

METHODOLOGY FOR DEVELOPING CLINICAL
REASONING COMPETENCE IN FUTURE PHYSICIANS THROUGH
DIGITAL TECHNOLOGIES

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Abstract: *This thesis explores the methodology for developing clinical reasoning competence in future physicians through digital technologies. The study is based on the premise that the digital transformation of medical education creates new opportunities for improving the quality of professional training and strengthening students' readiness for clinical practice. Clinical reasoning is considered one of the key components of professional competence, as it enables future doctors to collect patient data, interpret symptoms, analyze diagnostic findings, formulate differential diagnoses, and make evidence-based decisions. The thesis substantiates that digital technologies such as virtual simulations, clinical decision-support tools, interactive case platforms, learning management systems, and adaptive assessment instruments can significantly enhance the development of clinical reasoning competence. The proposed methodological approach integrates competency-based, practice-oriented, learner-centered, and reflective principles into the teaching process. The findings indicate that the systematic use of digital technologies contributes to the formation of independent thinking, diagnostic accuracy, and professional decision-making skills in future physicians.*

Keywords: *future physicians, clinical reasoning competence, digital technologies, medical education, competency-based learning, simulation, professional training.*

Introduction.

Modern medical education increasingly requires the preparation of future physicians who are capable of making accurate and timely clinical decisions in complex professional situations. In this regard, clinical reasoning competence has become one of the central outcomes of medical training. It reflects the ability of students to connect theoretical knowledge with practical interpretation, evaluate clinical signs, identify possible diagnoses, and choose appropriate management strategies. At the same time, the rapid development of digital technologies has changed the educational environment and created new methodological possibilities for teaching clinical disciplines. Digital platforms, simulation systems, intelligent educational tools, and interactive diagnostic tasks make it possible to model realistic clinical situations and organize active, student-centered learning. However, the methodological use of these technologies for the purposeful development of clinical reasoning competence still requires further justification. Therefore, the aim of this thesis is to substantiate a methodology for developing clinical reasoning competence in future physicians through digital technologies.

Materials and methods. The study was conducted on the basis of theoretical analysis and pedagogical modeling. The methodological foundation included competency-based, integrative, practice-oriented, learner-centered, and reflective approaches. Scientific and pedagogical literature on medical education, digital learning, and clinical competence development was analyzed to identify the conceptual basis of the proposed methodology. Comparative

analysis was used to examine the educational potential of traditional and digital teaching methods in the formation of clinical reasoning. Modeling was applied to structure the main components of the methodology, including objectives, content, instructional tools, stages of learning activity, and assessment mechanisms. Particular attention was paid to the use of virtual patient cases, simulation-based scenarios, interactive diagnostic tasks, digital feedback systems, and reflective e-learning activities as methodological means for strengthening clinical reasoning.

Results. The study resulted in the development of a methodology aimed at the systematic formation of clinical reasoning competence in future physicians through digital technologies. The proposed methodology includes several interconnected components. The target component is focused on the development of analytical thinking, diagnostic interpretation, differential reasoning, evidence-based judgment, and reflective self-assessment. The content component integrates medical knowledge with clinically relevant digital learning materials, including virtual cases, symptom analysis tasks, ECG and laboratory data interpretation exercises, and structured diagnostic algorithms. The procedural component is based on interactive forms of learning, such as simulation training, problem-based digital cases, collaborative discussion in online environments, and guided decision-making activities. The evaluative component includes formative and competency-oriented assessment tools that allow teachers to monitor students' reasoning processes, accuracy of conclusions, speed of analysis, and ability to justify clinical decisions. As a result, digital technologies function not only as supportive tools but also as methodological instruments for organizing meaningful clinical learning.

Discussion. The findings demonstrate that the effectiveness of developing clinical reasoning competence depends not merely on access to digital tools, but on their pedagogically grounded integration into the educational process. The methodology proposed in this thesis differs from technology-centered approaches by emphasizing the didactic and competency-oriented value of digital technologies. In this model, digital tools are used to create authentic clinical contexts, increase students' cognitive engagement, and support repeated practice in diagnostic reasoning. This is especially important in medical education, where future physicians must learn to operate in uncertain and dynamic situations. The use of digital simulations and interactive case environments also promotes students' motivation, independence, and reflective thinking. Furthermore, continuous feedback and adaptive assessment make it possible to identify gaps in reasoning and guide students toward more accurate clinical judgments. Thus, digital technologies become a means of transforming the logic of instruction from information transmission to active competence formation.

Conclusion.

The methodology for developing clinical reasoning competence in future physicians through digital technologies should be based on competency-oriented, practice-based, integrative, and reflective principles. The purposeful inclusion of virtual simulations, interactive clinical cases, diagnostic tasks, and digital assessment tools enhances the quality of medical training and supports the formation of independent clinical thinking. The proposed methodology provides favorable conditions for improving diagnostic reasoning, professional judgment, and decision-making skills in future physicians. Therefore, its

implementation can serve as an important pedagogical direction for modernizing medical education in a digitalized learning environment.

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