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EFFECTIVENESS OF PROJECT-BASED LEARNING IN UNDERGRADUATE UROLOGY EDUCATION

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Abstract. Project-Based Learning (PBL) is an innovative educational approach aimed at improving student engagement and professional skill development in medical education. The study included 312 medical students: 165 in the PBL group and 147 in the control group. Learning outcomes were assessed using questionnaires administered before and after practical sessions. The application of PBL led to increased student engagement, improved presentation and analytical skills, and better knowledge retention, with overall performance indicators rising from 58% to 90%.

Keywords: Project-Based Learning; urology; medical education; innovative teaching methods; student engagement.

Актуальность. Проектно-ориентированное обучение (Project-Based Learning, PBL) является инновационным педагогическим подходом, направленным на повышение учебной активности студентов и развитие профессиональных компетенций в медицинском образовании.

В исследовании приняли участие 312 студентов медицинского вуза: 165 - в экспериментальной группе (обучение с применением PBL) и 147 - в контрольной группе. Результаты обучения оценивали с помощью анкетирования до и после проведения практических занятий. Использование PBL способствовало повышению учебной мотивации студентов, улучшению презентационных и аналитических навыков, а также лучшему усвоению учебного материала; интегральные показатели успеваемости повысились с 58% до 90%.

Ключевые слова: проектно-ориентированное обучение; урология; медицинское образование; инновационные методы обучения; учебная мотивация.

Introduction. In medical education, it is essential not only for students to acquire comprehensive theoretical knowledge and practical skills but also to develop research aptitude and scientific inquiry. The implementation of innovative teaching technologies plays a critical role in preparing competitive healthcare professionals, requiring educators to actively integrate modern tools and stimulate independent learning.

In Uzbekistan, significant efforts have been undertaken to improve medical education through the adoption of international standards, credit-modular systems, and the integration of global best practices in education, clinical practice, and innovation. Key priorities include enhancing the quality of educational services, training highly qualified specialists tailored to healthcare institutions' needs, and implementing dual-education models that integrate theory and practice.

Pedagogical activity involves preparing young individuals for life, labor, and civic responsibilities by providing education and guidance through trained professionals. Teachers play a central role in nurturing well-rounded students and instilling essential qualities of personal and professional development. This task is complex, requiring consideration of each student's unique characteristics and behavioral traits. Effective pedagogy utilizes specialized methods to address social interaction complexities and fosters intellectual and creative growth.

Contemporary teaching methodology faces significant challenge. Higher medical education goals are evolving, and curricula are increasingly designed around integrated learning modules

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rather than isolated disciplines, emphasizing interdisciplinary approaches and holistic knowledge acquisition.

Objective of the Study. This study aimed to enhance the effectiveness of urology education by applying the Project-Based Learning (PBL) method and analyzing its outcomes.

Methods. The PBL method was used to foster students' scientific curiosity, develop research skills, and strengthen their ability to apply knowledge in practice. Specifically, this approach aimed to:

Develop students' scientific inquiry skills, including problem identification, information selection, evaluation, and evidence-based conclusion formulation.

Enhance communication competencies, enabling students to express ideas clearly, listen actively, provide constructive criticism, and propose alternative solutions.

A total of 312 students participated in the study: 165 in the experimental group (PBL) and 147 in the control group. Students engaged in practical exercises using the PBL approach, followed by surveys to evaluate engagement, learning satisfaction, and skill acquisition.

Results. The survey conducted among students following practical sessions using the Project-Based Learning (PBL) method demonstrated substantial improvements across multiple dimensions of learning and skill acquisition.

Interest and engagement in the topic: The perceived relevance and interest in the subject increased by 20%, rising from 67% before the intervention to 87% after participation in PBL activities.

Satisfaction with material presentation: Students' satisfaction with the way the material was delivered improved by 16%, increasing from 68% to 84%.

Adequacy of completed work: The sufficiency and thoroughness of students' assignments increased by 18%, from 59% to 77%, indicating that learners were better able to accomplish the tasks required.

Presentation skills: Students' ability to deliver presentations effectively improved by 32%, from 46% to 78%, reflecting enhanced communication and organizational skills.

Analytical abilities: The capacity to analyze and interpret obtained results increased by 41%, from 45% to 86%, showing significant improvement in critical thinking and evidence-based evaluation.

Retention of the topic: Memory retention and understanding of the topic during the learning process improved by 40%, rising from 58% to 90%, indicating that PBL facilitated deeper comprehension and long-term knowledge retention.

In addition to these quantitative improvements, the targeted use of PBL in urology education enhanced students' creative and problem-solving skills. Specifically, learners demonstrated the ability to:

Access and utilize information from evidence-based sources;

Apply innovative approaches in non-standard or urgent problem-solving scenarios;

Integrate theoretical knowledge into practical applications effectively;

Collaborate and communicate ideas within a team context, including giving and receiving constructive feedback.

Overall, the implementation of PBL resulted in substantial growth in students' engagement, knowledge acquisition, and practical competence, indicating that this pedagogical approach not only increases academic performance but also strengthens essential professional and research skills.

Conclusion. Following Uzbekistan's independence, there was an urgent need to prepare skilled professionals capable of critical thinking and contributing to national development. Pedagogical mastery involves perceiving students' intellectual and emotional states, guiding them wisely, and fostering their analytical, creative, and practical abilities.

Integrating Project-Based Learning into interdisciplinary medical courses proved effective in developing professional competencies among future healthcare educators. It also increased

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students' engagement during lessons and improved theoretical and practical knowledge acquisition, with average performance indicators rising from 58% to 90%. These results demonstrate that PBL is a valuable pedagogical tool for enhancing medical education and preparing highly competent specialists.

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