

Construction of Human Anatomy Experimental Course for Sports Rehabilitation Major

Hainiu Wang^{1,a,*}, Wenzhen Lu^{1,b}

¹Geely University of China, Chengdu, China

^awanghainiu.nihao@163.com, ^b3245922677@qq.com

*Corresponding author

Abstract: *This paper delves into the significance, current status, existing issues, and improvement strategies of the human anatomy experimental course for sports rehabilitation majors. By analyzing the limitations of traditional teaching methods, this paper proposes a series of innovative teaching models and laboratory construction schemes, aiming to enhance students' practical skills and integration of theoretical knowledge.*

Keywords: *Sports Rehabilitation; Human Anatomy; Experimental Course; Teaching Innovation; Laboratory Construction*

1. Introduction

With the continuous progress of medical education, sports rehabilitation, as an important branch of the medical field, has also been reforming and innovating its educational mode. As one of the core courses of sports rehabilitation, the quality of human anatomy experimental teaching is directly related to students' mastery of professional knowledge and cultivation of practical skills. However, the traditional teaching mode that focuses mainly on theoretical lectures can no longer meet the needs of modern education. This paper aims to explore how to reform experimental courses to improve teaching effectiveness and cultivate professionals with innovative ability and practical skills.

2. Current Status of Human Anatomy Experimental Course for Sports Rehabilitation Major

2.1 Analysis of Current Teaching Situation

Currently, many institutions still adopt traditional teaching methods in the human anatomy experimental course for sports rehabilitation majors, relying heavily on textbook knowledge and theoretical lectures while neglecting the importance of experimental operations and practical skills. Although this teaching model helps students establish a systematic framework of anatomical knowledge, it falls short in cultivating students' practical operation abilities and innovative thinking.^[1]

2.2 Evaluation of Student Learning Outcomes

Through the evaluation of student learning outcomes, we find that students perform well in mastering theoretical knowledge but relatively weaker in applying it to practical operations. This indicates that the current experimental teaching model requires further improvement and optimization.

2.3 Assessment of Teaching Resources and Facilities

In terms of teaching resources and facilities, many institutions' laboratories are equipped with outdated equipment, lacking modern teaching tools and experimental materials. This situation limits students' opportunities for high-quality experimental operations and affects the effectiveness of experimental teaching.

3. The Importance of Human Anatomy Experimental Course

3.1 Contribution to Professional Skill Cultivation

Human anatomy stands as the cornerstone of medical education, marking the inception of medical knowledge exploration and nurturing medical ethics and professionalism. Through the implementation of human anatomy experimental teaching, students not only systematically grasp the foundational knowledge framework, core theories, and practical skills in this field but also significantly enhance their proficiency in practical operations, problem-solving, and logical analysis. Additionally, they develop keen observation skills and preliminary clinical thinking, all of which are highly valued and essential qualities for contemporary sports rehabilitation professionals^[2]. Thus, this experimental course serves not only as a vehicle for knowledge transmission but also a pivotal link in ability cultivation and quality enhancement.

3.2 Role in Deepening Theoretical Knowledge

In the interactive sessions of experimental teaching, students collaborate in groups to dissect various body parts progressively on gross specimens, significantly reducing individual learning confusion, shortening the learning curve, and reinforcing cognition and memory of human macroscopic structures. This transformation from passive knowledge recipients to active explorers greatly stimulates students' learning motivation and fosters teamwork abilities. The exchange of ideas between teachers and students enhances teaching depth and breadth, promotes knowledge internalization and application, stimulates students' subjective initiative, fosters a more intense learning atmosphere, and significantly improves their ability to independently solve complex problems.

3.3 Preparation for Future Career Development

Targeting future career orientations and practical talent cultivation, we integrate laboratory resources, physical training facilities, and training equipment, incorporating muscle function analysis and training techniques into human anatomy experimental teaching. Some experimental designs transcend spatial constraints, extending from enclosed indoor environments to open outdoor settings, aligning closely with students' sports training practices. By increasing the proportion of experimental and practical teaching sessions, we aim to comprehensively deepen the learning outcomes and optimize the teaching quality of the human anatomy experimental course.^[3] This not only opens up broader practical exploration platforms for students but also effectively promotes their understanding and memory through rich experimental activities, continuously enhancing their knowledge mastery and application abilities, thereby laying a solid foundation for their career development paths and facilitating comprehensive ability leaps.

