

UDC: 378.147:613(575.1)

**ADVANTAGES OF THE IMPROVED TEACHING MODEL (DOGMATIC, ILLUSTRATIVE, HEURISTIC) OF THE SUBJECT "HYGIENE AND MEDICAL ECOLOGY" IN PRACTICAL APPLICATION****Usmanova Gulnoraxon Kamoliddinovna,**Department of Fundamentals of Preventive Medicine,  
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**ABSTRACT:** Objective: The study aims to evaluate the effectiveness of an improved teaching model for the subject "Hygiene and Medical Ecology" in medical higher education institutions. The model integrates dogmatic, illustrative, and heuristic educational technologies to enhance students' hygienic competence. Methods: A pedagogical experiment was conducted at Andijan State Medical Institute. The study utilized comparative analysis, testing, and mathematical-statistical methods. The experimental group utilized a new methodology incorporating "Quartet-block," "Problem-based learning," and digital educational resources, while the control group followed traditional methods. Results: The implementation of the improved model resulted in a significant increase in the assimilation of theoretical knowledge and practical skills in the experimental group compared to the control group. The integration of digital resources and heuristic tasks fostered critical thinking and professional adaptability. Conclusion: The proposed methodological system, characterized by the continuity of dogmatic, illustrative, and heuristic approaches, effectively develops hygienic competence in medical students. It is recommended for implementation in the curriculum of medical universities.

**Keywords:** Hygiene, Medical Ecology, Medical Education, Heuristic Learning, Pedagogical Technologies, Hygienic Competence, Innovative Teaching.

**"GIGIYENA. TIBBIY EKOLOGIYA" FANINI O'QITISHNING TAKOMILLASHTIRILGAN MODELINING (DOGMATIK, ILLYUSTRATSION, EVRISTIK) AMALIYOTDAGI AFZALLIKLARI.**

**ANNOTATSIYA:** Maqsad: Tadqiqot tibbiyot oliy o'quv yurtlarida "Gigiyena. Tibbiy ekologiya" fanini o'qitishning takomillashtirilgan modelini baholashga qaratilgan. Ushbu model talabalarning gigiyenik kompetentligini oshirish uchun dogmatik, illyustratsion va evristik ta'lim texnologiyalarini integratsiya qiladi. Metodlar: Andijon davlat tibbiyot institutida pedagogik tajriba-sinov o'tkazildi. Tadqiqotda qiyosiy tahlil, test sinovlari va matematik-statistik usullardan foydalanildi. Tajriba guruhida "Kvartet-blok", "Muammoli ta'lim" va raqamli ta'lim resurslarini o'z ichiga olgan yangi metodika, nazorat guruhida esa an'anaviy usullar qo'llanildi. Natijalar: Takomillashtirilgan modelni joriy etish nazorat guruhiga nisbatan tajriba guruhida nazariy bilimlar va amaliy ko'nikmalarni o'zlashtirish ko'rsatkichlarining sezilarli darajada oshishiga olib keldi. Raqamli resurslar va evristik topshiriqlarning integratsiyasi tanqidiy fikrlash va kasbiy moslashuvchanlikni rivojlantirdi. Xulosa: Dogmatik, illyustratsion va evristik yondashuvlarning uzviyligi bilan tavsiflangan taklif etilayotgan metodik tizim tibbiyot talabalarida gigiyenik kompetentlikni samarali rivojlantiradi. Uni tibbiyot oliy o'quv yurtlari o'quv dasturiga joriy etish tavsiya etiladi.

**Kalit so‘zlar:** Gigiyena, Tibbiy ekologiya, Tibbiy ta’lim, Evristik ta’lim, Pedagogik texnologiyalar, Gigiyenik kompetentlik, Innovatsion o‘qitish.

