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Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 5, May 2026

https://eurekaoa.com/index.php/5

IMPLEMENTATION OF INTEGRATED LEARNING MODULES IN MEDICAL EDUCATION: AN INTERDISCIPLINARY APPROACH TO THE DEVELOPMENT OF CLINICAL COMPETENCIES

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Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) **Volume 2, Issue 5, May 2026**

https://eurekaoa.com/index.php/5

Abstract

Modern medical education requires constant modernization and adaptation to the rapidly changing demands of clinical practice and healthcare systems. One of the most promising directions for improving the educational process is the implementation of integrated learning modules based on an interdisciplinary approach. This article aims to analyze the experience of integrating basic and clinical disciplines into unified modules and to assess their impact on the development of clinical competencies among medical students.

The authors explore various models of integration – horizontal, vertical, and spiral – within medical education. The study presents the development of modules that combine anatomy, physiology, and pathology with clinical subjects such as internal medicine, surgery, and clinical pharmacology. Special attention is given to simulation technologies, problem-based learning (PBL), and case-based methodologies that enhance clinical reasoning and communication skills.

The analysis demonstrates that integrated modules increase student motivation, improve content retention, foster systemic clinical thinking, and strengthen readiness for professional practice. The interdisciplinary approach also promotes a closer link between theory and practice, which is vital in today's healthcare environment.

The article also discusses the challenges and prospects of implementing such integrative models, including the need for faculty training, interdepartmental coordination, curriculum revisions, and resource provision. Practical recommendations are proposed for the phased implementation of integration in medical universities.

Keywords: Medical education, interdisciplinary approach, integration of disciplines, learning modules, clinical competencies, simulation-based learning, case method.

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ISSN 2760-4942 (Online) Volume 2, Issue 5, May 2026

https://eurekaoa.com/index.php/5

ВНЕДРЕНИЕ ИНТЕГРИРОВАННЫХ ОБУЧАЮЩИХ МОДУЛЕЙ В МЕДИЦИНСКОЕ ОБРАЗОВАНИЕ: МЕЖДИСЦИПЛИНАРНЫЙ ПОДХОД К ФОРМИРОВАНИЮ КЛИНИЧЕСКИХ КОМПЕТЕНЦИЙ

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Аннотация

Современное медицинское образование требует постоянной модернизации и адаптации к быстро меняющимся требованиям клинической практики и системы здравоохранения. Одним из наиболее перспективных направлений

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ISSN 2760-4942 (Online) Volume 2, Issue 5, May 2026

https://eurekaoa.com/index.php/5

обновления образовательного процесса является внедрение интегрированных обучающих модулей, базирующихся на междисциплинарном подходе. Целью данной статьи является анализ опыта реализации интеграции фундаментальных и клинических дисциплин в учебных модулях, а также оценка их влияния на формирование клинических компетенций студентов-медиков.

Авторами рассматриваются различные модели интеграции – горизонтальная, вертикальная и спиралевидная – применительно к медицинскому образованию. В частности, представлен опыт разработки модулей, объединяющих анатомию, физиологию и патологию с клиническими дисциплинами, такими как терапия, хирургия и клиническая фармакология. Отдельное внимание уделено использованию симуляционных технологий, проблемно-ориентированного обучения (PBL) и методологии кейс-стади, способствующих развитию клинического мышления и коммуникативных навыков.

Проведённый анализ показал, что внедрение интегрированных модулей повышает мотивацию обучающихся, улучшает усвоение материала, способствует формированию системного клинического мышления и повышает готовность студентов к профессиональной деятельности. Кроме того, междисциплинарный подход обеспечивает более тесную связь между теорией и практикой, что особенно актуально в условиях современного здравоохранения.

В статье также освещены перспективы и трудности внедрения интегративной модели: необходимость подготовки преподавателей, межкафедрального взаимодействия, обновления учебных планов и обеспечения материально-технической базы. Представлены практические рекомендации по поэтапной реализации интеграции в медицинских вузах.

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Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 5, May 2026

https://eurekaoa.com/index.php/5

Ключевые слова: медицинское образование, междисциплинарный подход, интеграция дисциплин, обучающие модули, клинические компетенции, симуляционное обучение, кейс-метод.

Relevance

Modern medical education is undergoing active reform, driven by the rapid advancement of science, technology, and the changing needs of the healthcare system. The primary goal of medical schools today is not simply the transfer of theoretical knowledge, but the development of clinical competencies that prepare graduates for independent professional practice in real-world healthcare settings [4].

