



PEDAGOGICAL TECHNOLOGIES TO IMPROVE THE EFFECTIVENESS OF LABORATORY CLASSES IN MEDICAL EDUCATION

Muxammadova Gulbaxor Qobiljon qizi

Assistant at the Community and Labor Hygiene department

Faculty of Preventive Medicine and Public Health

Fergana Medical Institute of Public Health Uzbekistan

muxammadovaguli0392@gmail.com

Abstract

The motivational function of laboratory-instrumental methods in medical education consists in stimulating students' knowledge and professional activity. Engaging students in active practical activities increases their interest in the learning process, forms stable learning motivation, and strengthens the internal need to acquire new knowledge.

Keywords: Laboratory-instrumental, equipment, diagnostics, assimilation, research activity, clinical diagnostics, interactive

Introduction

Currently, modern medical education is rapidly developing towards combining theoretical knowledge with practice. Laboratory and instrumental teaching methods play an important role in shaping the professional competencies of future doctors, helping to develop clinical thinking, diagnostic skills, and a research approach.

The use of laboratory-instrumental methods in medical education requires creating a flexible and rich didactic environment where students learn not only theoretical foundations but also practical skills in measuring, analyzing, designing, and interpreting data. The effectiveness of these methods largely depends on the diversity and quality of accompanying didactic materials.



Laboratory-instrumental methods are a set of pedagogical techniques and procedures aimed at developing students' abilities to:

- diagnose and interpret hygiene and clinical indicators;
- analyze and solve problems encountered in professional activities;
- use equipment and devices in educational and practical activities.

From the perspective of modern pedagogy, laboratory-instrumental methods serve as active teaching tools that:

- increase students' interest in medical knowledge;
- enable independent and research activities;
- facilitate continuous feedback between teacher and student;
- help develop critical thinking and skills to analyze and synthesize information.

These modern methods form the basis of an activity-based approach grounded in contemporary medical training. During laboratory work, students not only observe and memorize facts but also actively develop knowledge based on specific practical actions modeling their future professional environment.

According to V. P. Bepalko, didactic material should ensure a clear structure of learning activities, a high level of visualization and feedback, and contribute to students' independence. Using various materials helps implement principles of clarity, accessibility, practical orientation, and interactivity — particularly relevant in training future doctors.

Literature Review

Didactic conditions in pedagogy are classified by various criteria: functions, degree of control, scope of the learning process, implementing subjects, etc. In practice-oriented methods — including laboratory and instrumental methods — classification by content-functional criteria (I. Ya. Lerner, V. V. Kraevsky, V. P. Bepalko, M. V. Klarin, A. V. Khutorskaya, I. A. Zimnaya) is considered effective.

According to L. I. Lyubimova, “the most important condition for the effectiveness of laboratory classes is their problematic nature — posing learning tasks that require students to independently search for solutions.”

Laboratory activities also enable implementation of contextual and modular teaching technologies, personalization of learning, and development of teamwork



skills. Thus, laboratory and instrumental methods are key tools in a teacher's arsenal, ensuring knowledge is transformed into stable professional skills.

E. S. Prokhorova noted that laboratory activities help assimilate practice-oriented methods, leading to stable assimilation of medical knowledge and development of independent clinical diagnostic skills.

Laboratory-instrumental methods foster implementation of principles of clarity, accessibility, and scientificity, strengthen interdisciplinary connections, and promote a comprehensive approach to solving professional problems. As N. D. Nikolaeva stated, "the educational function of practice-oriented education lies in turning information into knowledge, and knowledge into action."

Research Methodology

- Modern medical education requires reconsidering traditional approaches and focusing on forming professional competencies that meet healthcare practice needs. In the context of digital transformation, accelerated educational processes, and professional standards, it is crucial to implement teaching methods that strengthen the link between theoretical knowledge and practical activity. One effective approach is laboratory-instrumental methods.

- However, their effectiveness depends significantly on didactic conditions: pedagogical design of tasks, creation of a motivational and developmental environment, provision of material and technical resources, teachers' readiness to use interactive and digital technologies, and organization of students' independent and group work.

- Therefore, studying and justifying the didactic conditions for applying laboratory-instrumental methods in hygiene is an important scientific and practical task that improves the quality of students' professional training, strengthens the practical component of education, and fosters a stable culture of hygiene among future doctors.

