

Challenges and Strategies in Developing Interdisciplinary University Physical Fitness Curriculum

Haoting Li^a

Lingnan Normal University, Zhanjiang 524000, China

^a646045877@qq.com

Abstract

Starting from the perspective of constructing physical fitness training majors in ordinary higher education institutions, this paper explores new directions for talent cultivation in university physical fitness training curriculum under the background of national curriculum reform. Constructing a high-quality interdisciplinary curriculum system for physical fitness training majors is of great significance in promoting students' comprehensive development and improving the level of curriculum construction for university physical fitness training majors. Taking the curriculum construction of physical fitness training majors at Lingnan Normal University as an example, this study focuses on integrating interdisciplinary concepts into physical fitness training courses, using research methods such as literature review and practical investigation. The study finds that constructing university physical fitness training majors faces significant challenges in disciplinary integration, faculty strength, curriculum design, and student adaptation. Countermeasures proposed include strengthening interdisciplinary research and cooperation, enhancing faculty strength, optimizing curriculum design, improving teaching methods, and providing student support services, which can effectively address these challenges.

Keywords

Interdisciplinary; Physical Fitness Training Major; Curriculum Construction; Talent Cultivation.

1. Introduction

With the continuous in-depth innovation and development of human social knowledge, many problems faced by sports science research institutes have become more diversified and complex. Constructing disciplinary integration is an important measure to promote disciplinary cultural integration. Especially in the development of modern disciplines, solving many complex problems often requires the use of multidisciplinary knowledge. Physical training is the basis of various sports and can provide basic conditions for various people to adapt to life and study. In my country, the development of physical training major started late, and physical training courses as an emerging discipline are still under development and construction. Internationally, countries such as the United States and Germany have achieved remarkable results in the interdisciplinary construction of physical training courses. For example, the NSCA (National Strength and Conditioning Association) in the United States and the physical training system in Germany have provided us with valuable reference experience. The goal of cultivating students in physical training courses in colleges and universities is not only to cultivate physical training professionals, but also to adapt to the needs of the national education policy environment and cultivate physical training teachers who are competent for physical education in primary and secondary schools.

Therefore, combining physical training courses with interdisciplinary theories is not only creative but also very feasible. To this end, it is necessary to focus on the application of interdisciplinary theories in the undergraduate teaching process so that students can be exposed to and understand interdisciplinary concepts from an early stage. This integration not only allows students to experience the learning of holistic knowledge and skills for future life, but also promotes the construction of physical training disciplines. The learning and application of physical training knowledge should be linked to students' future development and facing uncertain and complex environments, so as to better serve students' development and employment. Therefore, thinking about and clarifying related issues such as interdisciplinary integration in physical training courses in colleges and universities is of great significance to promoting the construction of physical training disciplines in my country.

2. The Necessity of Constructing A Cross-disciplinary Physical Training Curriculum

With the acceleration of globalization and the rapid development of science and technology, the boundaries between disciplines have gradually blurred, and interdisciplinary research has become an important trend in the development of academic research in my country and even the world. Modern education pays more and more attention to the cultivation of comprehensive qualities, and the teaching of a single subject can no longer meet the needs of students' all-round development. Interdisciplinary integration combines disciplines such as sports, medicine, nutrition, and psychology, injecting new vitality and perspectives into physical training courses. Many foreign studies have shown that interdisciplinary physical training courses can effectively improve students' comprehensive qualities and learning interests. The latest "Compulsory Education Physical Education and Health Curriculum Standards (2022 Edition)" issued by the Ministry of Education has clearly set interdisciplinary subject learning as one of the contents of the physical education and health curriculum, and it runs through the entire stage of compulsory education. As an important measure to cultivate students' "21st century literacy", interdisciplinary learning has become an important part of the world's primary and secondary school and university education reform.

With the promotion of national fitness and the popularization of various sports events, the society's awareness and demand for physical training are increasing. Community sports activities, corporate fitness projects, professional sports projects, etc. also require a large number of professional physical training talents to organize and guide. These activities not only increase the society's demand for physical training talents, but also increase the requirements for their professional quality. The training and introduction of professional physical training talents is very necessary to improve the overall health level of society and the quality of education.

3. The Feasibility of Integrating Multiple Disciplines into Physical Training Courses

With the continuous development of the times and the ever-changing teaching concepts, the cross-integration of physical training and other disciplines has become an inevitable choice. Interdisciplinary integration can not only improve students' learning effects in physical training courses and enhance their learning interest, but also improve teachers' teaching level and contribute to the development of physical education theory. This integration conforms to the policy call of the state for the new curriculum reform in primary and secondary schools, and it is particularly urgent to cultivate outstanding sports workers who can adapt to the needs of the new era.

Through interdisciplinary teaching methods and concepts, a more comprehensive and in-depth learning experience can be provided for students majoring in physical training, which can promote their development and innovation ability in future careers. Therefore, studying the interdisciplinary integration in physical training courses in colleges and universities is of great significance to promoting the development of physical training disciplines in my country and responding to the reform of education policies.

