

**MODEL FOR DEVELOPING PRACTICAL SKILLS IN CLINICAL LABORATORY
DIAGNOSTICS AMONG STUDENTS OF MEDICAL HIGHER EDUCATION INSTITUTIONS**

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Annotation: *This article examines the development and advancement of practical skills among medical university students through the application of modern pedagogical technologies in the teaching of Clinical Laboratory Diagnostics. It provides a scientific analysis of the distinctive characteristics of the educational process in this discipline, the methodological approaches to organizing practical sessions, and the significance of innovative technologies and simulation-based training in enhancing the overall effectiveness of learning.*

Keywords: *clinical laboratory diagnostics, practical skills, medical education, simulation technology, competence, laboratory practice, innovative method.*

Based on the results of our research, improving the methodological capabilities of medical higher education students in teaching the discipline of Clinical Laboratory Diagnostics through digital technologies should be considered one of the key aspects of enhancing the effectiveness of the learning process. This is because the use of digital technologies in teaching Clinical Laboratory Diagnostics allows for the efficient application of educational methods and interactive technologies during practical sessions, thereby achieving the intended learning outcomes and promoting the development of both practical and cognitive competencies, while also increasing their scientific and practical significance.

In this context, the development of practical training through the use of effective methods and technologies beyond the classroom plays an important role in improving methodological capabilities in teaching Clinical Laboratory Diagnostics to medical higher education students. It is well known that the pedagogical and psychological aspects of improving methodological opportunities through digital technologies have also been observed in the research of E.F. Zeer [3]. For example, the scholar notes that qualities such as self-organization, independence, self-management, reflection, and the ability to determine one's own path are crucial for developing the psychological mechanisms necessary for the practical application of cognitive competencies. These qualities enable the assessment of various goal-oriented voluntary actions, support self-regulation, and constitute internal intellectual activity essential for effective self-management.

In order to acquire competencies in education, it is important to focus on independent work and prioritize the mastery of acquired abilities. These aspects are also

highlighted in the research of John Raven [98], who emphasizes that in order to develop practical and cognitive competencies, individuals should be guided to observe themselves, engage in self-directed educational activities, and develop strategies for self-learning and self-improvement.

Thus, in the scholar's research, special emphasis is placed on developing students' self-regulation during the process of enhancing the methodological capabilities of medical higher education students in teaching Clinical Laboratory Diagnostics through digital technologies. This development is considered both in terms of individual growth of the learner's self-management of educational activity and the advancement of practical knowledge.

L. Osipova [4] defines the system of self-management as "a set of components including mutual interaction: identifying the purpose of activity, analyzing and clarifying essential conditions, selecting the optimal methods and sequence of actions, evaluating results when necessary, and making adjustments—essentially, a conscious process by which a person sets goals and strives to achieve them."

Y.N. Kulyutkin [2], in his research on the application of cognitive competencies in the educational process, describes self-management as "a systematic process of internal mental activity in which a person initiates, organizes, maintains, and regulates various types of voluntary activity aimed at achieving a chosen goal." Structurally, the fully functional process of self-management consists of the following components: the purpose of the activity as accepted by the subject, the subjective model of essential conditions, the program of actions to be executed, a system of subjective criteria for achieving goals, monitoring and evaluating actual results, and decisions to adjust the self-management system.

It is possible to distinguish between two types of self-management activity and self-regulation of the individual. Both types share the same structure but differ in content. Independent management of activity is directed at altering the objective world, while self-management of the individual's self is directed at changing relationships with others, oneself, and one's own types of activity. These two types of independent management complement each other. In managing activity independently, organizing actions predominates, whereas in self-regulation, organizing relationships is paramount. As Kulyutkin notes, "any form of independent management can only be realized in a specific action, decision-making, and its implementation" [3].

Thus, in improving the methodological capabilities of medical higher education students in teaching Radiology through digital technologies, the following pedagogical opportunities and aspects of conceptual development can be identified:

1. Goal-setting and achievement – the ability to understand the proposed objectives, develop them independently, maintain focus on the goals until they are achieved, and prevent others from taking over their fulfillment.

2. Modeling – the ability to identify key conditions for achieving goals, form a conceptual understanding of the object of need based on one's own experience, and locate appropriate objects in the surrounding environment.

3. Programming – the ability to select methods for modifying given conditions according to the activity's requirements, choose appropriate tools to implement these changes, and determine the sequence of individual actions.

4. Evaluation – the ability to assess both final and intermediate results of one's own actions, ensuring that subjective criteria for evaluation do not significantly differ from established standards.

5. Correction – the ability to conceptualize potential adjustments when outcomes do not meet established requirements.

6. Relationships – having an understanding of the rules governing interactions with other people and work objects.

Therefore, it can be concluded that the experience of improving methodological capabilities in teaching Radiology through digital technologies provides a practical framework for fostering these skills. Independent management of learning activity refers to a special type of self-directed regulation carried out by students as active subjects of their own educational process. As a result, students recognize their responsibilities as learning participants and structure the independent learning process according to the goals.

Research on independent management of learning activity shows that its components are similar in structure to the components of other types of activity. Scholars conclude that this approach promotes the concept of mental self-regulation of voluntary activity. Scientific studies also indicate that the operational aspects of independent management include key stages: goal planning, condition modeling, programming, monitoring results, and implementing corrections. Each of these stages is carried out through corresponding management procedures.

In pedagogical research, scholars have expressed various scientific perspectives on the concepts of model and modeling in education. The notion of a model is applied across all areas of the educational system and possesses multiple dimensions. Many researchers have dedicated studies specifically to exploring the concept of a model. In scientific research, the process of modeling involves developing and justifying system models of phenomena and objects. In particular, in the educational process, a model is defined as an artificially constructed object—such as a scheme, physical structure, symbolic form, or formula—that represents a simplified form of the structure, properties, relationships, and interconnections of the elements of the object under study.

V. Vyazovova [5] notes in her research on educational models that modeling can be understood as “a process in which simple changes gradually lead to more complex transformations, resulting in qualitative changes through the gradual accumulation of quantitative modifications”. According to the scholar, educational models should meet

certain criteria, and their development can be considered based on these criteria. The modern educational system is considered an open system, in which development can be guided by specific standards. Vyazovova highlights the following aspects of model development:

1. Increasing the complexity of the defined structure of the research subject;
2. Differentiation of its structures and functions;
3. Organizing interactions and relationships among people.

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