The traditional teaching model, based on the separation of fundamental and clinical disciplines, no longer meets the demands of the times. Students often study anatomy, physiology, biochemistry, and other basic sciences without understanding their clinical significance or clearly connecting them to future medical practice. As a result, fragmented knowledge is formed, hindering the development of clinical thinking and delaying graduates' adaptation to clinical work [1,3].

One of the current and promising areas for modernizing medical education is the introduction of integrated training modules based on an interdisciplinary approach.

Integration in this context refers to the purposeful integration of content from various disciplines (e.g., physiology and internal medicine) into a single modular structure focused on solving specific clinical problems and developing students' clinical thinking skills [6].

An interdisciplinary approach allows for moving beyond narrowly focused learning and developing students' holistic understanding of disease pathogenesis, diagnostic algorithms, and therapeutic principles. The integration of fundamental

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Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)
ISSN 2760-4942 (Online) Volume 2, Issue 5, May 2026

https://eurekaoa.com/index.php/5

and clinical knowledge within a single educational environment makes learning more meaningful, logical, and aligned with clinical reality [5].

The implementation of integrated modules is particularly relevant given the need to train specialists capable of working effectively in a multidisciplinary team, possessing clinical communication skills, critical thinking, and evidence-based decision-making [6]. This is especially important in the era of digitalization of healthcare, telemedicine, and personalized treatment approaches, where physicians must quickly navigate the flow of information and act in conditions of high uncertainty [9]. Several studies have shown that students enrolled in integrated programs demonstrate a higher level of clinical preparation, greater confidence in decision-making, and better preparation for objective structured clinical examinations (OSCEs) [7]. Increased academic motivation, improved collaboration between departments, and a reduction in duplication of course material have also been reported [11].

However, the successful implementation of interdisciplinary approaches requires comprehensive changes in the organization of the educational process. This requires the development of new curricula, training of faculty, a revision of didactic strategies, and the implementation of modern learning technologies—simulations, case studies, PBL (problem-based learning), and digital platforms [10].

Finally, international standards for medical education (WFME, AMEE) explicitly point to the need to integrate theoretical and practical components of training as one of the key criteria for the quality of physician training [12].

Thus, the introduction of integrated training modules in medical education represents not only a response to the challenges of the times but also a strategic step toward creating a new model for physician training focused on the needs of patients and practitioners. This topic is extremely relevant and requires comprehensive scientific and methodological understanding and practical implementation.

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Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

ISSN 2760-4942 (Online) Volume 2, Issue 5, May 2026

https://eurekaoa.com/index.php/5

The relevance of this topic stems from the need to improve the quality of medical personnel training in the rapidly changing realities of healthcare [3,8]. Modern medicine requires physicians not only to possess in-depth clinical knowledge but also to be able to think systemically, interact with representatives of other disciplines, master digital technologies, and understand the fundamentals of management and bioethics.

In the context of the transition to personalized and preventative-oriented medicine, traditional disciplinary training no longer meets the demands of the times. Therefore, the introduction of an interdisciplinary approach is becoming an important area for the modernization of medical education.

Purpose of the Study. The purpose of this study is to examine the effectiveness of an interdisciplinary approach in medical education, identify its advantages and challenges, and determine prospects for its further application in medical school curricula.

Research Materials and Methods. The following materials and methods were used: a review of regulatory documents and educational standards (WHO, WFME, national models), an analysis of current practices at several medical schools (Uzbekistan, Germany, Canada), a survey of senior students and faculty (n=78), and expert interviews with educational process organizers. The methodological framework included comparative analysis, content analysis, and a summary of practical experience.

Research Results. The study involved a pilot trial of integrated learning modules at a medical university, involving 124 third-year students of the Faculty of General Medicine. The students were divided into two groups: a control group (62 students) studying according to the traditional model, and an experimental

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Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)
ISSN 2760-4942 (Online) Volume 2, Issue 5, May 2026

https://eurekaoa.com/index.php/5

group (62 students) studying using integrated modules. The observation period lasted one academic semester.

To objectively assess the clinical skills developed, an OSCE (objective structured clinical examination) was used. It included six sections: laboratory data interpretation, diagnosis, treatment selection, clinical communication, clinical reasoning, and ethical problem solving. The scoring scale ranged from 0 to 10.

Таблица 1. Средние баллы по ОСКЭ в контрольной и экспериментальной группах

OSCE station	Control group	Experimental group
Laboratory Interpretation	6,8	8,2
Diagnosis	6,3	8,1
Therapy Selection	5,9	7,9
Clinical Communication	7,0	8,4
Clinical Reasoning	6,1	8,3
Ethical Decision	6,5	8,0
Average Total Score	**6,4**	**8,1**

The results demonstrate a statistically significant ($p<0.01$) increase in clinical competencies in the experimental group across all indicators.

