

UDC 378.6.147:37.091.3:614.253.4
<https://doi.org/10.31612/2616-4868.5.2026.16>

FEATURES OF ORGANIZING INDIVIDUALIZED PRACTICE-ORIENTED EDUCATIONAL PATHWAYS FOR HIGHER EDUCATION STUDENTS AT THE UNIVERSITY CLINIC OF BOGOMOLETS NATIONAL MEDICAL UNIVERSITY

Iurii L. Kuchyn, Inna I. Kucherenko, Oleg M. Vlasenko, Volodymyr S. Melnyk

Bogomolets National Medical University, Kyiv, Ukraine

Abstract

Introduction. The modernization of medical education in Ukraine focuses on competency-based, student-centered learning and the development of individualized educational pathways. University clinics support this process by integrating educational, clinical, and research activities and providing opportunities for the acquisition of practical competencies in real healthcare settings.

Aim. To examine the organizational characteristics of individualized practice-oriented educational pathways for higher education students at the University Clinic of Bogomolets National Medical University and to assess their potential benefits, implementation challenges, and influence on the development of professional competencies, clinical reasoning, and preparedness for future medical practice within contemporary healthcare systems.

Materials and methods. A cross-sectional analysis was conducted using survey data collected from higher education students in Ukraine in 2022 ($n = 273$), 2025 ($n = 474$), and 2026 ($n = 156$), yielding a total sample of 903 respondents. The study aimed to assess students' satisfaction with the quality of theoretical and practical training and their exposure to discussions on academic integrity during their studies.

Results. The study assessed higher education students' satisfaction with the quality of theoretical and practical training and their exposure to discussions on academic integrity between 2022 and 2026. Survey results demonstrated a steady increase in satisfaction with theoretical training, rising from 43.6% in 2022 to 64.7% in 2026, accompanied by a significant decline in dissatisfaction. Satisfaction with practical training also improved, increasing from 15.0% to 30.8% over the same period, although practical training remained an area requiring further enhancement. Trend analyses confirmed statistically significant positive changes in students' perceptions of educational quality across the study period.

Conclusions. The findings support individualized practice-oriented educational pathways as an effective approach to improving medical education quality and strengthening students' competencies. Integration of clinical practice, mentorship, research, and educational technologies within the University Clinic of Bogomolets NMU fosters clinical reasoning, professional responsibility, and readiness for medical practice.

Keywords: individualized practice-oriented educational pathway; medical education; clinical tutor

INTRODUCTION

The modernization of medical education in Ukraine is aimed at strengthening the practical component of professional training and ensuring the acquisition of competencies required for contemporary healthcare practice. Current educational reforms emphasize a student-centered approach, competency-based learning, and the development of individualized educational trajectories that enable students to tailor their learning experience according to their professional interests and career goals [1, 2].

University clinics play a crucial role in implementing practice-oriented medical education by integrating educational, clinical, and research activities within a single environment. Such institutions provide students with opportunities for early clinical exposure, direct participation in patient care under supervision, interdisciplinary collaboration, and the application of theoretical knowledge in real-world healthcare settings [3, 4]. This approach contributes to the formation of professional identity, clinical thinking, and decision-making skills, which are essential for future healthcare professionals.

In this context, the University Clinic of Bogomolets NMU serves as an innovative educational platform for the implementation of individual practice-oriented educational trajectories. The clinic enables students to engage in structured clinical activities, participate in specialized training programs, and acquire practical competencies beyond the standard educational curriculum. The integration of educational and healthcare resources creates favorable conditions for personalized learning and professional development.

At the same time, the organization of individual practice-oriented educational trajectories requires effective coordination of educational processes, mentorship support, competency assessment mechanisms, and alignment with healthcare system needs [5]. Therefore, the analysis of organizational approaches, opportunities, and challenges associated with the implementation of such trajectories is important for further improvement of medical education and the preparation of highly qualified healthcare professionals.

AIM

To examine the organizational characteristics of individualized practice-oriented educational pathways for higher education students at the University Clinic of Bogomolets NMU and to assess their potential benefits, implementation challenges, and influence on the development of professional competencies, clinical reasoning, and preparedness for future medical practice within contemporary healthcare systems.

MATERIALS AND METHODS

The empirical basis of the study consisted of survey responses collected from higher education students in Ukraine as part of a longitudinal assessment of educational quality and the learning environment. A cross-sectional analytical design was applied using data obtained in 2022, 2025, and 2026. A total of 903 students

voluntarily participated in the study, including 273 respondents in 2022, 474 in 2025, and 156 in 2026.

