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**ASSESSING THE SATISFACTION OF LEARNING WITH USE OF
SIMULATION IN MEDICAL UNIVERSITY**

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bars.mi@mail.ru**Abstract**

The article defines the necessity to change the form of medical training according to the requirements of Federal State Educational Standards of Higher Education and the conditions of digitalization in society and the health care system. Information technology that allows solving topical problems in education due to the current circumstances is analyzed. The perspective and lack of research on issues of information technology usage within the system of higher medical education are emphasized. A variety of organizational and technical capabilities has been determined, their achievement being possible due to the increase in the intellectual activity of university lecturers and students based on using information technology. The experience of medical specialties training in the simulation centre of Saratov State Medical University named after V.I. Razumovsky is observed. The results of subjective assessment of student satisfaction are presented. The conclusions on the advantages of training in a simulation centre aligned with the general idea of information technology usage in the process of medical training are made. The article emphasizes the importance of the information literacy of a physician, as well as their ability to work in the context of the healthcare system digitalization. The need for changing the direction of physicians' training, adapting forms and methods of education to the modern requirements is determined. The pedagogical conditions for the functioning of simulation centers with hardware and software are noted, among which is the consideration of the simulator's capabilities to simulate practically significant clinical situations, preparatory organizational work, innovative simulation technology.

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1. Introduction

Time makes demands on the quality of medical education: federal state educational standards of higher education have changed. The process of the reformation of the health care system is being performed. All this implies the development of competencies, having mastered which a medical specialist will be capable of keeping up to date. Physicians should possess not only information literacy but also a willingness to work in the new conditions of digitalization of the society in general and the health care system in particular. Hence, there is a need to change the educational direction of training future physicians, to adapt the forms and methods of teaching to solve pedagogical problems by constantly arising life challenges.

2. Problem Statement

Modern medical education should provide future specialists with a set of theoretical knowledge and practical skills to solve professional problems in the current context; be in line with all the latest medical technologies; to develop communication and psychological literacy, contributing to the solution of the assigned tasks. The achievement of the objectives is possible with the holistic training of health care specialists, based on sustainable motivation to obtain special knowledge, profile training, and the development of intellectual and personal capabilities of students. However, the higher medical school, like the entire educational community, is forced to fulfil its tasks in the face of the spread of the coronavirus. The development of a complex of information technologies allowing addressing new educational challenges in the current circumstances is a requirement for the educational process at a medical university.

3. Research Questions

In the scientific and scientific-methodical literature devoted to the issues of the informatization of higher professional education – works of A.L. Denisova, A.N. Tikhonov, N.Sh. Kozlova, I.V. Maruseva, I.V. Robert, E.Yu. Semenova and others – such synonymous expressions as "telecommunication and computer technology in education" (Sertakova, 2010, p. 300), "digital technology for education process" (Kozlova, 2019, p. 85), "e-learning technologies" (Karas, 2020, p. 143), etc. are often encountered. This indicates that terminology in this area of research and concepts corresponding to it have not yet been established (Karas, 2020).

Educational information technology (EIT) is defined as a set of training programs of various types: from the simple programs providing knowledge monitoring to training systems based on artificial intelligence. Sholokhovich (1998) proposes to define IT from the point of view of its content as a branch of didactics exploring a systematically and consciously organized process of teaching and assimilation of knowledge, in which the means of informatization of education are used.

The phased implementation of information technology (IT) in modern society provides for the informatization of higher education, which contains an integral system of methods, software, and technical means, as well as the corresponding learning processes, including the collection, processing,

accumulation, distribution and the use of information resources for high-quality training of students (Couturier et al., 2020; Goldshtein et al., 2020). The task of informatization is to intensify the intellectual activity of teachers and students based on the widespread use of new information technology (computer, telecommunication), which will make it possible to implement the following organizational and technical capabilities:

- to optimize the cognitive activity of students during training;
- to involve all types of sensory perception in a multimedia context and provide their intelligence with new tools;
- to form an individual learning path for students;
- to attract students to active training;
- make wide use of the capabilities of computers, which allow individualizing the learning process and taking advantage of new cognitive means;
- to increase the intensity of the educational process through the interactive communication of students and teachers with a computer.

The main advantage of IT is its capacity to create an effective multisensory interactive learning environment with great potential for use by teachers and students (Logvinov et al., 2019). Compared to well-known technical teaching aids, IT is aimed not only at providing students with the knowledge, but also at developing the intellectual abilities of students, their creative activity, the independent acquisition of knowledge, and interaction with various sources of information (Matveeva & Kuligin, 2021)

We are convinced that an approach by which the computer is not opposed to a teacher, but is a means of supporting the teacher's activities, should be considered the most useful (Barsukova et al., 2020).

The use of information and communication technology (ICT) in the educational process of medical educational institutions is an urgent problem of modern professional education. Today it is necessary that every teacher can prepare and conduct a training session using IT, and the student is ready to be involved in such an educational process.

