



**FACTORS INFLUENCING THE
DEVELOPMENT OF STUDENTS'
MULTIDISCIPLINARY COMPETENCE IN
TEACHING MICROBIOLOGY, VIROLOGY AND
IMMUNOLOGY.**

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***Abstract:** The article investigates the key pedagogical, technological, and psychological factors that influence the formation and enhancement of multidisciplinary competence.*

***Keywords:** multidisciplinary competence, microbiology, virology, immunology, medical education, virtual laboratories, reflective learning, integration, simulation-based learning, problem-based learning..*

In contemporary medical education, there is a growing demand for graduates who possess not only strong subject-specific knowledge but also the ability to integrate, apply, and critically analyze information across multiple disciplines. This is particularly relevant in teaching foundational biomedical sciences such as microbiology, virology, and immunology, which collectively underpin many clinical decision-making processes and diagnostic approaches.

However, the development of multidisciplinary competence in medical students remains a complex challenge. Traditional teaching models, which often compartmentalize subject areas, are insufficient for fostering integrative thinking and practical reasoning skills. As a result, there is a need for innovative educational strategies that bridge the gap between theory and practice while aligning with competency-based learning outcomes [1].

Recent advances in virtual simulation technologies (eg, Labster, Visible Body Microbiology), problem-based learning (PBL), and reflective learning models such as DEAR (Describe, Explore, Analyze, Reflect) offer new opportunities to cultivate interdisciplinary thinking. These tools enable students to experience realistic clinical scenarios, engage in critical reflection, and develop diagnostic reasoning in a safe and controlled environment [2].

There are several factors that influence the development of multidisciplinary competence in students in the teaching of microbiology, virology, and immunology. These factors can be divided into three large groups: teacher-related factors, learning process-related factors, and student-related factors.

1. Teacher-related factors.

The multidisciplinary competence of a teacher is to demonstrate his multidisciplinary skills, organize lessons in an interesting and effective way, and help students plan and implement multidisciplinary competence, which has a positive impact on the development of multidisciplinary competence. The teacher, in turn, should regularly update his knowledge and use innovative methods. It is advisable for teachers to use teaching methods that ensure the active participation of medical students, interactive teaching methods focused on independent thinking and problem solving, which help develop multidisciplinary competence. For example, methods such as problem-based learning and collaborative learning can be effective. The teacher-dependent factor also includes the assessment system, in which the criteria for the stages of developing multidisciplinary competence of medical students should be clear and understandable, and should stimulate their clinical thinking

and innovative approaches. It is necessary to evaluate not only the final result, but also the process [3].

2. Factors related to the learning process.

This factor can include educational materials that are modern, interesting and meet the needs of medical students, helping to develop multidisciplinary competence. The materials should include practical tasks, opportunities for multidisciplinary competence work and research. Clinical opportunities are also a component of the factors related to the educational process, and the use of computers, the Internet, multimedia tools has the potential to make the multidisciplinary work of medical students more interesting and effective. The use of modern technologies helps to speed up the process and increase its efficiency. In addition, the learning environment is also a component of the educational process. An open and comfortable learning environment that encourages clinical thinking and promotes cooperation between students is very important for the development of multidisciplinary competence [4].

3. Factors related to the student's personal characteristics.

Clinical thinking is considered a key component of a student's personality, it is formed by the ability of medical students to think clinically, generate new ideas and solve problems in non-standard ways, and is an important factor in the development of multidisciplinary competence. The ability to work independently also enters this factor, which is necessary for the successful implementation of the abilities of medical students to organize their work, search for information, analyze problems and find solutions. In addition, the ability to work in a team is also important, and multidisciplinary competence often has a collective character. Therefore, the ability of medical students to work in a team,

to work together and achieve a common goal in the work of medical fundamental knowledge has a positive effect on the development of multidisciplinary competence [5].

The above factors are interrelated, and each of them contributes to the development of multidisciplinary competence. Therefore, the collaborative work of the teacher, the educational process, and medical students is important for the development of multidisciplinary competence in students in the teaching of microbiology, virology, and immunology.

The development of multidisciplinary competence in medical students is a fundamental requirement for preparing future healthcare professionals capable of integrating complex biomedical knowledge with clinical decision-making. This study has shown that such competence is not acquired passively but is shaped by a combination of pedagogical strategies, technological tools, cognitive engagement, and reflective practice .

Key influencing factors include:

- The integration of theoretical and practical components within the curriculum,
- The use of virtual laboratories and simulations to model real-world clinical scenarios,
- The implementation of problem-based learning (PBL) and reflective frameworks such as the DEAR model to promote critical thinking and self-directed learning,
- The creation of an interactive and student-centered learning environment , which supports collaboration and clinical reasoning [6].

The findings emphasize the importance of a holistic, student-centered approach to medical education—one that moves beyond rote memorization and fosters deep, interdisciplinary understanding. Incorporating these elements into the teaching of microbiology, virology, and immunology can significantly enhance students' readiness for clinical practice and their ability to navigate the multifaceted nature of modern healthcare [7].

In light of these insights, medical institutions are encouraged to rethink curriculum design, invest in educational technologies, and provide opportunities for cross-disciplinary collaboration. Only through such efforts can medical education meet the growing complexity of biomedical science and the expectations of 21st-century healthcare.

REFERENCES:

- 1 Berman N.B. – Integrating Simulation and Curriculum in Health Education. New York: Springer, 2019. – 198 p.
2. Boud D., Keogh R., Walker D. – Reflection: Turning Experience into Learning. London: RoutledgeFalmer, 1985. – 180 p.
3. Brame C.J. – Effective Educational Videos and 3D Learning. Nashville: Vanderbilt University Press, 2020. – 198 p.
4. Komilov N. Examination of key factors in enhancing students' critical competence through the teaching of the history of medicine // / tanalysis of world scientific views international scientific journal. No. 3, 2025. - p. 37-42.
5. Komilov N. The relevance of medical history and its impact on medical education // international scientific conference "scientific advances and innovative approaches. No. 3, 2025. -p.5-10.

6. Komilov N. Contemporary approaches to teaching the history of medicine in higher medical education institutions and their evaluation // modern scientific research international scientific journal. No. 1, 2025. - pp. 41-45.

7. Komilov N. The significance of medical history in enhancing the specialized competence of students // International conference education, research and innovation. No. 2, 2024. - p. 84-88.