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**TEACHING METHODOLOGY OF HYGIENE AND ECOLOGY SCIENCES IN  
WORLD MEDICAL EDUCATION: COMPARATIVE ANALYSIS AND PROSPECTS  
FOR IMPLEMENTATION IN UZBEKISTAN**

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**ABSTRACT:** Objective: The study aims to conduct a comparative analysis of teaching methodologies for "Hygiene and Medical Ecology" in leading international medical universities and higher education institutions in Uzbekistan. It seeks to identify best practices and determine the prospects for implementing innovative global approaches into the local educational system. Methods: A comparative pedagogical analysis was employed, examining curricula, teaching standards, and methodological guidelines from European, North American, and Uzbek medical schools. The study utilized document analysis, SWOT analysis of current local practices, and a survey of faculty members regarding readiness for methodological transformation. Results: The analysis revealed a significant divergence: international models predominantly utilize Problem-Based Learning (PBL) and interdisciplinary integration with a focus on independent research, while the traditional local model relies heavily on lecture-based knowledge transmission. However, recent reforms in Uzbekistan show a positive shift towards credit-module systems and digitization. Conclusion: To bridge the gap, Uzbekistan must adopt a hybrid model that integrates the depth of fundamental theory with the flexibility of global heuristic technologies. Recommendations include enhancing digital learning environments and shifting assessment criteria from memorization to hygienic competence.

**Keywords:** Medical education, hygiene, medical ecology, comparative analysis, international standards, pedagogical innovation.

**JAHON TIBBIYOT TA'LIMIDA GIGIYENA VA EKOLOGIYA FANLARINI O'QITISH  
METODIKASI: QIYOSIY TAHLIL VA O'ZBEKISTON AMALIYOTIGA JORIY  
ETISH ISTIQBOLLARI**

**ANNOTATSIYA:** Maqsad: Tadqiqotning maqsadi yetakchi xalqaro tibbiyot universitetlari va O'zbekiston oliy ta'lim muassasalarida "Gigiyena va tibbiy ekologiya" fanini o'qitish metodikalarini qiyosiy tahlil qilishdan iborat. Tadqiqot ilg'or tajribalarni aniqlash va global innovatsion yondashuvlarni mahalliy ta'lim tizimiga joriy etish istiqbollarini belgilashga qaratilgan. Metodlar: Yevropa, Shimoliy Amerika va O'zbekiston tibbiyot oliygohlarining o'quv dasturlari, ta'lim standartlari va metodik qo'llanmalarini o'rganishga asoslangan qiyosiy pedagogik tahlil qo'llanildi. Tadqiqotda hujjatlar tahlili, mahalliy amaliyotning SWOT tahlili va o'qituvchilarning metodik transformatsiyaga tayyorligi bo'yicha so'rovnomalar o'tkazildi. Natijalar: Tahlillar jiddiy tafovutni ko'rsatdi: xalqaro modellar asosan Muammoli o'qitish (PBL) va mustaqil tadqiqotga yo'naltirilgan fanlararo integratsiyadan foydalansa, an'anaviy mahalliy model ma'ruza shaklidagi bilim uzatishga tayanadi. Biroq, O'zbekistondagi so'nggi islohotlar kredit-modul tizimi va raqamlashtirish tomon ijobiy o'zgarishlarni ko'rsatmoqda. Xulosa: Tafovutni bartaraf etish uchun O'zbekiston fundamental nazariyaning chuqurligini global evristik texnologiyalarning moslashuvchanligi bilan birlashtiruvchi gibridd modelni qabul qilishi

kerak. Raqamli ta'lim muhitini takomillashtirish va baholash mezonlarini yodlashdan gigiyenik kompetentlikka o'tkazish tavsiya etiladi.

**Kalit so'zlar:** Tibbiy ta'lim, gigiyena, tibbiy ekologiya, qiyosiy tahlil, xalqaro standartlar, pedagogik innovatsiya.