Data were collected using a structured questionnaire designed to evaluate key aspects of the educational experience. The questionnaire included items related to satisfaction with the quality of theoretical training, satisfaction with practical training, and exposure to discussions and educational activities concerning academic integrity. Respondents were asked to indicate their perceptions using predefined response categories, including «Yes,» «No,» and «Difficult to answer».

The study employed general scientific methods, including survey analysis, descriptive statistics, trend analysis, and comparative assessment across survey years. The collected data were processed and presented as relative frequencies (%), allowing for the evaluation of changes in students' perceptions over time. Linear trend analysis and chi-square tests for trend were used to examine the direction and statistical significance of observed changes in educational quality indicators.

Given the ongoing transformation of higher medical education and the increasing emphasis on competency-based learning, particular attention was paid to students' perceptions of theoretical and practical training as key determinants of professional development.

RESULTS

A cross-sectional analysis of survey data collected from Ukrainian higher education students in 2022, 2025, and 2026 ($N = 903$) was conducted to assess satisfaction with theoretical and practical training and awareness of academic integrity. The findings demonstrated a significant improvement in satisfaction with theoretical training over time, accompanied by a decline in dissatisfaction. Satisfaction with practical training also increased, although it remained comparatively lower. Trend analyses confirmed statistically significant positive changes in students' perceptions of educational quality across the study period ($p < 0.01$).

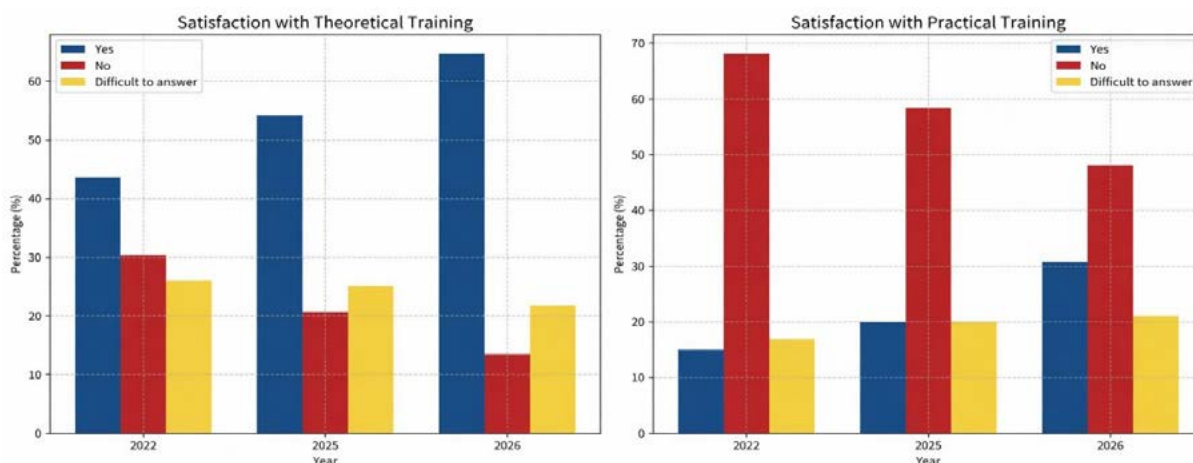


Figure 1. Satisfaction with the quality of theoretical and practical training among Ukrainian higher education students (Bogomolets NMU, 2022-2026 (%)).

Accordingly, these findings served as the impetus for the development of the Project for the Organization of an Individual Practice-Oriented Educational Pathway for Higher Education Students at the University Clinic of Bogomolets NMU. The project has been designed in accordance with the provisions of the University Development Strategy until 2030 [6] and is aimed at achieving the strategic goals of modernizing medical education, developing human capital, and enhancing the competitiveness of graduates at both national and international levels.

The project responds to the need for preparing healthcare professionals who can effectively operate in a rapidly evolving healthcare environment shaped by digital transformation, evidence-based medicine, and innovative medical technologies. It emphasizes the creation of an educational environment that integrates theoretical learning, clinical practice, research activities, and professional development, thereby supporting the comprehensive training of future physicians.