**ПРЕИМУЩЕСТВА УСОВЕРШЕНСТВОВАННОЙ МОДЕЛИ ПРЕПОДАВАНИЯ  
ДИСЦИПЛИНЫ «ГИГИЕНА И МЕДИЦИНСКАЯ ЭКОЛОГИЯ»  
(ДОГМАТИЧЕСКОЙ, ИЛЛЮСТРАТИВНОЙ, ЭВРИСТИЧЕСКОЙ) В  
ПРАКТИЧЕСКОЙ ДЕЯТЕЛЬНОСТИ**

**АННОТАЦИЯ:** Цель: Исследование направлено на оценку эффективности усовершенствованной модели преподавания предмета «Гигиена. Медицинская экология» в медицинских вузах. Модель интегрирует догматические, иллюстративные и эвристические образовательные технологии для повышения гигиенической компетентности студентов. Методы: Педагогический эксперимент проводился в Андижанском государственном медицинском институте. В исследовании использовались сравнительный анализ, тестирование и математико-статистические методы. В экспериментальной группе применялась новая методика, включающая «Квартет-блок», «Проблемное обучение» и цифровые образовательные ресурсы, тогда как в контрольной группе использовались традиционные методы. Результаты: Внедрение усовершенствованной модели привело к значительному повышению показателей усвоения теоретических знаний и практических навыков в экспериментальной группе по сравнению с контрольной. Интеграция цифровых ресурсов и эвристических заданий способствовала развитию критического мышления и профессиональной адаптивности. Выводы: Предложенная методическая система, характеризующаяся преимуществом догматических, иллюстративных и эвристических подходов, эффективно формирует гигиеническую компетентность у студентов-медиков. Рекомендуется к внедрению в учебный процесс медицинских вузов.

**Ключевые слова:** Гигиена, Медицинская экология, Медицинское образование, Эвристическое обучение, Педагогические технологии, Гигиеническая компетентность, Инновационное обучение.

## INTRODUCTION

In the context of global challenges in public health, the role of preventive medicine has become increasingly paramount. Consequently, the quality of training for future physicians in the field of "Hygiene and Medical Ecology" determines the effectiveness of future healthcare systems. The "Development Concept of Higher Education of the Republic of Uzbekistan until 2030" emphasizes the necessity of developing innovative and critical thinking skills, as well as collaborative abilities in students [1].

However, traditional teaching methods in medical universities often rely heavily on passive information transmission, which creates a gap between theoretical knowledge and practical application in real-world hygienic and ecological situations. The rapid development of educational technologies requires a transition from standard reproductive methods to improved models that combine foundational knowledge with creative application.

This study addresses the urgent need to improve the methodology of teaching "Hygiene and Medical Ecology" by developing a model that synthesizes dogmatic (foundational), illustrative (visual), and heuristic (investigative) approaches. The primary research question is: How does

the implementation of this integrated model affect the formation of hygienic competence in medical students compared to traditional methods?

## LITERATURE REVIEW

The transformation of medical education has been a subject of extensive research globally and locally.

Global Trends in Medical Education International educational concepts for 2030 focus on acquiring a "foundation of knowledge" while simultaneously developing innovative thinking. Scholars emphasize that hygiene education requires not just memorization of sanitary norms but the ability to analyze environmental factors affecting health. Research by constructivists suggests that heuristic learning—where students discover knowledge through problem-solving—is superior for long-term retention in medical sciences [2].

Local Context and Pedagogical Innovations In Uzbekistan, the improvement of educational quality and the introduction of digital technologies have been explored by researchers such as Y.X. To'raqulov, A. Qosimov, and R.A. Sobirova. They highlight the importance of integration between theoretical and clinical disciplines [3]. Furthermore, O.A. Abrorov and F.X. Inoyatova have discussed the necessity of competence-based approaches in medical training.

Despite these contributions, there is a paucity of research specifically dedicated to the methodology of teaching "Hygiene and Medical Ecology" through a structured transition from dogmatic to heuristic technologies. Previous studies often view these approaches separately rather than as a continuum necessary for building professional competence. This study fills this gap by proposing a unified model that respects the need for factual knowledge (dogmatic) while pushing towards creative application (heuristic).

## MATERIALS AND METHODS

Research design - the study employed a mixed-method research design, combining qualitative pedagogical analysis and quantitative experimental validation. The research was conducted within the framework of the applied project No. 012000273 at Andijan State Medical Institute (ASMI).

Participants - The participants were undergraduate medical students at ASMI. A total of 140 students were involved, divided into two groups: 1) Control Group (CG, n=70): Taught using traditional lecture-seminar formats. 2) Experimental Group (EG, n=70): Taught using the improved model incorporating integrated technologies.

