

Research on the Teaching Reform of College Anatomy in the Internet Era

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Abstract: Anatomy is the foundation of medical science and the bridge between basic medical courses and clinical courses. Its content is complex, filled with numerous difficult-to-understand medical terms, which pose great challenges to students' learning. In the context of the Internet, colleges and universities should focus on optimizing teaching with the help of Internet platforms, establish a systematic anatomical framework, reduce students' learning difficulties, and improve their learning outcomes. Based on this, this paper conducts research on the teaching reform of college anatomy courses in the Internet era. It expounds on its positive role in teaching reform, analyzes the existing problems in current teaching, and proposes specific optimization strategies, aiming to promote the adaptation of college anatomy teaching to the development needs of the Internet era.

Keywords: Internet era; Colleges and universities; Anatomy courses; Teaching reform

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1. Introduction

With the rapid development of Internet technology, the education field is undergoing profound changes. As an important basic medical course in colleges and universities, the traditional teaching model of anatomy faces many challenges in the new era^[1]. The teaching reform based on the Internet can integrate course resources, expand the teaching space, combine traditional classrooms with Internet-based learning, enhance students' learning enthusiasm, and enable students to effectively learn and memorize anatomical knowledge^[2]. How to leverage the advantages of the Internet to improve the teaching quality of anatomy and cultivate medical talents that meet the needs of modern society has become an urgent problem to be solved. The Internet era has brought new opportunities and directions for the teaching reform of college anatomy courses. It is of great practical significance to deeply study its reform path.

2. The significance of teaching reform of college anatomy courses in the internet era

2.1. Facilitating autonomous learning

The Internet era has broken the time and space limitations of learning in an unprecedented way, providing strong technical support for the autonomy of the anatomy learning process. Students are no longer restricted by the fixed time and space of traditional classrooms. With the help of various online learning platforms, such as anatomy-learning APPs and virtual laboratories, they can freely plan their learning paths according to their own learning rhythms and habits^[3]. Supported by Internet technology, students can repeatedly watch 3D demonstration videos of fine anatomical structures after class, deeply explore the complex mysteries of the human body, and also participate in online anatomy-knowledge Q&A communities during fragmented time to achieve common progress^[4].

2.2. Narrowing the gap between teachers and students

The Internet-based teaching model has essentially changed the teaching framework, building a bridge across the traditional gap between teachers and students and narrowing their distance^[5]. In the classroom, the teacher-student relationship has changed. Students have become the main players in learning, while teachers have become learning facilitators and guides. Through online communication platforms, students can ask teachers questions about anatomy learning at any time and share their learning experiences and insights. Teachers can timely understand students' learning dynamics and confusions and provide targeted guidance and suggestions. This can create an equal and open learning atmosphere and promote in-depth interaction and emotional communication between teachers and students^[6].

2.3. Visualizing knowledge

Anatomical knowledge is highly abstract and complex. Traditional teaching methods often struggle to present certain complex structures^[7]. The advent of the Internet era has made it possible to visualize anatomical knowledge in more ways. For example, with the help of virtual reality (VR) and augmented reality (AR) technologies, virtual scenarios can be created for students, allowing them to “enter” the human body and observe the shape, position, and interrelationships of various organs from a 360-degree perspective, as if on a magical journey of exploring the human body. Digital resources such as dynamic anatomical animations and high-definition physical specimen image libraries can present the originally obscure and difficult-to-understand anatomical knowledge in a vivid and intuitive form^[8].

3. Problems in the current college anatomy course teaching

3.1. Inadequate online resources to meet teaching needs

In the traditional teaching model, the teaching of anatomy courses often focuses on traditional textbooks, lacking timely updates and in-depth integration of cutting-edge research results and clinical application cases. There are a few digital resources. Some online resources are in a single form, mainly static text and images, lacking interactivity and interest. They are difficult to attract students' attention, cannot fully stimulate students' learning enthusiasm, and fail to meet students' growing thirst for knowledge.