The project implemented at the University Clinic promotes a modern practice-oriented model of medical education that supports the development of professional competencies, clinical reasoning, interdisciplinary collaboration, and lifelong learning. A key feature of the project is the individualization of the educational process, enabling students to follow personalized educational pathways aligned with their professional interests, academic achievements, and career goals.

The project contributes to the development of human capital as a key resource of both the university and the healthcare system. It seeks to improve the

educational environment through the introduction of innovative teaching methods, the advancement of critical thinking and practical skills, the expansion of international educational and scientific cooperation, and the promotion of continuous professional development in accordance with the lifelong learning concept.

The project is focused on establishing an innovative model for the training of future physicians that integrates theoretical education, clinical practice, research activities, and professional mentorship. Its foundation is the principle of «learning through practice,» which ensures the early integration of students into the clinical environment and the development of professional competencies in real healthcare settings.

The implementation of the project includes the introduction of individualized educational pathways, the development of clinical reasoning, professional responsibility, communication skills, and the ability to make evidence-informed decisions. Special attention is given to students' professional self-determination, continuous professional development, and alignment of training with contemporary international standards in medical education.

The primary goal of the project is to prepare a competitive next-generation medical professional through the integration of education, clinical practice, research, and professional development within a unified educational environment. The expected outcome is the formation of a highly qualified physician who is fully prepared for effective professional practice within the modern healthcare system.

Project Domains

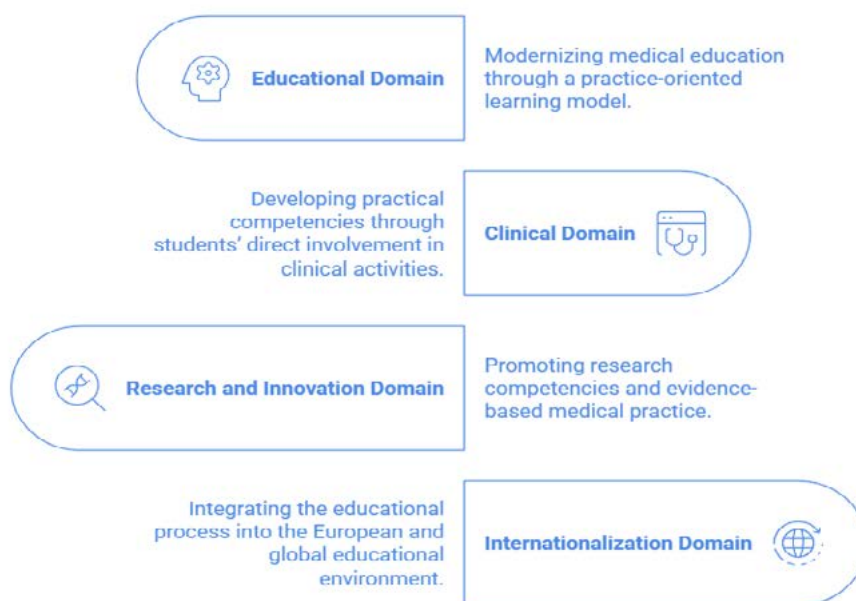


Figure 2. Project Domains.

The project implementation model is based on four interconnected components: individualized educational pathways, clinical immersion, mentorship, and integration with research and innovation.

The individualized educational pathway serves as the primary mechanism for personalizing medical education while ensuring full completion of the educational program and curriculum requirements. For each participant, an individual professional development plan is developed based on academic performance, professional interests, and existing competencies. The pathway defines the targeted learning outcomes, clinical activities, research tasks, and professional competencies to be achieved throughout the program. Particular emphasis is placed on the development of additional competencies essential for clinical practice, including critical thinking, decision-making, and effective communication within multidisciplinary healthcare teams.

A central component of the project is clinical immersion, which represents the practical implementation of the «learning through practice» principle. This approach provides systematic exposure to real clinical environments and enables students to develop professional competencies through direct participation in patient care. Participants are involved in clinical consultations, ward rounds, multidisciplinary case discussions, and diagnostic and therapeutic procedures appropriate to their level of training and patient safety requirements. Clinical immersion facilitates the development of clinical reasoning, evidence-based decision-making, and professional responsibility while reducing the gap

between theoretical learning and practical medical practice.

Mentorship is another key element of the model and contributes significantly to the development of human capital and professional identity. Each participant is assigned a clinical mentor selected from experienced faculty members, university clinic physicians, or specialists from affiliated healthcare institutions. Through regular consultations, performance assessment, and professional guidance, mentors support students in shaping their educational trajectories, defining career goals, and integrating into the professional community. Mentorship also promotes the development of ethical values, leadership qualities, professional responsibility, and commitment to lifelong learning.

