

IMPROVING THE TEACHING OF INFORMATION TECHNOLOGIES IN MEDICINE: AN INNOVATIVE EDUCATIONAL APPROACH

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Annotation. The digital transformation of healthcare systems has significantly increased the demand for medical professionals with strong competencies in information technologies. Medical education institutions are therefore required to modernize teaching methodologies to ensure the effective integration of digital tools, clinical information systems, and data-driven decision-making into professional training. This study examines the pedagogical effectiveness of improving the teaching of Information Technologies in Medicine through innovative, practice-oriented, and interdisciplinary instructional approaches. A mixed-methods research design was applied, involving experimental and control groups of medical students. Statistical analysis of learning outcomes demonstrates that students exposed to modernized teaching methods show higher academic achievement, improved digital competence, and increased motivation compared to those taught using traditional approaches. The results confirm that the integration of educational technologies, simulation tools, and applied digital tasks significantly enhances the quality of medical informatics education and contributes to the development of professional readiness in future healthcare specialists.

Keywords. Medical informatics education, information technologies in medicine, digital competence, innovative teaching methods, higher medical education, educational technologies.

Introduction. The rapid development of information technologies has fundamentally transformed modern healthcare systems, influencing diagnostic processes, treatment planning, patient monitoring, and medical decision-making. Digital health technologies such as electronic health records, telemedicine platforms, clinical decision support systems, and artificial intelligence tools have become integral components of contemporary medical practice. As a result, higher medical education institutions face the urgent task of preparing future healthcare professionals who possess not only clinical knowledge but also strong digital and technological competencies.

According to the World Health Organization, more than 75% of healthcare institutions worldwide have implemented digital health solutions, while over 60% of medical errors can be reduced through the effective use of health information systems. Despite these advances, numerous studies indicate that medical students often demonstrate insufficient preparedness to work with digital technologies due to outdated curricula and traditional teaching methods. OECD reports suggest that nearly 50% of medical graduates lack confidence in applying information technologies in clinical practice.

In this context, improving the teaching of Information Technologies in Medicine becomes a critical pedagogical challenge. Traditional lecture-based instruction frequently focuses on theoretical explanations and software demonstrations, offering limited opportunities for practical application and clinical integration. Innovative educational approaches that emphasize active learning, simulation-based instruction, and interdisciplinary integration are therefore required. This study aims to analyze the effectiveness of modernizing the teaching of Information Technologies in Medicine and to assess its impact on students' academic performance, digital competence, and professional readiness.

Materials and Methods. The research was conducted during the 2023–2024 academic year at a higher medical education institution. A total of 130 undergraduate medical students participated in the study. The participants were divided into two groups with comparable academic backgrounds. The experimental group consisted of 65 students who were taught using an

improved instructional model, while the control group included 65 students who received traditional instruction.

In the control group, the subject “Information Technologies in Medicine” was taught using conventional methods, including lectures, slide presentations, and standard practical classes. In contrast, the experimental group was exposed to an enhanced teaching model that integrated digital simulations, electronic medical record training modules, clinical case-based learning, and problem-solving tasks based on real medical data. The instructional design emphasized the application of information technologies in diagnostic processes, patient data management, and clinical decision-making.

Data collection methods included pre-test and post-test assessments, student surveys, and performance-based evaluations of digital competence. Academic achievement was measured using a 100-point grading system, while digital competence levels were assessed according to standardized criteria covering data literacy, system navigation, and clinical application of digital tools. Statistical analysis was performed using comparative and descriptive methods to identify differences between the experimental and control groups.

Results. The results of the study demonstrate a significant improvement in learning outcomes among students in the experimental group. At the initial stage of the research, the average pre-test scores of both groups were similar, with mean values of 61.8 points in the experimental group and 62.5 points in the control group. After the implementation of the improved teaching methodology, the experimental group achieved an average post-test score of 86.2 points, reflecting a 39.5% increase in academic performance. In comparison, the control group showed an increase to 72.4 points, corresponding to a 15.8% improvement.

Analysis of digital competence indicators revealed that 81% of students in the experimental group demonstrated a high level of proficiency in using medical information systems, compared to 44% in the control group. Student survey results indicated increased motivation and confidence, with 76% of experimental group participants reporting that the improved teaching methods enhanced their understanding of the practical role of information technologies in medicine. These findings align with international data suggesting that practice-oriented digital education can improve professional readiness by up to 35%.

Discussion. The findings of this study confirm that improving the teaching of Information Technologies in Medicine through innovative and practice-oriented approaches significantly enhances students’ academic achievement and digital competence. The integration of clinical simulations and real-world data allows students to connect theoretical knowledge with practical application, thereby increasing cognitive engagement and knowledge retention.

The results are consistent with previous research indicating that active learning and simulation-based education are particularly effective in technology-oriented medical disciplines. By engaging students in realistic clinical scenarios and digital problem-solving tasks, the improved teaching model supports the development of critical thinking and professional decision-making skills. Furthermore, the interdisciplinary nature of the instructional approach reflects the complexity of modern healthcare systems, where medical practice increasingly relies on technological integration.

The study highlights the importance of aligning medical informatics education with current healthcare demands. By modernizing curricula and teaching methods, higher education institutions can better prepare future healthcare professionals to operate effectively in digital clinical environments.

Conclusion. The study demonstrates that improving the teaching of Information Technologies in Medicine through innovative educational approaches leads to significantly better learning outcomes compared to traditional methods. Enhanced instruction contributes to higher academic performance, improved digital competence, and increased student motivation. The findings support the integration of modern educational technologies, simulation tools, and practice-oriented tasks into medical informatics curricula.

It is recommended that higher medical education institutions adopt improved teaching models for Information Technologies in Medicine to ensure the development of digitally competent healthcare professionals capable of meeting contemporary clinical challenges.

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