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THE IMPACT OF ACTIVE LEARNING METHODS ON STUDENTS' UNDERSTANDING OF PHYSIOLOGY

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Abstract: Physiology is a core discipline in medical education that requires deep conceptual understanding and the ability to apply knowledge to clinical contexts. Traditional lecture-based teaching methods often limit student engagement and promote surface learning. Active learning methods have emerged as effective instructional strategies that encourage student participation, critical thinking, and meaningful learning. This study aimed to evaluate the impact of active learning methods on students' understanding of physiology. A mixed-methods research design was employed to compare traditional teaching approaches with active learning strategies, including problem-based learning, case discussions, group activities, and interactive simulations. The findings demonstrate that active learning significantly improves conceptual understanding, academic performance, and student engagement in physiology courses. The study concludes that integrating active learning methods into physiology education enhances learning outcomes and better prepares students for clinical practice.

Key Words: Active learning; physiology education; medical students; student-centered learning; critical thinking; medical education

Introduction

Physiology forms the scientific foundation of medical education by explaining the normal functioning of the human body and supporting clinical reasoning and decision-making. A thorough understanding of physiological mechanisms is essential for medical students; however, physiology is often perceived as complex and challenging due to the abstract nature of many concepts. Traditionally, physiology has been taught through lecture-based methods that emphasize information delivery rather than active student involvement.

In recent years, medical education has undergone a paradigm shift toward student-centered learning approaches that promote active engagement and deeper understanding. Active learning methods involve instructional strategies that require students to participate actively in the learning process through discussion, problem-solving, collaboration, and application of knowledge. These methods are grounded in educational theories that emphasize learning as an active and constructive process.

The integration of active learning methods into physiology education offers opportunities to improve conceptual understanding and long-term knowledge retention. This article aims to examine the impact of active learning methods on students' understanding of physiology and to assess their effectiveness in enhancing learning outcomes and engagement.

Review of the Literature

The effectiveness of active learning in higher education has been extensively documented in educational research. Active learning strategies have been shown to improve student performance, critical thinking, and motivation across various disciplines. Prince reported that active learning leads to better understanding and retention compared to traditional lectures.

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In medical education, active learning methods such as problem-based learning, case-based learning, and team-based learning have gained widespread acceptance. Studies indicate that these approaches enhance students' ability to apply basic science knowledge to clinical problems. In physiology education, active learning has been associated with improved comprehension of complex systems and regulatory mechanisms.

Research by Freeman et al. demonstrated that active learning reduces failure rates and improves examination performance in science courses. Despite these benefits, challenges such as increased preparation time for instructors and resistance from students accustomed to passive learning have been reported. Nevertheless, the literature strongly supports the adoption of active learning methods to enhance learning outcomes.

Methods

This study employed a quasi-experimental mixed-methods design and was conducted over one academic semester at a medical school. Second-year medical students enrolled in a physiology course participated in the study. A total of 120 students were divided into a control group and an intervention group.

The control group received traditional lecture-based instruction, while the intervention group was taught using active learning methods. These methods included problem-based learning sessions, clinical case discussions, small-group activities, interactive quizzes, and simulation-based exercises. Both groups covered the same physiological topics and received equal instructional time.

Learning outcomes were assessed using pre-test and post-test examinations consisting of multiple-choice and short-answer questions. Student perceptions and engagement were evaluated using structured questionnaires, and classroom observations were conducted to assess participation and interaction. Quantitative data were analyzed statistically, and qualitative data were analyzed thematically.

Results

Pre-test results showed no statistically significant difference in baseline knowledge between the control and intervention groups. Post-test analysis revealed that students in the intervention group achieved significantly higher scores than those in the control group. The greatest improvements were observed in questions requiring conceptual understanding and application of physiological principles.

Student feedback indicated increased motivation, engagement, and confidence in understanding physiology among students exposed to active learning methods. Classroom observations demonstrated higher levels of participation, discussion, and collaborative learning in the intervention group. Overall, active learning methods positively influenced students' academic performance and understanding of physiology.

Discussion

The findings of this study demonstrate that active learning methods significantly enhance students' understanding of physiology. By actively involving students in the learning process, these methods promote deeper cognitive processing and meaningful learning. Active learning

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encourages students to analyze, discuss, and apply physiological concepts rather than passively receive information.

One of the key strengths of active learning is its ability to bridge the gap between theoretical knowledge and clinical application. Through problem-solving and case discussions, students develop early clinical reasoning skills and gain a better appreciation of the relevance of physiology to medical practice. Additionally, collaborative learning activities foster communication and teamwork skills.

Despite its benefits, implementing active learning methods requires careful planning, faculty training, and institutional support. A blended approach that combines traditional lectures with active learning strategies may offer the most effective model for physiology education.

Conclusion

Active learning methods have a significant positive impact on students' understanding of physiology. The integration of student-centered instructional strategies enhances conceptual understanding, engagement, and academic performance. By promoting critical thinking and application of knowledge, active learning better prepares medical students for clinical training and lifelong learning. Medical schools are encouraged to incorporate active learning methods into physiology curricula to improve the quality and effectiveness of medical education.

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