4. Experimental Courses of Human Anatomy in Sports Rehabilitation Major from an International Perspective

4.1 Analysis of Advanced International Teaching Modes

The essence of contemporary international cutting-edge teaching modes can be summarized into the following major dimensions:

Interdisciplinary Education: Given the diversified development of social needs, the single-discipline education system has become limited, and interdisciplinary education has emerged. Especially in the field of sports rehabilitation, integrating the essence of multiple disciplines such as sports anatomy, physiology, and biomechanics aims to cultivate students' comprehensive literacy and cross-border capabilities.

Global Talent Cultivation Strategy: Amid the surging wave of internationalization in higher education, universities need to embrace a global perspective, connect with international high-quality resources, implement intelligent teaching strategies, promote interesting international exchanges, and create a multicultural atmosphere, aiming to forge elite talents with international competitiveness and cross-cultural communication skills.^[4]

Integration of Knowledge and Practice: In the teaching of human anatomy experiments for sports rehabilitation majors, special emphasis is placed on the integration of practical operations, which

complements theoretical lectures and strengthens students' ability to deeply integrate theory with practice.

Localization Innovation of International Educational Resources: Actively absorb international advanced curriculum systems and teaching methods while combining them with local educational realities to implement localized transformation of teaching modes. For example, Sino-German Education Group has successfully introduced and improved the German dual-system education model, setting an example for educational innovation in China.

Professional Foreign Language and Communication Skills Enhancement: Given the increasing frequency of international exchanges, sports rehabilitation majors pay particular attention to improving students' professional foreign language proficiency and communication skills to meet career demands in a globalized context. Institutions such as Shanghai University of Sport have made positive attempts and contributions in this regard.

Continuous Innovation of Curricula and Teaching Methods: The continuous evolution of educational concepts is an important driving force for the transformation of teaching modes in sports rehabilitation majors. This includes emphasizing the cultivation of innovative thinking and independent thinking abilities, as advocated by the principal of Tsinghua High School Affiliated to Tsinghua University, which is equally applicable to the field of sports rehabilitation education.^[5]

Integration of Ideological and Political Education into Experimental Syllabuses: In planning experimental courses such as "Human Anatomy," not only the imparting of basic theories, knowledge, and skills is emphasized, but also ideological and political education elements are ingeniously integrated to guide students to respect experimental materials, cultivate a sense of responsibility and mission, and achieve the dual goals of knowledge imparting and value guidance.

4.2 Reference from Successful International Cases

Teaching Hardware and Sample Resources: The sports anatomy laboratory at Shanghai University of Sport is equipped with a variety of teaching samples, including transverse and coronal section samples of the human body, as well as detailed collections of muscle, blood vessel, nerve, and internal organ specimens. These abundant resources provide a solid platform for students to conduct practical operations, greatly promoting the integration of theory and practice.

Innovation in Teaching Modes and Strategies: The national key project of continuing medical education, "Advanced Practical Seminar on Sports Rehabilitation Cases," adopts small-class precision teaching, integrating theory lectures, assessment and diagnosis, case analysis, and practical operations, aiming to comprehensively enhance professionals' practical operation and problem-solving abilities.

Cross-border Academic Exchanges and Cooperation: The first International MTT Medical Sports Rehabilitation Summit brought together top scholars and experts from home and abroad, deeply discussing the latest systems and clinical operation procedures of global medical rehabilitation technology, effectively promoting international knowledge sharing and the construction of cooperation networks.^[6]

Professional Qualification Certification and Lifelong Learning System: In collaboration with 4S Sports Fitness Rehabilitation Institute, the Chinese Association of Rehabilitation Medicine has launched the professional training course "Clinical Practical Case Analysis of Sports Rehabilitation," which not only provides systematic knowledge transmission but also continuously promotes the internationalization and specialization of industry practitioners' skills through a professional certification mechanism.