The project further emphasizes integration with research and innovation, ensuring close interaction between educational activities and scientific advancement. Students are encouraged to participate in clinical and fundamental research projects, collaborate within research teams, prepare scientific publications, and present their findings at academic conferences. Such activities foster critical appraisal skills, evidence-based practice, and the ability to apply research findings to clinical decision-making. Clinical case analysis serves as an important educational tool that connects theoretical knowledge with real-world healthcare challenges and strengthens clinical reasoning. Participation in research and innovation activities also promotes creativity, scientific thinking, and readiness for professional practice in an era of rapid technological development in medicine.

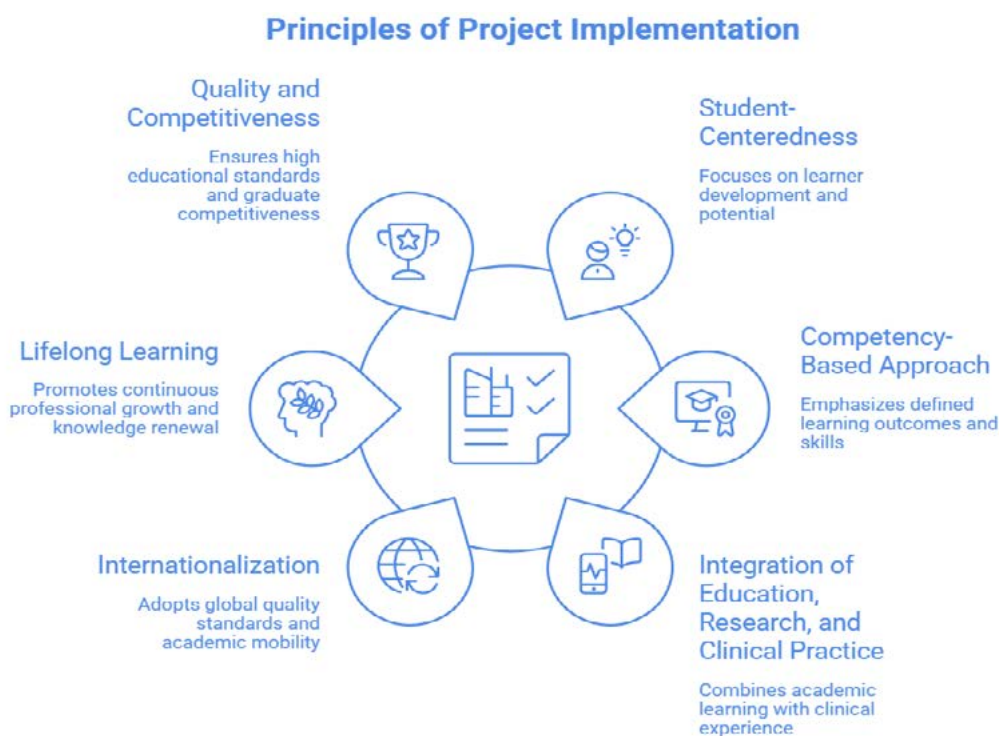


Figure 3. Principles of project implementation.

The implementation of an individualized practice-oriented educational pathway can provide higher education students with opportunities for deeper engagement in clinical practice in accordance with their professional interests. Practical training includes participation in clinical rounds, multidisciplinary case discussions, diagnostic and therapeutic procedures under the supervision of mentors, as well as involvement in research activities and educational projects.

DISCUSSION

The findings of this study underscore the value of individualized practice-oriented educational pathways in improving the quality of medical education. The integration of clinical practice, academic learning, research activities, and mentorship within the University Clinic of Bogomolets NMU supports the development of professional competencies and clinical reasoning among future physicians. Furthermore, the positive trends in students' satisfaction with theoretical and practical training indicate that practice-oriented and personalized learning approaches can enhance the educational experience and better prepare students for future professional practice. Early exposure to patient care and interdisciplinary teamwork facilitates the acquisition of practical skills and strengthens students' readiness for professional responsibilities in their future practice [7, 8, 9, 10].