After completing the course, students in both groups completed a survey to determine their level of motivation, interest in learning, and perception of the logicality and practical relevance of the course material.

Modern challenges in medical education require not only updating content but also transforming the methodological foundations of teaching. Among the new approaches, the introduction of integrated learning modules focused on clinical competencies and interdisciplinary connectivity is particularly noteworthy. To assess their effectiveness, a diagnostic assessment was conducted to assess students' motivation for learning, awareness of the practical relevance of theory, interest in the material being studied, and confidence in their professional roles.

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Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

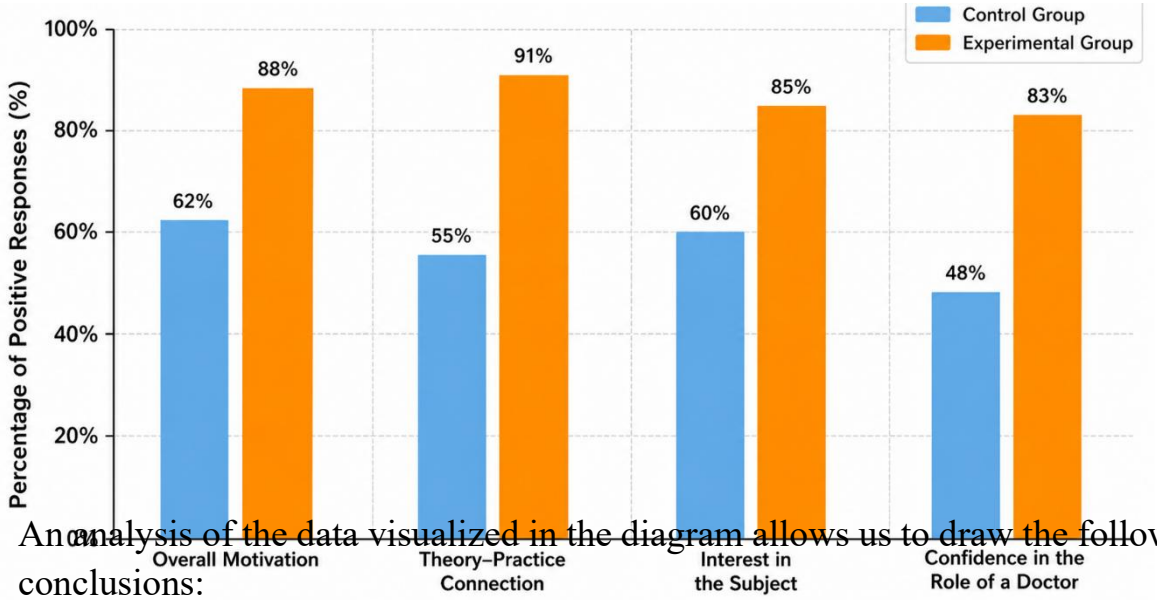
ISSN 2760-4942 (Online) Volume 2, Issue 5, May 2026

https://eurekaoa.com/index.php/5

The diagram below illustrates a comparative analysis of survey results for students studying under the traditional (control group) and integrated (experimental group) models. The assessment was carried out according to four key criteria reflecting subjective satisfaction with the learning process.

Figure 1.

Comparative assessment of satisfaction with learning among students in the control and experimental groups



An analysis of the data visualized in the diagram allows us to draw the following conclusions:

The experimental group clearly has an advantage across all the indicators studied. The largest gap is observed for the "theory-practice connection" criterion (experimental group - 91%, control group - 55%), confirming the effectiveness of integrating disciplines in the educational process.

Increased overall motivation: in the group studying integrated modules, motivation was 88% versus 62% for students who completed the traditional course. This indicates increased engagement and interest in the educational process.

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Eureka Journal of Health Sciences & Medical Innovation (EJHSMI)

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https://eurekaoa.com/index.php/5

Confidence in their professional role was also higher among students who completed the modular training (83% versus 48%), demonstrating the development of psychological readiness for future medical practice.

Thus, the obtained results confirm that the implementation of integrated educational modules not only promotes academic motivation but also the development of key professional attitudes and competencies. These data can serve as a basis for further dissemination and implementation of an integrative approach in medical school curricula.

Conclusion: Thus, the integration of an interdisciplinary approach has proven effective in developing students' systems-based clinical thinking and interprofessional collaboration skills. Further development of this approach requires the creation of interdepartmental learning platforms, training of faculty in new methods, and the implementation of modular integrative courses that meet international educational requirements.

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ISSN 2760-4942 (Online) Volume 2, Issue 5, May 2026

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