4.3 Inspirations for Domestic Teaching

Reviewing the experimental courses of human anatomy in sports rehabilitation majors from an international perspective, we can draw inspirations from the following aspects:

Innovation in Experimental Teaching Modes: Given the wave of technological advancement, experimental teaching is moving towards modernization, ingeniously integrating online digital resources with offline physical operations to implement a blended teaching approach. The sports anatomy laboratory at Shanghai University of Sport is a pioneer in this field, leading the teaching transformation integrating online and offline, effectively enhancing teaching efficiency and significantly stimulating students' interest and participation.^[7]

Construction of Interdisciplinary Knowledge Systems: The sports rehabilitation major inherently requires crossing multiple disciplinary boundaries and integrating the essence of sports science, life sciences, and medicine. As a foundational pillar, the teaching content of human anatomy should transcend the scope of morphology, deeply integrating principles of sports physiology and biomechanics to construct a comprehensive and interdisciplinary knowledge network, thereby promoting the improvement of students' comprehensive literacy.

Seamless Integration of Theory and Practice: In human anatomy experimental courses, emphasis should be placed on the teaching concept of "integration of knowledge and practice," closely combining theoretical lectures with experimental operations. By guiding students to observe specimens and models in detail and combining them with real case analyses, students can deepen their understanding of theoretical knowledge through practice, thereby enhancing their ability to analyze complex problems and find solutions.^[8]

Infiltration of Cultural Diversity in Teaching: Influenced by global cultural exchanges, education should also pay attention to the integration of cultural diversity. Similar to foreign bloggers in China showcasing cultural teaching creativity through short videos, sports rehabilitation majors can also draw inspiration from this approach by introducing rehabilitation cases from different cultural backgrounds, broadening students' international horizons, enhancing their cross-cultural communication and cooperation abilities, and laying a solid foundation for cultivating professional talents with global competitiveness.

In summary, facing the trend of internationalized education, domestic teaching needs to continuously innovate, strengthen interdisciplinary integration, optimize the teaching mode that combines theory with practice, and focus on the infiltration of cultural diversity in education, thereby comprehensively improving education quality and contributing outstanding professionals with international perspectives and cross-cultural competencies to society.

5. Strategies for Experimental Course Construction

5.1 Reform of Teaching Content and Methods

To enhance the effectiveness of experimental courses, reforms in teaching content and methods are necessary. Firstly, case studies related to clinical practice should be increased to enable students to apply anatomical knowledge in real-life situations. Secondly, more interactive teaching methods, such as group discussions and role-playing, should be introduced to boost student engagement and learning interest.

5.2 Updating Laboratory Facilities and Resources

As the primary venue for experimental teaching, updating laboratory facilities and resources is crucial for improving teaching quality. It is recommended that institutions increase investment in laboratory construction and introduce advanced experimental equipment and teaching tools, including Virtual Reality (VR) technology and 3D printing technology, to enrich students' experimental experiences.^[9]

5.3 Faculty Development and Construction

Teachers are the key drivers of teaching activities; therefore, faculty development is essential for the quality of experimental courses. Institutions should strengthen professional training for teachers to enhance their teaching capabilities and innovative consciousness. Simultaneously, teachers should be encouraged to participate in teaching research and academic exchanges to continually update their teaching concepts and methods.