3.2. Single-minded teaching methods

Currently, the teaching methods of college anatomy courses are relatively single. They overly rely on traditional

lecture-based teaching. Teachers dominate most of the class time, and students passively receive knowledge. Students lack the opportunity to actively participate and explore. They often have to follow the established steps, lacking the space to independently design experiments and analyze problems. This limits students' thinking activity and makes them helpless when facing complex and changeable clinical problems.

3.3. Incomplete teaching evaluation system

The teaching reform in the Internet era should add online teaching evaluation to the existing evaluation system to understand students' knowledge mastery, familiarity with specimens and anatomical terms, and their room for improvement. However, the current teaching evaluation system is not comprehensive enough. The evaluation method places too much emphasis on summative evaluation. The final exam score accounts for a large proportion of the total score, causing students to focus too much on rote memorization of exam content during the learning process and ignoring the in-depth understanding and application ability of knowledge, which is not conducive to the improvement of students' comprehensive quality.

4. Strategies for teaching reform of college anatomy courses in the internet era

4.1. Reconstructing the teaching target system and setting pre-class preview activities

Supported by Internet technology, colleges and universities should focus on reconstructing the teaching target system for anatomy courses and carefully design pre-class preview activities, using online platforms to build a preview ecosystem. Teachers can use the SPOC (Small Private Online Course) platform to set pre-class preview tasks to help students learn independently and efficiently. First, set teaching objectives reasonably. When presenting teaching objectives, change the traditional text-listing form to a mind-map form, connecting the key and difficult knowledge points of each chapter of anatomy to help students clearly understand the learning context^[9].

Second, provide a study guide. Teachers provide students with a study guide, presented as an "Anatomy Exploration Guide", to guide students to explore the course content step by step. For example, when learning the anatomy of the digestive system, the study guide is themed "A Gastronomic Journey in the Human Body", raising interesting questions such as "Where does food go first after entering the mouth? What amazing changes will occur in this organ?" to stimulate students' initiative to explore the mysteries of the digestive system.

Third, innovate teaching videos. Teachers should innovate the design of pre-class preview videos, transforming complex and abstract knowledge points into interesting and vivid animation elements to arouse students' curiosity and exploration desire^[10]. In addition to regular knowledge-explanation videos, teachers can also add "Interviews with Anatomy Masters," inviting well-known experts in the field to share their interesting experiences and unique insights in anatomy research, and introduce "Anatomy History Stories" to tell the major events in the development of anatomy, allowing students to feel the profound heritage of the discipline while learning knowledge.

Fourth, design preview challenge tasks. Teachers design a series of challenges related to anatomical knowledge for students, such as accurately marking the position of a specified organ on a virtual anatomical model or finding the relationship between a certain disease and anatomical structures through puzzle-solving. For each challenge completed, students can get corresponding points and virtual rewards, thus increasing students' participation. During the entire preview process, students can communicate with teachers through the platform at any time, and teachers can answer students' questions in a timely manner, creating an actively interactive learning

atmosphere and promoting students' development^[11].

4.2. Building an online learning platform to improve teaching effect

To give full play to the advantages of Internet technology, schools should build an online learning platform to improve the teaching effect of anatomy courses and provide students with an unprecedented learning experience.

First, optimize the teaching courseware design. In the design of teaching courseware, teachers should reflect diversity and interest, integrate wonderful video resources, create videos for difficult points, and build teaching resources with the characteristics of their schools. For example, when explaining the nerve conduction pathway, create an animation video titled "The Fantastic Adventure of Nerve Signals," comparing nerve signals to brave adventurers shuttling through the "maze" of the human body, vividly showing the whole process from the receptor, through various neurons, and finally to the effector, making it easy for students to understand the abstract knowledge. When showing the video of "Body Donor" specimens in the laboratory, teachers can add innovative elements, such as voice-over explanations, 3D annotations, and virtual perspective effects, giving students a "perspective" view to see the internal structural layers of the specimens and feel the gift of knowledge from the selfless dedication of "Body Donors"^[12].

