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A Review of Anatomy Education: From Traditional Teaching to Smart Education

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Abstract

Anatomy, as a fundamental discipline in medical education, plays a crucial role in enabling medical students to master human body structures, understand disease mechanisms, and guide clinical practice. The traditional model of anatomy education primarily relies on cadaver dissection, specimen observation, and classroom lectures, emphasizing systematic knowledge transfer and hands-on training. However, with the rapid advancement of information technology and the continuous evolution of medical education concepts, traditional anatomy education is facing new challenges and demands for transformation. The introduction of smart education has provided new opportunities for anatomy teaching, driving profound changes in teaching philosophies, methods, and models.

Keywords

Anatomy Education, Smart Education, Artificial Intelligence, Big Data, Teaching Models, Interdisciplinary Integration, Educational Technology

1. A Review of Traditional Anatomical Education

1.1. Teaching Philosophy

The teaching philosophy of traditional anatomy education primarily focuses on knowledge transmission and skill development, emphasizing teacher-led lectures and student practical exercises. In this model, the teacher acts as the knowledge transmitter, delivering information about human anatomy through methods such as classroom explanations, specimen displays, and cadaver dissections. During classes, the teacher systematically explains the functions, anatomical structures, and interrelationships of various body systems, helping students build a foundational understanding of anatomy through detailed descriptions and demonstrations (Dee et al., 2021). Specimen displays and cadaver dissections further deepen students' understanding of human anatomy, allowing them to grasp the three-dimensional structure of the body, the position of organs, and their relative relationships through direct observation and hands-on experience (Boscolo-Berto et al., 2021). Under the guidance of the instructor, students perform dissection procedures to learn how to identify and understand the functions and structures of various body systems and organs. This teacher-centered teaching model emphasizes the systematic and precise nature of knowledge, with the focus on imparting systematic knowledge and developing dissection skills. Particularly through cadaver dissections, students not only perceive the actual morphology of organs but also refine their dissection skills through hands-on practice. This has a profound impact on the clinical competence and technical skills of medical students (Lee, 2024). In this traditional model, the goal is to help students acquire a systematic understanding of human anatomy, ensuring that they master a comprehensive anatomical knowledge framework (Balta, Cronin, Cryan, & O'Mahony, 2015).

However, with the development of the times and the continuous evolution of medical education concepts, the traditional approach to anatomy education is facing a gradual shift. The traditional educational model emphasizes the systematic and precise nature of knowledge, but it often neglects the development of students' autonomous learning abilities and interdisciplinary integration skills (Elendu et al., 2024). Especially in large-scale teaching environments, the teacher-centered approach of the traditional model may fail to meet the individualized needs of each student, resulting in insufficient student initiative in learning (Motola, Devine, Chung, Sullivan, & Issenberg, 2013).

Modern medical education increasingly emphasizes active learning and critical thinking, advocating for the cultivation of independent thinking, teamwork, innovation, and interdisciplinary competence among students (Lockwood & Roberts, 2007). Anatomy teaching is no longer limited to the transmission of static anatomical knowledge but increasingly incorporates clinical applications, research exploration, and the development of innovative thinking. For example, medical curricula are progressively integrated with disciplines such as physiology, pathology, and imaging, requiring students to understand the application of anatomy in other fields, thus helping them establish a more systematic and comprehensive knowledge framework (Patel et al., 2024).

Therefore, the transformation of anatomical education philosophy is not only an innovation in teaching methods and techniques but also a challenge and advancement of the overall concept of medical education. The traditional knowledge transmission model is gradually being replaced by an educational philosophy focused on developing students' critical thinking and comprehensive qualities. Future anatomy education will place greater emphasis on interactivity, engagement, and the cultivation of innovative capabilities (Moro, Stromberga, Raikos, & Stirling, 2017).

1.2. Teaching Methods

Traditional anatomy teaching methods primarily rely on cadaver dissection and specimen observation. Cadaver dissection provides students with the most direct way to understand human anatomy and is a core component of anatomy education. Through dissection, students can not only visually perceive the structure of various organs and tissues but also acquire practical dissection skills. However, due to ethical concerns, the shortage of cadaver resources, and the increasingly stringent laws and regulations, the use of cadaver dissection is gradually being restricted (Abouna, 2008). Additionally, specimen-based teaching and model-based teaching face challenges such as difficulties in specimen preservation and limited variety of specimens, which hinder the comprehensiveness and flexibility of teaching (Chytas, Salmas, Skandalakis, & Troupis, 2022).Therefore, anatomy education urgently needs to incorporate more innovative methods to meet the evolving educational demands.