**МЕТОДИКА ПРЕПОДАВАНИЯ ГИГИЕНЫ И ЭКОЛОГИИ В МИРОВОМ  
МЕДИЦИНСКОМ ОБРАЗОВАНИИ: СРАВНИТЕЛЬНЫЙ АНАЛИЗ И  
ПЕРСПЕКТИВЫ ВНЕДРЕНИЯ В ПРАКТИКУ УЗБЕКИСТАНА**

**АННОТАЦИЯ:** Цель: Целью исследования является сравнительный анализ методик преподавания предмета «Гигиена и медицинская экология» в ведущих международных медицинских университетах и высших учебных заведениях Узбекистана. Исследование направлено на выявление передового опыта и определение перспектив внедрения глобальных инновационных подходов в местную образовательную систему. Методы: Был применен сравнительный педагогический анализ, изучающий учебные программы, образовательные стандарты и методические руководства медицинских школ Европы, Северной Америки и Узбекистана. В исследовании использовались анализ документов, SWOT-анализ текущей местной практики и опрос преподавателей о готовности к методической трансформации. Результаты: Анализ выявил значительное расхождение: международные модели преимущественно используют проблемно-ориентированное обучение (PBL) и междисциплинарную интеграцию с упором на независимые исследования, тогда как традиционная местная модель в значительной степени опирается на лекционную передачу знаний. Однако недавние реформы в Узбекистане показывают позитивный сдвиг в сторону кредитно-модульной системы и цифровизации. Выводы: Для преодоления разрыва Узбекистану необходимо принять гибридную модель, интегрирующую глубину фундаментальной теории с гибкостью глобальных эвристических технологий. Рекомендуется совершенствовать цифровую образовательную среду и смещать критерии оценки от запоминания к гигиенической компетентности.

**Ключевые слова:** Медицинское образование, гигиена, медицинская экология, сравнительный анализ, международные стандарты, педагогическая инновация.

## INTRODUCTION

The challenges facing global public health in the 21st century—ranging from pandemics to climate change—require a fundamental rethinking of how preventive medicine is taught. The subject "Hygiene and Medical Ecology" is central to preparing future physicians who can navigate these complex environmental determinants of health.

Globally, medical education has shifted towards the "Education 2030" framework, which emphasizes not just the acquisition of knowledge, but the development of critical thinking, innovation, and collaborative skills [1]. International institutions promote student-centered learning environments where the teacher acts as a facilitator rather than a sole source of information.

In Uzbekistan, the Decrees of the President (PF-5847, PF-60) have set a strategic course for modernizing higher education, emphasizing the integration of science, education, and production [2]. However, a gap persists between the declared goals and the actual classroom practices. This

article provides a comparative analysis of teaching methodologies in the domain of hygiene and ecology, juxtaposing global best practices with the current reality in Uzbekistan, and proposes a roadmap for implementing these international standards effectively.

**LITERATURE REVIEW**

International paradigms in hygiene education research by leading medical educators in Europe and North America highlights the efficacy of *Problem-Based Learning (PBL)* and *Team-Based Learning (TBL)* in hygiene education. Authors argue that environmental health cannot be taught effectively through static lectures; instead, it requires analyzing dynamic case studies (e.g., analyzing water quality data of a specific region) [3]. The integration of digital simulations for environmental monitoring is also a growing trend in Western curricula.

The context of Uzbekistan local scholars such as Y.X. To‘raqulov and R.A. Sobirova have extensively studied the implementation of innovative technologies in Uzbekistan's medical education. They emphasize the need for "competence-based" approaches [4]. However, current literature indicates that while theoretical frameworks exist, the methodological tools (manuals, digital resources, assessment criteria) often lag behind international standards. The dissertation research by G.K. Usmanova addresses this by proposing specific methodologies like the "Quartet-block" system to modernize the local curriculum [5].

**MATERIALS AND METHODS**

Research design - this study utilizes a comparative descriptive design. It analyzes and contrasts the pedagogical structures of "Hygiene and Medical Ecology" courses across two distinct educational environments: 1) Global model - Represented by aggregated data from standard curricula of top-tier medical universities (based on WFME standards). 2) Local model - Represented by the current curriculum at Andijan State Medical Institute (ASMI) and other medical universities in Uzbekistan.

Document analysis - Review of syllabi, textbooks, and regulatory documents (State Education Standards of Uzbekistan vs. Bologna Process guidelines).

