

## THEORETICAL FOUNDATIONS OF USING INTERACTIVE SIMULATORS TO DEVELOP PRACTICAL SKILLS IN MEDICAL EDUCATION STUDENTS

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**Abstract:** This article highlights the technologies for developing the practical skills of medical education students through the use of interactive simulators in teaching internal medicine. The study examines the application of simulation technologies in clinical training, their integration into the educational process, and their impact on the effectiveness of education.

**Keywords:** medical education, internal medicine, interactive simulator, practical skill, clinical thinking, innovative technologies.

In recent years, special attention has been paid to the development and reinforcement of students' practical skills through the introduction of modern pedagogical technologies in the medical education system. In particular, unlike traditional methods, the use of interactive simulators in teaching internal medicine allows for the organization of training sessions that closely replicate real clinical conditions—enabling modeling of clinical cases, making diagnostic decisions, communicating with patients, and performing necessary procedures.

With the help of interactive simulators, students can apply theoretical knowledge in practice, develop clinical reasoning, and build independent decision-making skills. This process not only fosters the formation of professional competencies but also provides the opportunity to learn from mistakes through repeated training in a safe environment.

The development of modern medicine worldwide and the increasing complexity of diagnostic and treatment methods require students not only to possess theoretical knowledge but also to acquire practical skills that enable them to make correct decisions and act independently in specific clinical situations.

In traditional education systems, the development of students' practical skills was carried out through direct involvement with patients. However, this approach had limitations due to the risk of student errors and concerns about patient safety. Therefore, the search for new pedagogical approaches to effectively develop students' practical competencies in medical education has become an urgent issue.

Currently, the widespread use of interactive simulators in the medical education process in our country—especially in teaching internal medicine—offers opportunities to integrate students' theoretical knowledge with practical skills and develop their ability to analyze complex clinical situations. This, in turn, plays an important role in reducing medical errors, improving students' practical competencies, and ensuring their rapid adaptation to clinical practice.

It can be stated that this research is one of the first independent studies to scientifically analyze the development of practical skills in medical students through the use of interactive simulators. While certain aspects of this topic have been discussed in scientific works, studies, and articles by both local and international scholars, the available data is not sufficient to draw comprehensive conclusions about students' practical skills developed through interactive simulators in medical education.

Certain aspects of this direction have also been analyzed in the scientific and pedagogical works of local scholars such as M. Kadirova, N. Komilov, I. Iminakhunova, Sh. Polatova, F. Muydinov, Sh. Ahmadaliyev, B. Haydarova, Q. M. Maxkamova, U. I. Inoyatov, Sh. T. To'xtasinov, A. A. Akhmedov, O'. Kh. Khaitov, N. Kh. Shomurodov, M. Kh. Akhmedova, R. S. Khasanov, B. B. G'ofurov, D. Kh. Khodjayev, and Z. I. Israilova.

However, these studies have mostly focused on particular aspects of developing students' practical skills and have not specifically analyzed the teaching of internal medicine in medical education. In this regard, the present dissertation provides a foundational basis for future scientific research in our country on the development of medical students' practical skills through the use of interactive simulators.

The scientific-pedagogical significance of internal medicine and the importance of preparing medical students as future professionals with strong practical competencies have been deeply studied by researchers from the Commonwealth of Independent States (CIS), including A.G. Chuchalin, Y.N. Belenkov, N.A. Mukhin, Ye.I. Gusev, I.A. Kassirskiy, M.V. Chernorutskiy, V.S. Moiseyev, V.G. Kukes, and I.P. Zamotaev [2].

On issues related to this topic, prominent international scholars such as R.M. Harden, D.I. Newble, R.L. Kneebone, J. Ker, J. McGaghie, D.A. Cook, G.R. Norman, R.A. Schmidt, L.W.T. Schuwirth, T. Dornan, and S.J. Hamstra have conducted extensive research focusing on the use of interactive simulations in medical education, the development of clinical skills, the orientation of students toward practical competencies, and the creation of effective pedagogical technologies. These works are widely recognized in global practice and serve as an important scientific and methodological foundation for modern medical pedagogy [3].

An analysis of the didactic potential of using interactive simulators in medical education shows that the application of this pedagogical technology effectively contributes to the formation of students' professional competencies. Compared to traditional methods, simulation-based education offers several advantages, the most significant of which is the opportunity to safely prepare students for real clinical practice. Mazkur texnologiyalarning yana bir ustunligi, talabalar nazariy bilimlarni bevosita amaliy faoliyatda qo'llash orqali yanada mustahkam va chuqur o'zlashtirishga erishadilar. Bunda o'quv jarayonining sifat ko'rsatkichlari, ayniqsa, amaliy ko'nikmalar, klinik fikrlash va tanqidiy tahlil qilish qobiliyatlarini rivojlantirish samaradorligi oshadi.

Through the didactic capabilities of interactive simulators, students are given the opportunity to repeatedly practice clinical cases of varying complexity. As a result, they develop the ability to avoid potential errors in real-life situations and make appropriate decisions based on specific clinical scenarios. Additionally, simulators provide an automatic assessment system that allows for accurate and impartial evaluation of students' actions, thereby contributing to the objectivity of the assessment process [4].

A theoretical and methodological analysis of the role and significance of interactive simulators in medical education demonstrates that these technologies ensure the effective integration of theory and practice. Simulators provide students with the opportunity to develop practical skills in settings that closely mimic real-world clinical environments. This enables students to apply their theoretical knowledge in practical contexts, significantly enhancing their learning outcomes.

Another important aspect of interactive simulators is their contribution to creating a safe learning environment. When performing clinical procedures in simulated conditions, students are not afraid of making mistakes, which allows for more effective development of practical experience. Errors made by students are recorded and approached reflectively, enabling them to understand their mistakes and work toward reducing such errors in the future [5].

Simulators also serve as an essential tool for developing students' independent decision-making and clinical reasoning skills. During simulation sessions, students have the opportunity to independently assess a patient's condition, make a diagnosis, and decide on appropriate treatment. Through this process, they also develop a sense of personal responsibility [6].

One of the didactic advantages of interactive simulators is the availability of automated assessment systems, which enhance objectivity and transparency in the evaluation process. Such systems allow for the development of individualized learning trajectories for students and enable educators to allocate more time to effective interaction with them.

In addition, the visual and practical features of simulators increase students' interest in the learning process and help them absorb knowledge more effectively. Through interactive and group-based sessions, students develop teamwork and communication skills, which are essential for their future professional practice.

The results of the research show that the use of interactive simulators in teaching internal medicine is a significant factor in improving the quality of medical education. Simulation technologies serve as an effective tool for developing students' practical skills, fostering clinical reasoning, enhancing independent decision-making, and improving their ability to communicate effectively with patients.

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