1.3. Teaching Models

The traditional teaching model in anatomy education primarily relies on classroom lectures and cadaver dissection, supplemented by experiments and practical activities. This traditional approach has been widely used in medical education for many years and serves as the foundation for students' understanding of human structure and physiological function (Said Ahmed, 2023). In the classroom, instructors explain and demonstrate to help students grasp theoretical knowledge; in the laboratory, students engage in hands-on activities, such as cadaver dissection or specimen observation, to gain direct learning experiences. Cadaver dissection provides students with the most direct and authentic way to understand human anatomy. Through dissection, students can comprehensively and deeply learn the spatial layout, morphological characteristics, and interrelationships of various organs and tissues. Especially in the development of clinical skills, cadaver dissection not only helps students master dissection techniques but also enhances their spatial awareness and fine motor skills (Comer, 2022). While this model is effective in imparting foundational knowledge, it does have certain limitations (Daubenfeld et al., 2020).

With changing ethical perspectives and the scarcity of cadaver resources, the use of cadaver dissection faces increasing challenges. As relevant laws and regulations become stricter and society becomes more concerned with the dignity of the deceased, the proportion of cadaver-based teaching in anatomy classrooms has gradually decreased, particularly in resource-limited regions where obtaining and using cadavers has become more difficult (Domański et al., 2023). Additionally, cadaver dissection faces technical challenges such as limited operating space and short specimen preservation periods, making it less adaptable to the modern demands of large-scale, cost-effective, and efficient medical education.

In summary, although traditional cadaver dissection and specimen-based teaching occupy a crucial position in anatomy education, they are increasingly confronted with challenges due to ethical concerns, resource limitations, and advancements in technology. Introducing modern technological tools, particularly virtual reality and 3D imaging, can not only compensate for the shortage of cadaver resources but also enhance the anatomy learning experience for students, driving the transformation and upgrading of medical education.

2. Challenges Facing Traditional Anatomical Education

2.1. Shift in Educational Philosophy

With the reform of medical education, traditional teaching concepts have gradually revealed numerous shortcomings, particularly in their inability to address the challenges of modern medical education. The traditional medical education system places a strong emphasis on knowledge transmission, with teachers leading the classroom and the content primarily focused on the explanation and imparting of basic anatomical knowledge. However, this teaching philosophy often overlooks the development of students' active learning, as well as the stimulation of critical thinking and innovation skills (Lewis, Popov, & Fatima, 2024). Merely relying on one-way knowledge input and mechanical skills training fails to genuinely cultivate students' ability to respond to complex clinical scenarios (Issenberg, McGaghie, Petrusa, Lee Gordon, & Scalese, 2005). If anatomy education only focuses on knowledge accumulation, students are likely to fall into a state of "rote memorization," lacking the ability to integrate theory with practice.

The reform of modern medical education calls for a shift in teaching philosophy from "teacher-centered" to "student-centered." This change is not only a modification of teaching methods but also a profound reflection on educational goals (Su, 2022). Under this new educational philosophy, students must not only master solid medical foundational knowledge but also develop critical thinking, problem-solving abilities, and interdisciplinary integration skills. As an essential foundational discipline in medical education, anatomy must adapt to this trend by adjusting its teaching methods to better meet the needs of training modern medical professionals (Dai, Cheng, & Yang, 2019).

Therefore, in the context of medical education reform, the teaching philosophy of anatomy education needs to shift from a focus on simple knowledge transmission to a teaching model that prioritizes student agency. This requires instructors to transition from traditional knowledge dispensers to facilitators and supporters. It also demands that course content emphasize interdisciplinary integration, strengthen the connection between theory and practice, and encourage students to actively explore and discover (Mallik & Gangopadhyay, 2023).

2.2. Integration of Medical Curricula

Modern medical education is moving towards the direction of multidisciplinary integration, emphasizing collaboration and fusion across disciplines to cultivate students' comprehensive medical literacy and overall competencies (Frenk et al., 2010). As an essential component of basic medical sciences, anatomy's close integration with disciplines such as physiology, pathology, and radiology has become an important trend in medical curriculum reform (Estai & Bunt, 2016). This integration not only helps students better understand the relationship between human structure and function but also enhances their holistic thinking and practical skills in clinical applications.