The specialists in the field of teaching at medical universities face a difficult task – to prepare medical workers for independent practical work with patients, both planned and emergency, and to form and develop clinical thinking. Despite the widespread conservatism in the use of educational information technology, the traditional form of education in medicine in the Russian Federation, knowledge – control – assessment is gradually being replaced by innovative methods of education, the essence of which is the development of the direct ability to use the theoretical knowledge gained in practice, to interpret the knowledge gained from related disciplines, adequately perceive new information and consolidate the knowledge gained in solving a complex clinical case presented by simulation equipment. With great success in medical education, active imitation teaching methods are used. The essence of these is to create training conditions as close as possible to professional activity, modelling cases. It fully applies to the formation and development of soft skills in students but is not included in the research objectives in this work.

Simulation-based education is one of the youngest branches of medical education in the Russian Federation. The development of simulation education in the medical field begins in the 70s of the

XX century. Today, the training of students of medical universities in practice is carried out using simulation technologies that contribute to the development of the mental activity, intellectual abilities of students, a creative and scientific approach in solving a practical problem, and an independent search for a solution to the problem (Tereshchuk et al., 2021).

It is important to create pedagogical conditions for the development of the fundamentality and practical orientation of educational programs, as well as for the formation of a continuing education system, a system of advanced training and retraining of medical workers (Fedonnikov, 2018).

Based on the studied and well-researched features of the treatment process, simulation centres are being created, the purpose of which is to involve the combined efforts of educational and medical organizations. Simulation centres are distributed according to the complexity of the technical equipment and software, as well as the characteristics of using various simulation methods on special dummies. To organize the educational process, it is necessary to create pedagogical conditions for learning, for example, it is necessary to take into account the abilities of a simulator to model those clinical cases that occur in practice. The effectiveness of training depends on the preparatory organizational work carried out in the simulation centre, on the applied innovative technologies of digital simulation and simulation on computerized dummies, as well as on the capabilities of automated workstations.

4. Purpose of the Study

The purpose of this study is to determine the subjective assessment of the satisfaction with the quality of simulation training in clinical specialties among students of Saratov State Medical University.

A simulation centre operates at Saratov State Medical University (Figure 1).



Figure 1. Equipment of the simulation laboratory of the Saratov State Medical University

The simulation centre is equipped with high-tech facilities and is a valuable educational resource. The effectiveness of medical education is achieved by a more complete use of the centre's capabilities associated with improving the quality of simulation and the effectiveness of feedback. An important component for the functioning of this centre is the equipment of methodical rooms, as well as the equipment of classrooms, in which training takes place through the use of simulation equipment. Through the introduction of innovative technologies using computerized dummies, digital simulation, and

modelling tools, as well as automated workstations, it is possible to distinguish the classification types of training based on simulation technologies:

- visual level – for a visual demonstration of the technique of manipulation (posters, anatomical models, diagrams, simple computer programs);
- tactile level – for the development of manipulation skills (suturing, intubation, etc.);
- reactive level – for conducting independent training based on the use of special manipulation exercises or a corresponding set of manipulations, while the built-in controller signals the correctness and accuracy of the manipulation exercises;
- automated level – for the development of students' ability to work in a team with the help of more experienced mentors, and their joint activity allows students to learn to consider themselves as part of a team in the process of performing certain actions. In this case, the simulators used have rather complex programmable reactions to external influences, close to real ones, and, in addition, have more accurate quality control of the manipulation actions carried out using a computer and video systems;
- the hardware level is about the implementation of modelling the work of the entire medical unit, for example, the intensive care unit, operating room, etc., and it is possible to use medical equipment or its imitation;
- the interactive level is designed to perform a rather complex interaction of students, a robotic simulator of a patient and medical equipment, and it is possible to change the indicators of vital functions in the simulator as a reaction to external influences;
- the integrated level compares changes in the values of vital signs and diagnostic data obtained by the simulation system during a demonstration. In this case, the system "robot – patient simulator – virtual simulator – medical equipment" functions (Ignatiev et al., 2019, p. 3).

5. Research Methods

The results of the social survey of first-year residents studying Traumatology, Obstetrics, Gynecology, Surgery, Oncology, Dentistry, etc. were used for determining the subjective level of satisfaction with the learning process in the simulation centre of SSMU named after V.I. Razumovsky.

The questionnaire consists of 25 items related to various fields of study. Here are descriptive statistics of assessments of satisfaction with the quality of training of residents.

6. Findings

The majority of respondents (98 %) consider training in a simulation centre to be imperative. 79% are confident that the only possible way of mastering professional skills encompasses the active use of information and communication training systems, which refers to training in a simulation centre. According to the respondents, such a training form makes it possible to relieve the stress of the first surgical experience and practice professional skills the required number of times. In our opinion, this is consistent with the general idea of using information technology in the process of training physicians.

It is logical to assume that the student's level of satisfaction will be directly dependent on the students' motivation for acquiring knowledge and mastering the profession (Kloktunova et al., 2021).

7. Conclusion

Of course, informational innovations cannot fully replace patients and provide a full-fledged clinical experience. Thus, due to learning using simulation complexes, several educational objectives can be achieved as efficiently as possible. Combined with theoretical training and clinical practice, it is designed to solve the following tasks: to remove the fear of the patient and forthcoming manipulations, to allow mastering the craft (each student needs a different number of repetitions of actions), the ability to practice skills in not widespread, complex clinical situations. In addition, the results obtained in the process of simulation training are available to a large number of participants in the pedagogical process: practitioners, teachers, students of other groups, and students of advanced training. All these give unlimited possibilities for the use of materials.

Thus, medical institutions with simulation complexes can help students improve and market their skills.

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