The implementation of individualized educational pathways also supports the personalization of learning, allowing students to align their educational experiences with their professional interests, career aspirations, and academic strengths. Such an approach promotes learner autonomy, self-directed learning, and continuous professional development, all of which are essential competencies for modern healthcare practice. Moreover, personalized educational pathways may contribute to increased student motivation and engagement by providing meaningful and relevant clinical experiences throughout the educational process [11, 12].

Mentorship represents a critical component of the proposed model. The involvement of clinical tutors and mentors provides students with professional guidance, constructive feedback, and opportunities for reflective learning. Previous studies have demonstrated that effective mentorship positively influences academic performance, professional identity formation, and career development. Therefore, the establishment of structured mentorship programs within university clinics may significantly enhance the effectiveness of individualized practice-oriented medical education [13, 14, 15, 16].

CONCLUSIONS

The findings of this study informed the development of the Project for the Organization of Individualized

Practice-Oriented Educational Pathways for Higher Education Students at the University Clinic of Bogomolets NMU. The project is designed to strengthen the integration of theoretical education, clinical practice, research activities, and mentorship, thereby enhancing professional competencies, clinical reasoning, and preparedness for future medical practice.

The implementation of individualized educational pathways offers significant opportunities for improving the quality of medical education by promoting personalized learning, early clinical immersion, professional self-development, and competency-based training. The integration of mentorship, research engagement, and innovative educational technologies can further support students' academic and professional growth while increasing their motivation and readiness for lifelong learning.

The successful realization of individualized practice-oriented educational pathways requires a comprehensive approach that combines clinical training, research activities, mentorship, digital innovation, and continuous quality improvement. Such a model may contribute to the preparation of highly qualified, adaptable, and competitive healthcare professionals capable of meeting the evolving challenges of contemporary healthcare systems and international medical education standards.

Perspectives for further research. Future research should focus on the long-term effectiveness of individualized practice-oriented educational pathways, the development of valid assessment tools, and comparative analysis of implementation models across medical universities to optimize integration of clinical, research, and educational components in medical education.

Primary data and materials. This study was primarily based on peer-reviewed scientific literature, international normative and regulatory documents, and policy frameworks published by leading intergovernmental and professional organisations, including the World Health Organization. The literature search was conducted in the Scopus, PubMed, and Web of Science databases, covering the period from 2021 to 2026, and was supplemented by an analysis of foundational bioethical texts and documented case studies on algorithmic decision-making in clinical practice.

Study limitations. As a narrative review, this study does not provide a quantitative or systematic assessment of the prevalence of the bioethical issues discussed and is therefore subject to a degree of selectivity inherent to this methodological design. The evidence base draws predominantly on sources originating from countries with advanced technological and economic development, in particular the United States and the Member States of the European Union, which limits the generalisability of the conclusions to healthcare systems operating under substantially different institutional, economic, and social

conditions, including Ukraine's healthcare system under martial law. Future systematic reviews and empirical studies are needed to validate and extend the findings presented here.

This study presents the experience of organizing practice-oriented education through individualized educational pathways at the University Clinic of Bogomolets National Medical University. While the findings demonstrate the potential of this educational model to enhance students' clinical competencies, professional motivation, and integration of theoretical knowledge with practical training, they are based on the experience of a single higher education institution. Therefore, caution should be exercised when generalizing these results to other educational settings. Further multicenter empirical studies, comparative analyses, and systematic literature reviews are required to validate the effectiveness, scalability, and sustainability of individualized practice-oriented educational pathways in medical education. Future research should also evaluate their long-term impact on learning outcomes, professional development, and readiness for clinical practice, as well as identify organizational factors that facilitate successful implementation across diverse institutional contexts.

COMPLIANCE WITH ETHICAL REQUIREMENTS

The research was performed in compliance with the ethical principles outlined in the Declaration of Helsinki and in accordance with internationally recognized bioethical standards governing sociological studies in healthcare. Prior to participation, all respondents (N = 903) were fully informed about the aims, procedures, and voluntary nature of the study and provided informed consent. The survey was conducted anonymously to ensure the confidentiality of personal information and to safeguard the academic and professional standing of the participants.

All collected data were processed in a de-identified format, and findings are reported only in aggregate form, preventing the identification of individual respondents.

The study protocol and survey instrument were subjected to independent expert evaluation and received ethical approval from the local Bioethics Committees of Bogomolets National Medical University.