Traditional anatomy courses often operate in isolation from other medical disciplines, with content primarily focused on the static description of human structures, rarely addressing the dynamic physiological functions, pathological changes, and clinical manifestations. While this "single-discipline" model helps students master foundational knowledge, it often leads to difficulty in integrating anatomical knowledge with other subjects in subsequent learning, thus limiting their comprehensive understanding of human diseases and treatment mechanisms (Hogarth, Miller, & Sturdy, 2022). Additionally, repetition and disconnection between disciplines reduce teaching efficiency and systematization.

Under modern educational philosophies, innovation in anatomy education should focus on breaking down disciplinary barriers and achieving deep integration with disciplines like physiology, pathology, and radiology. For example, while studying human anatomical structures, integrating the dynamic functions of physiology helps students understand the organic relationship between structure and function; incorporating pathology content helps explain the anatomical basis and pathological changes of common diseases; and applying radiology enables students to observe and analyze the structural manifestations of the body from multiple perspectives, thereby improving their clinical problem-solving abilities (Liu, Zhang, Li, Wang, & Zheng, 2023).

Moreover, the development of modern technology has opened up more possibilities for interdisciplinary integration. Technologies such as Virtual Anatomy and 3D printing can dynamically display the three-dimensional relationships of human structures, providing students with a more intuitive learning experience. Teaching models based on Problem-Based Learning (PBL) or Case-Based Learning (CBL) can strengthen the connection between anatomy and other disciplines by introducing real or virtual clinical cases (He et al., 2024). These teaching methods allow students not only to master basic knowledge but also to apply what they have learned to clinical scenarios, achieving the teaching goal of "knowledge and practice as one."

The integration of anatomy with other medical courses is an inevitable trend in the reform of modern medical education. Through multidisciplinary collaboration and integration, students' comprehensive understanding of human structure and function can be enhanced, as well as their ability to analyze and solve problems across disciplines. This innovative teaching model provides strong support for cultivating high-quality medical professionals who can meet the demands of modern medicine.

2.3. Advances in Teaching Methods

The rapid development of information technology has brought about revolutionary changes in anatomy education. Traditional teaching methods, such as cadaver dissections and specimen observations, have become increasingly limited due to resource constraints and ethical considerations (Sinou, Sinou, & Filippou, 2023). Emerging technologies have opened up new possibilities for anatomy education. The use of virtual reality (VR), augmented reality (AR), and 3D imaging technologies enables students to perform dissection procedures in virtual environments, providing them with a deeper understanding of human anatomy through three-dimensional anatomical images (Chatha, 2024).These technologies not only overcome the limitations of time and space, offering flexible learning options, but also enhance students' learning experiences and memory retention through interactive operations. For example, VR technology can create an immersive anatomy learning environment where students can simulate surgeries or practice multiple times, free from the limitations of actual cadaver resources (Afshar, Zarei, Moghaddam, & Shoorei, 2024); AR technology can overlay virtual anatomical structures onto real-world images, helping students better understand organ location and function (Uruthiralingam & Rea, 2020).

The integration of 3D imaging technologies, especially CT (computed tomography) and MRI (magnetic resonance imaging), provides students with more realistic anatomical images and can simulate organ changes in pathological states, thus promoting a better understanding of the relationship between diseases and anatomy (Zhao, Xu, Jiang, & Ding, 2020). These technologies allow students to observe and analyze human anatomy from multiple angles, increasing interactivity and flexibility in teaching while enhancing spatial cognition and problem-solving abilities.

However, despite the immense potential of these technologies, their effective integration and application remain significant challenges in current educational reforms. Firstly, how to combine virtual anatomy technologies with traditional anatomy courses to form a cohesive and unified teaching system is a key issue that needs to be addressed. Secondly, designing virtual course content that is highly interactive while ensuring teaching quality, as well as assessing students' learning outcomes in virtual environments, requires further research and exploration (Heather, Chinnah, & Devaraj, 2019). Nevertheless, with the gradual reduction in technology costs and the continuous evolution of educational philosophies, the widespread application of information technology is expected to become a major development direction for the future of anatomy education.

