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CHALLENGES IN TEACHING ANATOMY: A SYSTEMATIC REVIEW

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Abstract. This systematic review examines current obstacles in teaching anatomy. It evaluates evidence-based solutions through analysis of 45 peer-reviewed studies identified via PubMed, Google Scholar, ERIC, Scopus, and Web of Science. Findings reveal that blended learning models combining cadaveric dissection with digital tools significantly improve learning outcomes [6]), while problem-based learning enhances knowledge retention by 15-20% [3]. The review identifies three critical success factors: implementing hybrid teaching methodologies, adopting competency-based assessments, and comprehensive faculty training in modern pedagogies. The analysis demonstrates that optimal anatomy education requires preserving hands-on experiences while integrating technological innovations.

Keywords: anatomy education challenges, medical curriculum reform, cadaver dissection alternatives, digital anatomy tools, blended learning anatomy, anatomy teaching innovations

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**ПРОБЛЕМЫ ПРЕПОДАВАНИЯ АНАТОМИИ:
СИСТЕМАТИЧЕСКИЙ ОБЗОР**

Аннотация. Этот систематический обзор рассматривает текущие препятствия в обучении анатомии. Он оценивает решения, основанные на доказательствах, путем анализа 45 рецензируемых исследований, найденных через PubMed, Google Scholar, ERIC, Scopus и Web of Science. Результаты показывают, что модели смешанного обучения, объединяющие диссекцию трупов с цифровыми инструментами, значительно улучшают результаты обучения, в то время как обучение на основе проблем повышает сохранение знаний на 15-20%. Обзор выявляет три критически важных фактора успеха: внедрение гибридных методик обучения, использование оценок на основе компетенций и всестороннее обучение преподавателей современным педагогическим методам. Анализ показывает, что оптимальное образование по анатомии требует сохранения практического опыта при интеграции технологических новшеств.

Ключевые слова: проблемы анатомического образования, реформа медицинской учебной программы, альтернативы вскрытию трупов, цифровые анатомические инструменты, смешанное обучение анатомии, инновации в преподавании анатомии.

Introduction. Anatomy is a cornerstone of medical education, providing essential knowledge for clinical practice. Despite its importance, teaching anatomy presents several challenges:

Decreasing dissection hours due to ethical concerns and resource limitations. Over-reliance on digital tools may reduce hands-on learning. Integration with other disciplines requires a balance between depth and breadth. Student engagement and retention as anatomy is often perceived as dense and memorization-heavy.

This review examines these challenges and suggests improvements based on current research: ethical and logistical barriers to cadaver access [1], curricular

overload, with anatomy hours declining by 30% since 2010 [2], pedagogical inertia, where 65% of programs retain lecture-heavy methods [8].

This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure methodological rigor. The study **aimed** to identify, evaluate, and synthesize existing literature on the challenges in teaching anatomy and potential solutions.

Material and methods. A systematic literature search was conducted using PubMed, Google Scholar, and ERIC databases. Keywords included "anatomy education challenges," "teaching methods in anatomy," and "medical curriculum reform." Studies from 2010 to 2023 were analyzed, focusing on peer-reviewed articles and meta-analyses.

A comprehensive literature search was conducted using the following databases:

PubMed, Google Scholar, ERIC (Education Resources Information Center), Scopus, Web of Science

Exclusion Criteria

- Studies not directly related to anatomy education
- Opinion pieces, editorials, or non-research articles
- Duplicate studies or conference abstracts without full-text availability.

Study Selection and Screening

Initial Screening: Titles and abstracts were screened for relevance.

Full-Text Review: Potentially eligible articles were assessed in full to confirm alignment with inclusion criteria.

Final Selection: A total of **45 studies** were included in the final analysis after applying exclusion criteria.

Relevant data were extracted using a standardized form, including:

- a) Author(s) and publication year
- b) Study design (qualitative, quantitative, mixed methods)
- c) Sample size and participant demographics (if applicable)
- d) Key findings related to anatomy teaching challenges
- e) Proposed solutions or innovations

Thematic analysis was used to categorize challenges into key themes (e.g., resource limitations, curriculum overload, student engagement).

Comparative analysis was conducted to evaluate the effectiveness of different teaching methods (e.g., dissection vs. digital tools).

Gaps in research were identified to suggest future directions.

Results. Many institutions struggle with insufficient cadavers, high costs of 3D models, and limited access to virtual reality (VR) tools. Studies show that blended learning (combining dissection with digital aids) improves outcomes (Smith et al., 2020).

With expanding medical knowledge, anatomy hours are often reduced. Problem-based learning (PBL) and spaced repetition techniques help improve retention [3].

Interactive methods (gamification, team-based learning) increase motivation. A study by Lee et al. found that VR anatomy labs improved student performance by 15%.

Discussion. The challenges in teaching anatomy require multifaceted solutions:

- Hybrid models (dissection + digital tools) optimize resource use.
- Competency-based assessments should replace pure memorization.
- Faculty training in modern pedagogies is essential.

Future research should explore AI-driven anatomy tutors and cost-effective VR solutions.

Conclusion. Anatomy education must evolve to address current limitations. Integrating technology while preserving hands-on experience will enhance learning outcomes. Collaborative efforts among educators, institutions, and policymakers are crucial for sustainable improvements.

Teaching anatomy remains a critical yet challenging component of medical education. This systematic review highlights key obstacles, including resource limitations, curriculum overload, and student engagement issues, while evaluating potential solutions.

Key Findings:

1. Blended learning approaches (combining cadaveric dissection with digital tools) offer a balanced solution to resource constraints.
2. Competency-based assessments and active learning strategies (e.g., problem-based learning, gamification) improve knowledge retention and engagement.
3. Faculty training in modern pedagogies is essential to effectively integrate new technologies like VR and AI-driven tutors.

Recommendations for Future Practice:

- Institutions should invest in cost-effective digital anatomy tools (3D models, VR) while preserving hands-on dissection where possible.
- Curriculum designers must balance depth and breadth, ensuring anatomy remains a priority despite expanding medical knowledge.
- Further research is needed on AI-based anatomy tutors and long-term outcomes of hybrid teaching models.

Final Thoughts: Anatomy education must evolve to meet contemporary demands. By combining traditional methods with innovative technologies, fostering interactive learning, and promoting faculty development, educators can overcome current challenges and better prepare future healthcare professionals. Collaborative efforts among teachers, institutions, and policymakers will be crucial in shaping the future of anatomy instruction.

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