Second, create a simulated cloud classroom. To enable students to have a good learning experience, teachers can create a 360-degree immersive anatomical simulated cloud classroom. Students can wear VR devices and be immersed in a virtual anatomy laboratory, observing and "dissecting" virtual human models, separating tissues layer by layer, and observing the position, shape, and interrelationships of organs. In the virtual world, students can enter the interior of various organs, observe the blood flow process, and feel the opening and closing of heart valves, etc. to improve students' learning effect.

Finally, analyze students' learning results with the help of big data. Teachers can rely on big-data technology to analyze students' learning results, such as obtaining students' learning trajectories on the platform, including data such as video-watching duration, time spent on knowledge points, and homework completion. By analyzing these data, teachers can understand students' learning habits, knowledge mastery levels, and weak points. Based on the analysis results, if teachers find that some students have a high error rate in learning a certain part of the knowledge, they can set up learning modules, add corresponding exercise questions and explanation videos to help students solve problems^[13]. Teachers can set up a real-time interaction area on the platform, regularly collect students' feedback, and optimize teaching content and methods based on this to achieve mutual improvement in teaching and learning.

4.3. Improving the teaching evaluation mechanism to assess students' comprehensive abilities

In the Internet era, the traditional teaching evaluation mechanism can no longer meet the teaching needs of anatomy courses. Teachers should focus on improving the teaching evaluation mechanism and constructing a comprehensive and scientific evaluation system to assess students' comprehensive abilities.

First, evaluate autonomous learning. To reflect students' learning autonomy, teachers can set up autonomous-learning evaluation content. The final score is composed of the usual score (40% of the total score) and the final-exam score (60% of the total score), comprehensively capturing students' performances in the autonomous-learning system^[14].

Second, use the intelligent detection function of the learning platform. Teachers can use the functions of the learning platform to record the time students spend on each knowledge point and their attention-degree curves.

For example, when learning complex joint structures in anatomy, if a student spends a reasonable amount of time on relevant videos or materials and has a high attention degree during this period, it indicates that they have invested sufficient learning energy in this knowledge point. This performance will be converted into a corresponding score proportion (5% of the total score).

Third, enrich the evaluation methods. The comprehensive evaluation should introduce a combination of peer review and self-evaluation. Students not only need to self-evaluate their performances in the autonomous-learning process, such as the formulation and implementation of learning plans and the quality of knowledge summaries, but also evaluate their peers' learning attitudes and contributions in group learning^[15]. In this way, mutual learning and supervision among students are promoted, and this part of the evaluation accounts for 10% of the total score.

Fourth, conduct content-based phased tests. Teachers can adopt a combination of project-based assessment and case-analysis methods. For example, after learning the anatomy of the respiratory system, teachers guide students to complete the project "The Relationship between Respiratory System Diseases and Anatomy" in groups, including making presentations and writing analysis reports. Teachers also provide actual clinical cases for students to use the learned anatomical knowledge for diagnostic reasoning. This part of the assessment accounts for 10% of the total score.

Fifth, hold offline specimen examinations. Teachers can set up a creative-practice part, allowing students to use the learned anatomical knowledge to create creative models or write popular-science stories based on specimens, demonstrating their in-depth understanding and innovative application of anatomical knowledge. This part accounts for 15% of the total score.

5. Conclusion

In conclusion, the Internet provides a broad space for the teaching reform of college anatomy courses, enabling the advantages of traditional classrooms and online platforms to be fully utilized. During the teaching-reform process, schools should focus on reconstructing the teaching-target system, building an online learning platform, and improving the teaching-evaluation mechanism to solve the problems in traditional teaching, improve the teaching effect of anatomy courses, promote the autonomy of students' learning process, and achieve the visualization of knowledge. The teaching reform is a continuous and dynamic process. Colleges and universities should constantly explore and innovate in anatomy teaching to better adapt to the development of the times.

Disclosure statement

The authors declare no conflict of interest.

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