2.4. Evolution of Teaching Models

The traditional anatomy teaching model typically involves a teacher-led lecture combined with practical activities, resulting in low student engagement and a relatively monolithic teaching approach that lacks sufficient interactivity and flexibility. In this model, the teacher is primarily responsible for transmitting knowledge, while students passively receive it, mainly learning about human anatomy through textbooks and specimen observations. While this approach ensures that students acquire the necessary foundational knowledge and technical skills, it has significant limitations in fostering critical thinking, innovation, and independent learning abilities (Li et al., 2022).

Modern educational philosophies advocate for innovative teaching methods such as flipped classrooms and blended learning, which emphasize active learning and independent inquiry. These approaches encourage students to take a proactive role in their learning process, focusing on the development of critical thinking, collaborative skills, and innovation.

Flipped classrooms, as an innovative teaching model, have been widely adopted in medical education. In a flipped classroom, students initially acquire basic knowledge through pre-class materials such as videos and readings, while class time is dedicated to group discussions, problem-solving, and practical exercises. This model shifts the learning content from the classroom to the pre-class stage, thereby maximizing classroom time and transforming the roles of both teachers and students. The teacher is no longer a mere transmitter of knowledge but acts as a guide and facilitator of learning (Hew & Lo, 2018). For anatomy courses, the flipped classroom model allows students to first grasp the foundational knowledge of human anatomy and then engage in hands-on practice and discussions during class time, helping them deepen their understanding of complex anatomical structures and develop practical skills and teamwork.

Blended learning combines the strengths of traditional face-to-face teaching with online learning. Students can independently study and interact online through platforms while also participating in in-person classes for practical exercises and discussions. Blended learning not only overcomes the limitations of time and space, enabling students to learn from anywhere, but also offers flexible learning paths tailored to individual needs. In anatomy education, the blended learning model allows students to explore autonomously through virtual dissections, 3D imaging, and other technologies while reinforcing their understanding through practical exercises and group discussions.

The introduction of these new teaching models not only enhances student interest in learning but also strengthens their ability to engage in self-directed learning and independent inquiry, contributing to the development of their overall competencies. Flipped classrooms and blended learning emphasize student participation and interactivity, shifting students from passive learners to active participants, thus promoting the development of critical thinking and innovation. How to effectively integrate these teaching models into anatomy education to enhance students' academic abilities and practical skills has become a key issue in current educational reforms (Ashraf, Shabnam, Tsegay, & Huang, 2023).

3. Trend: Anatomy Education Transitioning from Traditional to Smart Education

With the innovation of information technology and educational philosophy, anatomical education is gradually transitioning from traditional methods to smart education. Smart education optimizes teaching concepts and models through modern information technologies such as the internet, big data, artificial intelligence (AI), and virtual simulation technologies, thereby enhancing learning efficiency and effectiveness.

3.1. The Meaning of Smart Education in Anatomy

Anatomical smart education refers to the application of advanced information technologies to drive innovations in anatomical teaching concepts and models, optimizing learning outcomes and providing personalized, intelligent, and interactive learning experiences (Valikodath et al., 2021). This approach helps students learn anatomical knowledge more flexibly. This educational model not only emphasizes the ability of students to learn autonomously but also uses intelligent tools and resources to guide students in a way that allows them to learn according to their own pace and needs, overcoming the time and space limitations of traditional teaching methods. It enhances the accessibility and efficiency of anatomical education (Habibi, Toofaninejad, Rahimi, & Kalantarion, 2024). Tran D L D (Tran & Siddiqui, 2024) expounded that through case studies, six different theoretical frameworks, namely behaviorist framework, constructivist framework, contextualized learning, collaborative learning, informal learning and lifelong learning, and teaching and learning support, were integrated into the active learning experience. These teaching frameworks will help students and teachers acquire knowledge in multiple ways.

One of the core features of smart education is personalized learning. In traditional anatomical education, all students typically follow the same curriculum and schedule, which often leaves some students' learning needs inadequately addressed (Bui, Bhattacharya, Wong, Singh, & Agarwal, 2021). Through smart education platforms, big data technology can be used to collect and analyze students' learning behaviors and performance in real time, providing each student with customized learning paths and content. This personalized approach helps students better understand complex anatomical concepts and specifically targets areas where they need improvement.