6. Close Integration of Experimental Courses and Clinical Practice

6.1 Application of Clinical Cases in Experimental Teaching

In the implementation of clinical case-based teaching methodology, upon receiving a case, students' primary task is to internalize the case content, subsequently retrieving and integrating the theoretical

knowledge systems they deem crucial. This process naturally deepens students' mastery of knowledge, driven entirely by active learning. Based on the acquired theoretical knowledge, students must engage in meticulous and comprehensive thinking to devise strategies and solutions to the problem, marking a significant leap in their ability level. Meanwhile, students continuously seek immediate guidance from teachers during the problem-solving process.^[10] This interaction not only inspires students to delve deeper into their thoughts but also motivates teachers to flexibly adjust and enrich their teaching content based on each student's unique insights, fostering a bidirectional teaching interaction between teachers and students. This teaching mode undoubtedly imposes stricter and more comprehensive requirements on teachers' professional competence and teaching abilities.^[11]

6.2 Mechanism for Student Involvement in Clinical Practice

Students should independently think, analyze, and solve problems during their learning process, significantly enhancing their learning motivation and autonomy. Especially in the discussion section of clinical case-based teaching, each student must articulate their personal perspectives on their own and their peers' solutions. This process fosters intense intellectual clashes. On one hand, it offers students opportunities to absorb insightful analyses and ideas from outstanding peers; on the other hand, by expressing their own views, students' communication skills are honed, and their emotional intelligence is enhanced. Furthermore, this environment nurtures a positive incentive effect: faced with situations where they may initially perform slightly below their peers, students are internally motivated to excel, striving to surpass themselves and others, translating into proactive and diligent learning behaviors.^[12]

6.3 Promotion of Experimental Teaching by Clinical Feedback

Clinical case-based teaching is a pedagogical approach that ingeniously simulates or reproduces real-life medical practice scenarios, immersing students in case scenarios through role-playing and facilitating in-depth analysis and lively discussions to achieve learning objectives. This methodology not only reinforces students' memories of fundamental anatomical knowledge but also encourages them to broaden their cognitive horizons by leveraging individual or collective wisdom, mastering the flexible application of basic anatomical knowledge, and gaining insights into the core principles of disease management in clinical practice, thereby cultivating a more comprehensive and profound professional competence.

7. Construction and Implementation of the Experimental Course Evaluation System

7.1 Objectives and Principles of the Evaluation System

When constructing the evaluation system, factors such as the cultivation of students' individualized potential, enhancement of personalized skills, and participation in extracurricular practical projects should be comprehensively considered. Under the guidance of instructors, students independently choose the path of experimental exploration, covering multiple dimensions such as the analysis of system functions, optimization of structural design, and formulation of practical exercise strategies.^[13] Ultimately, their learning outcomes are comprehensively evaluated through submitted experimental reports. This model not only significantly stimulates students' enthusiasm for learning but also effectively hones their experimental operating skills, deepening their understanding of system architecture and operational principles. Critically, it fosters the germination and growth of students' independent innovation capabilities, laying a solid foundation for their development into expert talents in specific fields, which will have an immeasurable positive impact on their career shaping and development in the long run.

7.2 Development of Evaluation Methods and Tools

Teaching strategies that introduce group collaborative learning and emphasize practical sessions are aimed at revolutionizing the traditional one-way imparting model, stimulating the intrinsic motivation of group members, and ensuring that each student actively engages in knowledge exploration and learning interactions. A multi-dimensional and comprehensive evaluation system is constructed to holistically and systematically assess students' learning outcomes while stimulating their enthusiasm for autonomous learning. This transformation aims to deepen students' understanding and mastery of anatomical knowledge, enhance their professional skills, and ensure that what they learn can be flexibly

applied in practice.^[14]

During the teaching process, students complete related assignments using online platforms (e.g., Learning Tong), while teachers provide immediate evaluation, feedback, and answers to questions online, regularly reflecting on and summarizing teaching effects. In the middle of the semester, students consolidate and reflect on their learning content through classroom quizzes and peer evaluation mechanisms. By the end of the semester, students complete online course learning, tests, and assignments and participate in offline final exams, with teachers providing comprehensive and fair evaluations based on online and offline learning performance.

