsultation, telemonitoring, creation and support of personal websites, blogging, etc.) (Haborets, 2020).

In order to identify the focus on the development of self-improvement of medical students using IT, we considered seven syllabi in medical informatics of various progressive institutions of higher medical education in Ukraine and analyzed the goals and results of this discipline. The results of the study are presented in more detail in (Haborets, 2021). ...
modern IT is given extremely insufficient attention at the level of educational programs and, accordingly, the educational process. We have singled out two medical universities of Ukraine among the studied, the goals of the initial programs which aim at self-development and self-improvement of the future specialist by means of modern and advanced information technologies – I. Horbachevsky Ternopil National Medical University (“development of ability to master software different purposes and to update and integrate the acquired knowledge”) and Donetsk National Medical University (“ability to apply skills of using information and communication technologies as a means of self-improvement”).

In the context of the Donetsk National Medical University university, we have directly developed a corresponding syllabus as a result of purposeful research and experiments. Thus, at the Department of Fundamental Disciplines of Donetsk National Medical University (DNMU) practical classes in medical informatics are organized in accordance with our improved program. According to the topic of practical training, the teachers of the department develop and constantly improve (due to rapid changes in the development of modern computer technology) tasks for students with special computer programs and applications that are installed on each computer in the classroom. These tasks are directly related to the practical aspects of information technology in medical science and health care. Medical informatics as a discipline involves students studying two modules: «Fundamentals of information technology in the health care system. Processing and analysis of medical and biological data» and «Medical knowledge and decision making in medicine and dentistry».

The implementation of practical work in the first module is aimed at the following:
- formation of students' skills in working with a personal computer to search for medical and biological data using information technology;
- work of students with databases (their development and search of the necessary information in them according to the specified criteria);
- acquaintance with the principles of coding of medical information and use of international systems of classification of diseases;
- acquaintance with the principles of coding of medical information and use of international systems of classification of diseases.

The study of the second module of medical informatics involves:
- study of the basics of algorithmization of medical problems, basic concepts of logic and ways of applying formal logic in solving problems of diagnosis, treatment and prevention of diseases;
- work of students with expert systems;
- study of the principles of modeling in medicine (in particular, mathematical modeling);
- teaching students to work with various medical information systems, individual medical records;
- acquaintance with the basics of evidence-based medicine, ethical and legal principles of information management in the health care system.

In the process of learning, students are offered to perform practical tasks with computer programs. For example, they consider: specialized computer programs used by doctors in diagnosing various diseases; «RadiAnt» – program for viewing medical images of the DICOM-PACS standard; IRPREVIEW – program to provide visualization of thermal field measurements, as well as for storage and processing of the obtained thermograms; program ICD-10, which assists medical staff in daily practice. It contains: directory, search by ICD code or text, links within the directory by code, as well as between search results and the directory. With the help of the program "Small Expert System" students get acquainted with the basic principles of the expert system, which are designed to consult with the user in any application area (for which the downloaded knowledge base is configured) to determine the probability of possible results. The program "Family Doctor" is able to identify the disease, give its description, symptoms and methods of treatment. Dental Simple Service – is a medical information system, which is designed to facilitate the routine work of the doctor, related to the implementation of basic clinical activities, namely: automate the registration of patients and visits, medical records, pre-registration, cash flow and other actions (Gaborets, 2018).

Today, 3D-technologies in medicine are used to create three-dimensional images, which, in combination with three-dimensional printing, create exact copies of fragments of the human body for the training of future doctors. 3D modeling in medicine allows to create three-dimensional models. Computed tomography images of patients are first transformed into images, and then into three-dimensional solid 3D models. Considering the high cost of implementing such models, an electronic resource Anatomy Learning (https://anatomylearning.com) has been developed using IT tools, where 3D images of all components of the human body are presented. The application is available for various computer devices running Windows, Mac and Android, which provides mobility of its use in the process of training future doctors.

During the study of the discipline "Anatomy" at the Department of Human Anatomy of the Donetsk National Medical University (Kropyvnytskyi, Ukraine) teachers and students use the Sectra Virtual Dissection Table (Abuvatfa, 2021). The possibilities of this resource are quite wide:
- 3D models show anatomical formations;
- models can rotate at any angle, tilt, increase, hide, change sharpness. This allows to study various anatomical formations in the view;
- allows to learn definition of any anatomic formation at pressing on which their name is deduced in Latin and English with a possibility of sounding that is very convenient for studying of the correct pronunciation;
- a search for anatomical formations by name that can be identified or added to the model is available.