Declaration of AI use. Generative AI was not used in the development of the scientific content, data interpretation, analysis, or conclusions of this manuscript. AI-assisted language technologies were employed exclusively to improve the English language, grammar, and stylistic quality of the text. All edits generated by these tools were carefully reviewed, verified, and approved by the authors, who assume full responsibility for the accuracy, integrity, and originality of the manuscript.

FUNDING AND CONFLICT OF INTEREST

The authors declare the absence of any financial or personal interest that could have influenced the objectivity of the presentation of the study results. The study was conducted as a fragment of the scientific project «Ensuring the quality of computer science and physics and mathematics training of future healthcare professionals in the classroom and distance learning environment» (2024-2026, state registration № 0124U000724).

AUTHOR CONTRIBUTIONS

Iurii L. Kuchyn^{A, B, C, D, E, F}

Inna I. Kucherenko^{A, B, C, D, E, F}

Oleg M. Vlasenko^{A, B, C}

Volodymyr S. Melnyk^{E, F}

REFERENCES

1. Kuchyn, Y., Vlasenko, O., Kucherenko, I., Mykytenko, P., & Melnyk, O. (2024). Analysis of regulatory and legal acts regarding current issues of training of specialists in the industry of health care and social security: Challenges and prospects. *Naukovi Zapysky*, (158), 55-69. <https://doi.org/10.31392/NZ-udu-158.2024.06>
2. Veresniuk, N., Lavrentii, D., Monastyrsky, H., et al. (2026). Governance and reform in the healthcare system: Key challenges and perspectives. *JANUS.NET e-journal of International Relations*, 16(2), 382-391. <https://doi.org/10.26619/1647-7251.DT0226.20>
3. Kuchyn, Y., & Boiko, Y. (2026). Competencies of higher medical education students in simulation-based learning: A comparative analysis of OSCE results within the educational program «Medicine». *Medicine and Pharmacy: Educational Discourses*, (2), 3-8. <https://doi.org/10.32782/eddiscourses/2026-2-1>
4. Kuchyn, I. L., Vlasenko, O. M., Melnyk, V. S., Stuchynska, N. V., Kucherenko, I. I., & Mykytenko, P. V. (2022). Simulation training and virtual patients as a component of classroom training of future doctors under COVID-19 conditions. *Wiadomości Lekarskie*, 75(5), 1117-1122. doi: 10.36740/WLek202205112

5. Lymar, L., Kostiuk, I., Demydenko, Y., Kefelianovska, O., & Dzhalilova, E. (2026). Mentorship in medical education: A Ukrainian experience. *Medicine and Pharmacy: Educational Discourses*, (2), 85-89. <https://doi.org/10.32782/eddiscourses/2026-2-12>
6. Bogomolets National Medical University. (n.d.). Development strategy until 2030. <https://nmuofficial.com/strategiya-rozvytku-do-2030-roku/>
7. Korolenko, O., Chernysh, T., Ihnashchuk, O., Vernyhor, Y., Oksamytna, S., Dunaievska, Y., & Raab, M. (2024). Assessment of the educational environment of medical and nursing students in higher medical education institutions in Ukraine. DRIM Project. <https://mededu.org.ua/wp-content/uploads/2024/08/drim-2023.pdf>
8. Korolenko, O., Chernysh, T., Ihnashchuk, O., Vernyhor, Y., Oksamytna, S., Kachurets, M., Dunaievska, Y., & Raab, M. (2024). Assessment of the educational environment of medical interns in Ukraine. DRIM Project. <https://mededu.org.ua/uploads/report-pheem-2023.pdf>
9. Stepurko, T., Korolenko, O., Ihnashchuk, O., Barska, Y., Dunaievska, Y., & Raab, M. (2019). Assessment of the educational environment of medical and nursing students in higher medical education institutions in Ukraine. Swiss-Ukrainian Project «Medical Education Development». https://mededu.org.ua/wp-content/uploads/2021/05/zvit-DREEM-for-web_new3.pdf
10. Korolenko, O., Ihnashchuk, O., Barska, Y., Dunaievska, Y., & Raab, M. (2019). Assessment of the learning environment of physicians-interns in Ukraine: Results of the PHEEM study. Swiss-Ukrainian Project Medical Education Development. <https://mededu.org.ua/wp-content/uploads/2021/05/report-PHEEM-for-web.pdf>
11. du Plooy, E., Casteleijn, D., & Franzsen, D. (2024). Personalized adaptive learning in higher education: A scoping review of key characteristics and impact on academic performance and engagement. *Heliyon*, 10(21), e39630. <https://doi.org/10.1016/j.heliyon.2024.e39630>
12. Zhao, Z. (2025). Understanding the role of personalized learning pathways in enhancing academic confidence among ESL students in overseas study contexts. *Journal of Education and Educational Research*, 13(2), 19-27. <https://doi.org/10.54097/bee2p44>
13. Ventimiglia, G., Setti, I., & Maffoni, M. (2026). Mentoring in hospital settings: A systematic review of guidance, care, and professional development. *Healthcare*, 14(4), 505. <https://doi.org/10.3390/healthcare14040505>
14. Kilcullen, N. M. (2007). Said another way: The impact of mentorship on clinical learning. *Nursing Forum*, 42(2), 95-104. <https://doi.org/10.1111/j.1744-6198.2007.00073.x>
15. Chea, C. (2024). Mentorship's role in shaping professional identity: Insights from Cambodian teaching practicums. *Cogent Education*, 11(1), 2419710. <https://doi.org/10.1080/2331186X.2024.2419710>
16. Shah, P., Thornton, I., Kopitnik, N. L., & Hipskind, J. E. (2024). Informed consent. In StatPearls. StatPearls Publishing. <https://www.ncbi.nlm.nih.gov/books/NBK552775/>