7.3 Application of Evaluation Results and Feedback Loop

Based on the collected feedback, many professionals in sports-related fields have expressed that relying solely on final exams is insufficient to comprehensively assess students' depth and breadth of anatomical knowledge. Specifically, up to 71% of respondents advocate introducing group peer evaluation and phased assessment mechanisms to comprehensively evaluate students' mastery of sports anatomy expertise through diversified means.^[15] This suggestion points to the direction of teaching model innovation, whereby the addition of diverse interactive teaching sessions and a richer evaluation system can not only significantly stimulate students' learning motivation and interest but also effectively enhance learning outcomes, ensuring that students can more solidly grasp sports anatomy knowledge.

8. Conclusion

This paper analyzes the current status of the human anatomy experimental course for sports rehabilitation majors and proposes a series of reform strategies and innovative teaching models. By reforming teaching content and methods, updating laboratory facilities and resources, and strengthening teacher team construction, the teaching quality of experimental courses can be effectively improved, cultivating professionals with practical abilities and innovative spirits. In the future, we should continue to explore more innovative teaching methods and technologies to meet the development needs of medical education.

References

- [1] Zhang, H. X., & Lu, J. (2024). Discussion on the ideological and political teaching mode of "three-comprehensive education" in human anatomy based on the integration of "five educations". *Journal of Hebei North University (Natural Science Edition)*, 40(10), 54-55+58.
- [2] Feng, Y., & Liu, Y. (2024). Innovative research on the ideological and political teaching mode of human anatomy in higher vocational education. *Liaoning Higher Vocational and Technical College Journal*, 26(06), 62-64.
- [3] Peng, J. A. (2024). Exploration of integrating ideological and political education into experimental teaching of human anatomy in colleges and universities. *Industrial and Technological Forum*, 23(11), 207-208.
- [4] Zhang, S. J., Zhu, H., Sun, Y., et al. (2024). Improving teaching effectiveness by enhancing students' interest in human anatomy experimental courses. *Technology Wind*, (15), 29-31.
- [5] Ma, Y. B., Ji, S. F., Zhou, J. S., et al. (2024). Construction and scientific management of teaching environment in human anatomy laboratory in the digital age. *Medical Education Research and Practice*, 32(03), 315-319.
- [6] Zhang, X., Wang, T., She, D. Y., et al. (2023). Exploration and practice of ideological and political education in animal anatomy experimental courses. *Journal of Xichang University (Natural Science Edition)*, 37(03), 109-113.
- [7] Li, N., Xu, H. H., & Li, P. (2023). Application of case analysis method in systematic anatomy teaching. *Basic Medical Education*, 25(07), 563-566. DOI: 10.13754/j.issn2095-1450.2023.07.01.
- [8] Yu, X. C., Huang, Q. L., Liu, X., et al. (2023). Exploration of teaching reform of sports anatomy course based on OBE concept. *Contemporary Sports Technology*, 13(14), 92-95.
- [9] Hu, X. Y., Luo, J. H., & Liu, J. H. (2022). Construction and management of modern anatomical laboratory. *Progress in Anatomical Sciences*, 28(03), 374-376.
- [10] Xia, Q. H. (2022). Core exploration of the reform of sports anatomy experimental teaching. *Science and Technology Vision*, (09), 111-113.

- [11] Wang, Y., & Ai, W. M. (2021). *Teaching reform and practical experience of human anatomy experiments. In Proceedings of the 8th National Academic Conference on Anatomy Techniques, Chinese Society of Anatomy, [Publisher Unknown], pp. 2.*
- [12] Tao, Y. N., Li, Q., Li, B., et al. (2021). *Brief discussion on the reform and exploration of the experimental teaching mode of human anatomy. Medical Theory and Practice, 34(08), 1433-1434.*
- [13] Li, H. L., Liang, P. X., Yang, Y. Y., et al. (2021). *Application of PBL combined with TBL teaching method in local anatomy experimental teaching. Technology Wind, (10), 51-52.*
- [14] Zhang, D. L., & Han, Z. B. (2020). *Exploration and research on the experimental teaching reform of human anatomy in higher vocational colleges. Modern Vocational Education, (02), 230-231.*
- [15] Hu, H. Z. (2015). *Construction of sports anatomy experimental course in rehabilitation medicine. Western China Quality Education, 1(04), 67.*