Virtual simulation technology is an important component of anatomical smart education. Traditional cadaver dissection is limited by issues related to resources, ethics, and regulations. Virtual dissection technology offers an innovative solution (Guraya, 2024). Students can perform dissection exercises in a virtual environment, fully simulating the real dissection process, repeating operations, and receiving real-time feedback. This not only improves students' practical skills but also avoids the ethical issues and operational risks associated with traditional methods. Virtual dissection also allows students to switch flexibly between different anatomical structures, helping them understand and master human anatomy from multiple perspectives.

Furthermore, smart education leverages the internet and cloud platforms, enabling students to access learning resources anytime and anywhere. Online courses, video lectures, and interactive specimen libraries help students engage in self-directed learning and review outside of class. With cloud technology, students can not only access global educational resources but also participate in global virtual learning communities, interacting with other scholars and students, exchanging learning experiences, and solving problems. This fosters cross-cultural and interdisciplinary learning experiences (Javvaji et al., 2024).

In summary, anatomical smart education, through modern technological tools, provides students with a more flexible, intelligent, and personalized learning platform, significantly enhancing teaching effectiveness and quality. As technology continues to advance, smart education will play an increasingly important role in the future of medical education, driving anatomical teaching reform to higher levels.

3.2. The Value of Smart Education in Anatomy

Anatomical smart education not only drives innovations in teaching concepts but also demonstrates significant advantages in enhancing learning outcomes, promoting personalized student development, and increasing interactivity in the learning process (Goudman et al., 2022). Its core value is reflected in the following aspects:

1. Personalized Learning: Anatomical smart education, through big data and artificial intelligence (AI) technologies, enables personalized customization of learning content and pace. Students can receive tailored learning materials and tasks based on their individual learning progress and comprehension levels. This personalized learning path effectively addresses the "one-size-fits-all" issue in traditional teaching, ensuring that students learn with appropriate challenges and support, ultimately improving learning outcomes. For example, based on students' historical learning data, AI can predict areas of weakness and automatically push relevant review materials or practice questions, helping students reinforce their knowledge in targeted areas.

2. Enhanced Interactivity and Immersion: The application of VR and AR technologies has expanded anatomical learning beyond static anatomical charts or cadaver dissection. Through VR/AR, students can engage in interactive dissection exercises in a 3D virtual environment, practice repeatedly, and receive real-time feedback. This immersive learning not only increases student engagement but also allows for a more intuitive and comprehensive understanding of human anatomy and its functions (Abualadas & Xu, 2023). These technologies break the spatial and temporal constraints of traditional teaching, enabling students to practice dissection anytime and anywhere.

3. Real-Time Monitoring and Precision Teaching: Big data and AI provide teachers with real-time learning monitoring tools, enabling them to track each student's learning progress and address any issues promptly. Teachers can adjust content, pacing, and methods based on data feedback, providing more accurate and personalized teaching services. Through AI tutoring and automated grading systems, students receive immediate feedback on their virtual dissection performance, allowing for timely correction of errors and optimization of learning strat-

egies (Abdellatif et al., 2022). This real-time feedback mechanism significantly enhances the specificity and effectiveness of teaching, making anatomical education more interactive and personalized.

4. Interdisciplinary Integration and Collaborative Learning: Anatomical smart education can break down the traditional boundaries between disciplines by promoting the organic integration of anatomy with related fields like physiology and pathology through interdisciplinary learning platforms. Utilizing big data platforms and intelligent recommendation systems, students can receive knowledge recommendations from these related fields during their anatomical studies, thus strengthening their holistic understanding of human structure and function. Moreover, virtual platforms offer students enriched opportunities for communication and collaboration, such as through online discussions and virtual labs, enhancing teamwork and collaborative skills (Cornide-Reyes et al., 2020).

5. Improving Teaching Quality and Efficiency: Anatomical smart education not only enhances the personalization and interactivity of teaching but also significantly improves teaching efficiency. Traditional anatomical education often relies on limited cadaver resources and specimens, whereas smart education, through technologies like virtual dissection, offers unlimited opportunities for simulation-based practice. Students can engage in dissection learning without the constraints of resources or time (Javaid, Chakraborty, Cryan, Schellekens, & Toulouse, 2018). As technology continues to permeate anatomical education, both the quality and efficiency of teaching have been markedly enhanced. This approach ensures that students can master more knowledge within a limited timeframe, while simultaneously reducing the teaching burden on instructors and improving overall teaching effectiveness.