Резюме

ОСОБЛИВОСТІ ОРГАНІЗАЦІЇ ІНДИВІДУАЛІЗОВАНИХ ПРАКТИКО-ОРІЄНТОВАНИХ ОСВІТНІХ ТРАЄКТОРІЙ ДЛЯ ЗДОБУВАЧІВ ВИЩОЇ ОСВІТИ В УНІВЕРСИТЕТСЬКІЙ КЛІНІЦІ НАЦІОНАЛЬНОГО МЕДИЧНОГО УНІВЕРСИТЕТУ ІМЕНІ О. О. БОГОМОЛЬЦЯ

Юрій Л. Кучин, Інна І. Кучеренко, Олег М. Власенко, Володимир С. Мельник

Національний медичний університет імені О. О. Богомольця, м. Київ, Україна

Вступ. Модернізація медичної освіти в Україні передбачає впровадження компетентнісного, студентоцентрованого навчання та розвиток індивідуалізованих освітніх траєкторій. Університетські клініки підтримують цей процес через інтеграцію освітньої, клінічної та наукової діяльності, забезпечуючи можливості набуття практичних компетентностей у реальних умовах охорони здоров'я.

Мета. Дослідити організаційні особливості індивідуалізованих практико-орієнтованих освітніх траєкторій здобувачів вищої освіти в Університетській клініці Національного медичного університету імені О. О. Богомольця, а також оцінити їхні потенційні переваги, виклики впровадження та вплив на формування професійних компетентностей, клінічного мислення і готовності до майбутньої медичної практики в сучасних системах охорони здоров'я.

Матеріали та методи. Проведено перехресний аналіз даних опитування здобувачів вищої освіти в Україні у 2022 (n = 273), 2025 (n = 474) та 2026 (n = 156) роках, загалом 903 респонденти. Дослідження було спрямоване на оцінювання задоволеності студентів якістю теоретичної та практичної підготовки, а також їх залученості до обговорення питань академічної доброчесності під час навчання.

Результати. Встановлено, що рівень задоволеності якістю теоретичної підготовки зріс із 43,6% у 2022 році до 64,7% у 2026 році, що супроводжувалося зменшенням рівня незадоволеності. Задоволеність практичною підготовкою також зросла з 15,0% до 30,8% за той самий період, однак цей компонент залишався проблемною зоною, що потребує подальшого удосконалення. Аналіз трендів підтвердив статистично значущі позитивні зміни у сприйнятті студентами якості освітнього процесу протягом досліджуваного періоду.

Висновки. Отримані результати підтверджують ефективність індивідуалізованих практико-орієнтованих освітніх траєкторій як підходу до підвищення якості медичної освіти та розвитку професійних компетентностей студентів. Інтеграція клінічної практики, наставництва, наукової діяльності та освітніх технологій в Університетській клініці НМУ імені О. О. Богомольця сприяє формуванню клінічного мислення, професійної відповідальності та готовності до медичної практики.

Ключові слова: індивідуалізована практико-орієнтована освітня траєкторія; медична освіта; клінічний тьютор

Received: 01.05.2026

Accepted: 26.06.2026

Published: 13.08.2026