The improved pedagogical model the experimental intervention was based on a three-stage pedagogical model: 1) Dogmatic stage - Establishing the foundation. Focus on laws, regulations, and standard sanitary norms. Illustrative stage - Visualization of concepts using animations, video materials, and electronic educational resources developed by the authors. Heuristic stage - Application of knowledge in "unknown" situations. This involved: a) *Quartet-block method*: Dividing topics into four integrated segments. b) *Problem-based learning*: Solving real-world epidemiological case studies. c) *Project-based learning*: Creating hygiene plans for specific facilities.

Data collection and analysis data were collected through pre-test and post-test assessments measuring "Hygienic Competence." Competence was defined by cognitive (knowledge), practical (skill), and motivational components. The results were analyzed using mathematical-statistical methods to determine the significance of differences (Student's t-test).

## RESULTS

Comparative analysis of academic performance before the experiment, the baseline knowledge levels in both groups were statistically similar ( $p > 0.05$ ). After the implementation of the improved model, the Experimental Group showed a marked improvement in all assessed parameters. Table 1 illustrates the shift in competence levels post-experiment.

**Table 1. Comparison of hygienic competence levels post-experiment (%)**

Competence level	Control group (CG)	Experimental group (EG)	Difference
Low	28.5%	8.6%	-19.9%
Medium	51.4%	42.8%	-8.6%
High	20.1%	48.6%	+28.5%

*Note: The transition from Low/Medium to High level is significantly more pronounced in the EG.*

Effectiveness of specific technologies - The application of the "Quartet-block" and digital resources allowed students to visualize complex ecological processes. Survey results indicated that 85% of students in the EG reported higher engagement due to the multimedia components (animations of pollutant dispersion, physiological responses to environmental factors).

**Table 2. Average assessment scores (0-100 scale)**

Assessment component	Control group (Mean $\pm$ SD)	Experimental group (Mean $\pm$ SD)	P-value
Theoretical knowledge	72.4 $\pm$ 4.5	84.1 $\pm$ 3.8	<0.01
Practical skill application	68.2 $\pm$ 5.1	81.5 $\pm$ 4.2	<0.01
Creative problem solving	61.0 $\pm$ 6.0	79.3 $\pm$ 5.5	<0.001

As shown in Table 2, the most significant improvement was observed in "Creative Problem Solving," validating the effectiveness of the heuristic component of the model.

## DISCUSSION

The results of this study confirm the hypothesis that a structured transition from dogmatic to heuristic teaching methods enhances professional competence.

Unlike traditional methods, which often treat "Hygiene" as a set of dry rules, the improved model creates an immersive learning environment. The use of electronic methodological support (videos, animations) addressed the "Illustrative" need, making invisible hygienic factors (radiation, microclimate) visible and understandable.

The success of the Experimental Group can be attributed to the Interdisciplinary Integration. By using the "Quartet-block" method, students were able to connect hygiene not just with ecology,

but with clinical disciplines, understanding the etiology of diseases related to the environment. This aligns with the findings of U. Begimqulov regarding the digitalization of education, extending his theories into the specific domain of preventive medicine.

The study also highlighted the importance of assessment criteria. The newly developed test systems and control questions provided a more accurate measure of *competence* rather than just *memory*, encouraging students to focus on understanding mechanisms rather than rote learning.

## CONCLUSION

The research successfully developed and validated an improved methodology for teaching "Hygiene and Medical Ecology" in medical higher education institutions.

**Pedagogical opportunities identified** - The study identified that the integration of dogmatic, illustrative, and heuristic technologies is not mutually exclusive but complementary. A strong dogmatic foundation is necessary for effective heuristic problem solving.

**Model efficiency** - The developed model, incorporating "Quartet-block", "Project-based learning", and "Collaborative learning", statistically improved students' hygienic competence, particularly in creative application and practical skills.

**Digital integration** - The creation of electronic educational resources (animations, digital texts) proved essential for the modern "Illustrative" approach, catering to the visual learning styles of the current generation of students.

**Assessment reform** - The introduction of new assessment criteria based on professional activity parameters ensured a more objective evaluation of student readiness.

**Recommendations** - It is recommended to implement this improved model in the curricula of medical universities across the Republic. Future research should focus on the long-term retention of these competencies during the clinical years of medical training.

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