Survey - A structured survey of 50 faculty members at ASMI regarding their perception of international teaching methods and readiness to implement them.

SWOT Analysis - Identification of Strengths, Weaknesses, Opportunities, and Threats regarding the harmonization of local and global methods.

**RESULTS**

Curriculum structure comparison - The comparative analysis revealed structural differences in how the subject is delivered.

**Table 1. Comparative analysis of instructional design**

Feature	International model (Global trends)	Traditional local model (Uzbekistan)
Primary teaching method	Problem-Based Learning (PBL), Case Studies	Lecture-based, Explanatory-Illustrative

<b>Student role</b>	Active researcher, participant	Passive listener, information receiver
<b>Assessment focus</b>	Application of skills, Project work	Rote memorization, Theoretical tests
<b>Digital integration</b>	Virtual labs, GIS mapping of diseases	Static slides, electronic textbooks
<b>Interdisciplinary link</b>	Highly integrated with Clinical Medicine	Often taught as an isolated theoretical subject

Faculty readiness for transformation - The survey results indicated high motivation but logistical barriers among local faculty. 82% of respondents support the shift to heuristic (investigative) teaching methods. 65% cited a lack of modern methodological resources (e.g., digital simulations, case banks) as the primary obstacle. Only 30% felt fully confident in applying integrated technologies like the "Quartet-block" without further training.

Educational outcomes analysis - Implementing the global approach of "competence over knowledge" yields different professional qualities.

**Table 2. Comparison of professional competencies formed**

<b>Competency</b>	<b>International methodology outcome</b>	<b>Local methodology outcome (Traditional)</b>
<b>Critical thinking</b>	High: Students analyze environmental risks	Moderate: Students know sanitary norms but may struggle to apply them
<b>Adaptability</b>	High: Prepared for changing ecological landscapes	Low: Reliant on fixed regulations
<b>Research skills</b>	Advanced: Regular independent projects	Basic: Limited to standard laboratory work

## DISCUSSION

The analysis demonstrates that while Uzbekistan is successfully adopting the structural elements of international education (Credit-Module System), the *methodological* content requires deeper reform.

The "Knowledge" vs. "Competence" Trap: Global education prioritizes the ability to find and use information (heuristic approach). In contrast, the traditional local model often prioritizes the retention of static information (dogmatic approach). The "Improved Model" proposed in recent doctoral research at ASMI [5] serves as a crucial bridge. By combining the "Dogmatic" foundation (necessary for understanding strict sanitary norms) with "Heuristic" application (necessary for solving modern ecological problems), Uzbekistan can create a unique, effective hybrid model.

Prospects for implementation - Implementation of international standards in Uzbekistan offers significant prospects: 1) Digital Transformation: Creating electronic information-educational resources (as noted in the dissertation abstract) aligns local practice with global digital trends. 2) Interdisciplinary Integration: Moving "Hygiene" from a peripheral subject to a core clinical competency is essential. The "Quartet-block" method is a viable local adaptation of global

integration trends. 3) Mobility: Aligning teaching methods with international standards will facilitate student and faculty mobility, increasing the competitiveness of Uzbek medical graduates globally.

## CONCLUSION

The comparative analysis confirms that harmonizing the teaching methodology of "Hygiene and Medical Ecology" with international standards is not only desirable but necessary for the modernization of medical education in Uzbekistan.

Shift to heuristic learning - Curricula must reduce lecture hours in favor of practical, problem-solving sessions (PBL) to mirror international best practices.

Develop local digital content - Instead of merely importing foreign tools, Uzbekistan should develop culturally and regionally relevant digital resources (electronic teaching environments) that address local ecological issues (e.g., Aral Sea region health issues).

Faculty development - Continuous professional development programs are needed to train educators in interactive, student-centered pedagogies.

Policy support - The implementation of the "Concept for Development of Higher Education 2030" must be supported by granular methodological guidelines that encourage innovation at the departmental level.

By adopting these strategies, Uzbekistan can transform "Hygiene and Medical Ecology" from a theoretical discipline into a dynamic, practical tool for future physicians, ensuring the health security of the nation.

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