- Laboratory-instrumental methods also allow the teacher to monitor students' actions in real and simulated conditions. Their diagnostic component helps assess not only outcomes but also the process of achieving them — crucial in medical education.



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- Their professional function lies in bringing the educational process closer to real professional activities by modeling clinical, diagnostic, and sanitary-hygienic conditions that future specialists will face.
 - These methods develop not only students' knowledge base but also professional skills, including:
 - mastering diagnostic and research algorithms;
 - ability to hygienically assess environmental factors;
 - ability to use medical and laboratory instruments;
 - cultivating responsibility for the quality of research;
 - developing communication and ethical aspects of professional activity.
 - According to A. A. Markova, "The formation of a specialist begins with the development of internal mechanisms of professional self-awareness and responsibility, which is impossible without immersion in real or simulated conditions of activity."
 - These methods help students understand the importance of methodology adherence, measurement accuracy, and ethical interaction with colleagues and patients. They also promote planning, recording and interpreting results, and drawing conclusions — all integral to clinical and sanitary practice.
 - The motivational function of these methods lies in stimulating students' knowledge and professional activity. Engaging them in active practice increases interest, forms stable motivation, and strengthens the internal need to acquire new knowledge. This is achieved by:
 - creating conditions for success and positively reinforcing results;
 - ensuring tasks are practical and meaningful;
 - engaging students in research and diagnostic scenarios;
 - fostering a sense of ownership over future professional activities;
 - using interactive and competitive formats (cases, simulations, laboratory games).

Analysis and Results

The methodology of introducing laboratory and instrumental methods into hygiene includes:

- effectively forming students' professional competencies;



•bringing the learning process closer to the reality of medical and sanitary practices;

•ensuring integrity: knowledge → action → understanding → value.

This renews hygiene's role not only as a scientific but also as a deeply practical, preventive, and socially significant discipline.

Ways to implement these methods in hygiene teaching include:

•modular lessons, where each laboratory topic is pre-defined with theoretical guidance and concluded with protocol design;

•field research (visiting schools, enterprises, sanitary service laboratories);

•using electronic simulators that imitate sanitary-hygienic examinations;

•incorporating laboratory-instrumental methods into individually designed tasks for hygienic environmental analysis.

These Methods Ensure

•development of competencies of professional significance;

•improved quality of mastering educational material;

•promotion of independent and research activities;

•alignment of the learning process with real sanitary-hygienic tasks.

Thus, laboratory-instrumental methods not only increase learning motivation but also serve as a foundation for the professionalization of medical education.

Conclusions and Suggestions

Hygiene, as an academic discipline in medical education, requires not only theoretical assimilation of standards and principles but also development of practical skills in monitoring environmental factors. In this context, laboratory-instrumental methods become an effective tool for ensuring systematic and competency-oriented development of the subject.

The aim of using these methods is to develop students' professional skills in sanitary-hygienic monitoring and preventive activities.

In the context of modernizing higher medical education and transitioning to competency-oriented training models, pedagogical technologies that help form practice-oriented knowledge, skills, and professional attitudes are of particular importance. From this perspective, laboratory-instrumental methods serve as a



key link in ensuring the quality of medical education — especially in studying clinical, hygiene, and preventive disciplines.

Theoretical-methodological and practical analysis allowed identifying the following contributions of laboratory-instrumental methods to students' professional training:

- development of skills to observe, measure, analyze, and interpret sanitary-hygienic data;
- development of critical thinking, independence, and responsibility for decisions;
- integration of theoretical knowledge and practical actions in conditions close to future professional activities;
- increased motivation and stable interest in preventive medicine and public health.

Applying these methods in the educational environment of medical universities enables implementing an activity- and practice-oriented learning model, where knowledge is acquired through action, analysis, and reflection. This not only ensures solid assimilation of material but also helps shape the professional identity of future doctors.

References

- 1.Lyubimova L. I. Methods of active teaching in a medical university. Kazan: KGMU, 2011. 168 p.
- 2.Prokhorova E. S. Development of professional competencies of future doctors through laboratory and instrumental teaching // Modern Medical Education. — 2015. — №4. pp. 44–49.
- 3.Nikolaeva N. D. Practice-oriented education in medical training. St. Petersburg: Piter, 2014. — 224 p.
4. Markova A. K. Professional Psychology. Moscow: Znanie, 1996. — 308 p.