By studying the musculoskeletal system, future doctors can consider the connection of bones and muscles separately or combine them, which is very helpful in mastering the topography of the above anatomical structures. In the section
on osteology there is a function of choosing individual bones with different colors on them all anatomical formations, their names in Latin, which allows students to spend less time searching in textbooks and faster to master and learn the topic of the lesson. The topography of some bones relative to others can be viewed in 3D, which is not possible on posters, models or preparations. For example, it is good to examine the ethmoid bone, the topography of which relative to neighboring bones cannot be seen on the preparation of the whole skull. In the section "Myology", this program allows students to examine all the superficial and deep layers of muscles, their points of origin and attachment to the bones, which is difficult to understand when looking at posters or textbook illustrations. Also, when studying the musculoskeletal system, these programs have the opportunity to consider separately the female and male reproductive systems [5]. From our own experience, future doctors report that using such computer programs makes the topic clear to them after one or two re-examinations, while self-study of textbooks takes much more time, but has no such effect.

When teaching the discipline "Medical and Biological Physics" at the Donetsk National Medical University, teachers of the Department of Fundamental Disciplines use an original series of laboratory works located in the virtual educational environment "System of laboratory works in Medical and Biological physics" (Lunhol, 2020; Sukhovirska, 2019).

Virtual laboratory work is an IT tool that, in the process of preparing students of a medical university, is an effective means of achieving learning goals. In particular, as an e-learning tool in biophysics lessons at Donets National Medical University, the authors created the Software product "Laboratory work "Study of the basics of hemodynamics using the device "Artificial circulation of blood SORIN C5", registered in the Ministry of Economy Development and Trade of Ukraine – Certificate of copyright registration № 81646, 09/21/2018 [16]. The work is performed within the theme "Hydrodynamics and hemodynamics". This software product is focused on the formation of research competencies in physics. As a result, students' knowledge and skills on this topic are better acquired by increasing the impact on their internal potential resources by involving the senses, in particular through video visualization of educational material (animation), sound effects and practical professional activities. In the course of experimental research the efficiency of methods of teaching medical and biological physics on the basis of information technologies was determined. Developed Software product «Sorin C5» (Sukhovirska, 2019) in the course of Medical and biological physics demonstrates the use of IT as a means of developing professional competencies of medical students, as an effective step in the use of modern interactive forms of information and as an important element of modern cognitive technologies.

When teaching a professional foreign language at a medical university, teachers use traditionally implemented education technologies and new modern digital technologies that have become an integral part of language teaching methods: Internet resources (text, audio and video information, e-mail, forums, chats); electronic lexicographic sources (network and local versions); multimedia textbooks and interactive books, as well as the latest IT, which are the driving force for effective learning (mobile applications, online quests, etc.); extracurricular activities that integrate the use of IT with natural, humanitarian and professional subjects; virtual laboratory work, augmented reality, interactive whiteboards, tables etc. In the process of teaching professional communication in a foreign language, different types of work with modern information technologies are used, which help to increase motivation and, consequently, self-study after class work.

Methodical recommendations for teachers "The use of information technology in the study of English in the specialty 221 "Dentistry" (on the example of the mobile application Kahoot!)" (Pyshnohub, 2021) – offer experience in the use of IT in the organization of the educational process of medical university, open new opportunities to improve learning, using the resources of mobile gadgets in all forms of education in the teaching of the discipline "Foreign language for professional purposes".

Expected result of using the Kahoot! mobile application by students:
- quick memorization of the proposed material;
- development of independence and motivation for self-improvement through the use of information technology;
- development of higher mental functions (thinking, memory, attention);
- manifestation of increased interest in the subject being studied.

The developed guidelines contain general information about the Kahoot! Application, intended for use by teachers in preparation for practical classes and independent work of students, as well as help to effectively use this resource in distance learning, which is quite relevant today.

A number of elective courses, such as European Computer Literacy Standard, are taught alongside medical informatics to provide sufficient IT knowledge in medical universities. The program of this discipline is developed in accordance with the curricula for higher education in the field of knowledge "HealthCare" specialty "Medicine", aimed at the formation and development of basic competencies in the use of modern software. The main tasks of studying the discipline are:
- formation and development of knowledge and skills necessary for the effective use of modern general and professional applications in educational, cognitive and professional activities;
- acquainting students with the role of new information technologies in professional activities, with the prospects for the development of computer technology and the importance of continuous professional self-improvement;
the ability to independently master various software tools, update and integrate the acquired knowledge.