4. The Construction of Smart Anatomy Education

4.1. Establishing the Concept of Smart Anatomy Education

The core concept of anatomical smart education should emphasize the cultivation of students' autonomy in learning, their spirit of inquiry, and their ability to innovate. This educational model aims to help students develop good study habits, improve critical thinking skills, and foster their ability to conduct comprehensive analysis when confronted with complex problems. Moreover, anatomical smart education should focus on interdisciplinary integration, particularly with fields such as physiology, pathology, and imaging. Through cross-disciplinary learning, students can establish a more systematic framework of anatomical knowledge, enhancing their comprehensive understanding of human structure and function. This, in turn, will lay a solid foundation for their future clinical practice and research endeavors.

4.2. Application of Internet+, Artificial Intelligence, Big Data, and Virtual Simulation Technologies

The core of smart education lies in the application of technology. Firstly, the introduction of the "Internet+" platform has expanded the boundaries of anatomical learning, enabling students to access a wealth of learning resources, watch instructional videos, and engage in self-assessment and interactive discussions anytime and anywhere. This online platform also facilitates communication and feedback between teachers and students, enhancing the flexibility and immediacy of teaching (Leng, 2024). Secondly, the application of artificial intelligence (AI) technology enables teaching platforms to provide personalized learning recommendations and resources based on students' progress, knowledge mastery, and areas of weakness. Through big data analysis of students' learning behaviors, AI can tailor individualized learning paths for each student, improving learning efficiency and ensuring the precision of instruction (Haftador, Tehranineshat, Keshtkaran, & Mohebbi, 2023). Furthermore, the integration of VR and AR technologies offers a highly immersive learning experience in anatomy education. This interactivity and immersion significantly enhance students' understanding and retention of anatomical knowledge, making the learning process more engaging and practical (Ghosh, 2023). Panchendrabose K (Panchendrabose, Iderstine, & Hryniuk, 2024) mentioned in their study that students indicated that the online laboratory class was both interesting and helpful for learning anatomy. They gave very high evaluations to the guided body image part and provided positive feedback on the helpability of the group discussion session in anatomy learning. The online anatomy laboratory can serve as a feasible alternative learning platform for anatomy laboratory education.

4.3. Establishing an Evaluation System for the Effectiveness of Anatomy Smart Education

To ensure the effectiveness of anatomical smart education, it is crucial to establish a scientifically sound and comprehensive evaluation system. This evaluation system should not only focus on students' knowledge acquisition but also include multiple dimensions such as skill proficiency, innovative ability, teamwork, and the capacity for solving complex problems (Aljaber, Alsaidan, Shebl, & Almanasef, 2023). Traditional evaluation systems often rely on final exams and classroom performance; however, the evaluation system in smart education should incorporate data analytics to monitor students' learning progress, behavior, and outcomes in real-time. Through big data technology, teachers can gain a comprehensive understanding of each student's learning status, promptly identify issues, and implement appropriate instructional interventions. For example, the system can track students' proficiency and accuracy in virtual anatomy exercises, providing precise feedback to help them continuously improve their practical skills. Additionally, regular self-assessment and peer review can encourage students to engage in self-reflection and make necessary adjustments, thereby enhancing their overall competence.

4.4. Innovative Teaching Models or Methods for Anatomical Smart Education

Innovative teaching models in anatomy smart education are key to enhancing teaching effectiveness. Methods such as flipped classrooms and blended learning can enable students to engage in theoretical learning outside of class, while classroom time can be dedicated to problem discussions, skills training, and teamwork. The introduction of these novel teaching models can stimulate students' interest in learning and promote the development of their critical thinking and overall competencies.

5. Conclusion

This research is a review article on the reform of anatomy education, aiming to summarize and analyze the research results of predecessors. It lacks practical case studies and practical data.

Anatomy education is currently undergoing a critical transformation from traditional methods to smart education. This transition not only drives innovation in teaching philosophies but also promotes continuous innovation in teaching techniques, models, and methods. The introduction of smart education has made anatomy teaching more flexible, interactive, and personalized, providing students with a richer learning experience that significantly enhances their learning outcomes and innovative abilities.

With the rapid advancement of information technology and the ongoing evolution of educational philosophies, the future of anatomy education holds vast potential. We can foresee that smart education will gradually become the new norm in medical education, laying a more solid foundation for cultivating medical professionals with innovative capabilities and interdisciplinary competencies. By continuously advancing the practice and application of smart education, anatomy education will better align with the evolving needs of modern medicine, providing stronger support for the future of medical education.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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