Thus, on the example of the considered disciplines and teaching aids it can be argued that the integration of scientific knowledge and professional skills by means of modern digital technologies ensures the development of professionalism of the future doctor and creates favorable conditions for continuous self-development and self-improvement throughout practice. It is also obvious that the use of digital technologies in the system of professional training is not only important for future doctors, but also for any highly qualified specialists.

As a result of conducting a pedagogical experiment and after processing statistical data, comparing in control and experimental groups on the level of formation of the activity criterion of the professional position of future medical professionals, the following results presented in Table 1.

### Table 1

<table>
<thead>
<tr>
<th>Levels</th>
<th>Criterion indicators</th>
<th>Amount of students (%)</th>
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<tr>
<td>basic (reproductive)</td>
<td>insufficient understanding of self-assessment of one's activities, weak level of use of digital technologies for professional self-development</td>
<td>control group: 22,3, experimental group: 7,3</td>
</tr>
<tr>
<td>sufficient (heuristic)</td>
<td>ability to carry out self-analysis, self-control and self-assessment of results of activity on professional self-improvement with use of digital technologies;</td>
<td>control group: 66,1, experimental group: 70,6</td>
</tr>
<tr>
<td>creative</td>
<td>manifestation of strong-willed qualities, in particular persistence, discipline in the process of performing educational tasks and achieving the goals of professional self-improvement by means of digital technologies; formation of professionally important and necessary for the implementation of professional activities qualities</td>
<td>control group: 11,6, experimental group: 22,1</td>
</tr>
</tbody>
</table>

### Conclusions.
In the analysis of scientific works of Ukrainian and foreign scientists, psychologists and teachers, which reflect the main directions of professional self-improvement of future professionals, as well as outline the basic concepts of the problem, allowed to define the definition of "professional self-improvement". Professional self-improvement of the individual as a conscious, continuous, independent and purposeful human activity aimed at improving one's own traits and qualities in accordance with socially and personally significant values and ideals. For example, we consider self-improvement of future professionals as a continuous, systematic and conscious process, which consists in self-deepening of one's professional competence and development of professionally significant qualities and skills in accordance with social requirements, professional conditions and human moral qualities.

We have determined that, for example, the development of self-improvement and the development of skills for the professional and effective use of digital technologies by future physicians are closely interrelated and are a guarantee of the necessary changes in the Health Care system.

The research problem was considered based on the following definition: information technology is a set of methods and procedures by which the functions of collecting, transmitting, processing, storing and bringing information to the user in organizational and management systems using the selected set of technical means. In order to identify the focus on the development of professional self-improvement of future doctors using digital technologies, we reviewed seven curricula on medical informatics of various progressive institutions of higher medical education in Ukraine and analyzed the goals and results of the discipline "Medical Informatics". In general, on the example of detailed consideration of such disciplines as: "Medical Informatics", "Medical and Biological Physics", "Anatomy", "European Standard for Computer Literacy", "Foreign Language for Professional Purposes" it is proved that the integration of natural sciences knowledge and professional skills by means of modern IT ensures the development of professionalism of the future doctor and creates favorable conditions for continuous self-development and self-improvement throughout the practical activities. Obviously, accordingly, the statement about the extreme importance of using IT in the system of professional training of future doctors in order to develop their self-improvement.

### References:


DOI https://doi.org/10.30525/2592-8813-2022-2-22

МИЖРЕГІОНАЛЬНА КОНКУРЕНЦІЯ ЯК ШЛЯХ ПІДВИЩЕННЯ КОНКУРЕНТОСПРОМОЖНОСТІ РЕГІОНА

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Анотація. Процеси розширення впливу регіональних суб’єктів на світовому ринку призвели до суттєвих змін не тільки в підходах, методах та інструментах управління і регулювання міжнародних економічних відносин, але і самій регіональній економічній політиці, що здійснюється в країнах. Регіональна економічна політика вже не є інструментом супутньої внутрішньої економічної політики держави і перетворилась на інструмент управління, який в значній мірі відповідає за конкурентоспроможність країни. Цей новий статус обумовлений також тим фактом, що регіон в порівнянні з національною економікою володіє значно більш адаптивним потенціалом в плані зміни зовнішніх умов і меншою інерційністю в процесі розвитку. Це є логічним способом концентрації факторів виробництва в порівняно короткий період часу, створюючи необхідні умови для впливу масштабів виробництва, агломерування, кластерізації на що в значній мірі впливає конкурентоспроможність території і діючих в ній економічних суб’єктів.

Ключові слова: конкурентоспроможність, міжрегіональна конкуренція, управління конкурентоспроможністю регіону, конкурентні переваги, економічний потенціал регіону.