4. Current Status of Physical Training Courses

4.1. Teachers and Equipment

Lingnan Normal University has a good foundation in the teaching team and equipment facilities of physical training courses. The equipment includes strength training combiner, three-dimensional motion analysis system, sports cardiopulmonary function test evaluation system, isokinetic muscle strength test training system, balance test and training system and other equipment. It can not only carry out comprehensive physical training assessment, physical training and scientific research for high-level athletes, but also realize the integrated development of physical training and research. Faculty: The School of Sports Science has a strong faculty in the physical training major. Among the 22-member faculty team, there are 4 professors, 8 associate professors, 13 doctors and 9 masters; all members are front-line teachers in the major of sports human science and social sports (fitness direction), and have rich teaching experience in physical training related majors. Team members focus on going out for learning and communication. A total of 10 people have participated in the training of "physical training trainer" and obtained the physical training trainer certificate; 4 people have participated in the training of the Asian Physical Fitness Training Institute and obtained the "Professional Physical Fitness Coach" certificate; 2 people have obtained the "Fitness Coach Trainer" certificate. Teachers have introduced cutting-edge international physical training theories through external study and exchanges many times, laying a good foundation for the construction of physical training majors.

Lingnan Normal University's physical training professional equipment and teaching staff make the model of integrating multiple disciplines into physical training courses not only feasible but also very promising, which can effectively improve the teaching quality of physical training majors and the comprehensive quality of students, and make full preparations for the development of physical training in terms of teaching team and hardware facilities.

4.2. Curriculum Standards and Objectives

The curriculum standards conform to the new requirements of the country's high-quality development of education in the new era and the new requirements of Guangdong Province's local social development. By providing a curriculum system in line with international standards and teaching methods combined with sports practice, it focuses on student development and implements the goal of cultivating moral character. Based in Guangdong and facing the whole country, it adheres to the school's "normal, teaching, local, and application-oriented" school-running positioning, cultivates high-quality application-oriented talents with a high sense of social responsibility and noble professional ethics, masters systematic sports science professional knowledge and physical training theoretical knowledge, has the practical ability to guide competitive sports physical training, public health physical training and physical training for special groups, and is "responsible, capable, and innovative" with all-round development of morality, intelligence, physical fitness, aesthetics, and labor.

Table 1. Example course objectives and corresponding course titles

Course Objectives	Knowledge Points	Course Title
Expertise	Master the basic theories, basic knowledge and basic abilities related to physical training;	Sports anatomy, sports physiology, sports overview, health education, sports psychology, sports research methods, sports sociology, sports training, physical training theory and methods, sports training biological monitoring
	Understand the current development status and future trends of physical training at home and abroad.	Sports biomechanics, sports nutrition, sports biochemistry, sports protection technology, sports ability testing and evaluation
Professional skills	Have the ability to discover existing problems in physical training practice.	Introduction to Sports, Sports Anatomy, Sports Physiology, Sports Biomechanics, Health Education, Sports Psychology, Sports Sociology, Sports Science Research Methods, School Sports, Sports Curriculum and Teaching Theory, Sports Training, Sports Biochemistry, Sports Health
Application Innovation	Have the ability to apply theories and knowledge related to physical training and analyze specific problems.	Exercise physiology, health education, sports sociology, sports science research methods, sports marketing, fitness club operation and management, labor and social practice, graduation thesis

As shown in Table 1, we should closely combine the industry needs to set course objectives and knowledge points, and select appropriate courses to ensure that students majoring in physical fitness can be competent for various professional roles such as physical education teaching in primary and secondary schools, fitness guidance, and physical training coaches for sports teams after graduation, and cultivate students with a high sense of social responsibility and noble professional ethics, master systematic sports science knowledge and physical training theory, and have the ability to guide competitive sports, public health, and physical training for special groups. This kind of high-quality application-oriented talents is an important training direction for physical fitness majors.

4.3. Course Content and Classification

With the continuous development and progress of modern science and technology, the cross-integration and mutual penetration of multiple disciplines are becoming more and more frequent. Knowledge flow and interdisciplinary research are also developing with the progress of knowledge and the differentiation of disciplines, gradually forming relatively independent research subject areas.

From the perspective of the research field of interdisciplinary knowledge flow, it is mainly concentrated in the research fields of sports traumatology, sports physiology, sports rehabilitation, sports psychology, sports sociology, sports system engineering, sports neuroscience, sports health and environment, sports nutrition, sports biomechanics, sports education and teaching, children's sports and geriatric sports medicine.

The content of physical training courses includes main disciplines (sports, education) and core courses (sports anatomy, sports physiology, sports biomechanics, physical training theory and methods, sports skill learning and control, sports ability testing and evaluation, sports protection technology, growth and development and sports, sports training, physical training training special). The course is classified into two parts: theoretical knowledge and skill practice. Theoretical knowledge covers the introduction to physical training, physical

assessment, training methods, sports injuries and protection, etc. Skill practice includes quality training such as strength, speed, endurance, flexibility, agility, and special skill exercises.

4.4. Interdisciplinary Theme Design

Table 2. Theme design of physical fitness courses in an interdisciplinary context

Subject Background	Course Theme	Design	Course Exploration Content
Combination of physical fitness and nutrition courses	Nutritional Assessment Program		Comprehensive consideration of the relationship between sports quality, functional mode and the three major nutrients
	Competition nutrition strategy		Nutritional matching before, during and after the game
Combining psychology and physical training	Mental health education		Analysis of the implementation methods and effects of mental health education
	Meditation and relaxation techniques		Discuss the application and results of these technologies in physical training
Combining technology and sports	Data analysis		Introduce specific application cases and data analysis results of technologies in sports
	Virtual reality and augmented reality		Discuss the application and effects of VR and AR technologies in physical training courses
Combining history with physical education courses	Sports history courses		Introduce the course design and teaching effects of combining history and sports
	Cultural experience		Explore the specific forms of cultural experience activities and students' feedback
Combining art with physical education courses	Dance and creative expression		Analyze the physical fitness courses with dance elements and students' feedback on "aesthetic education"
	Sports aesthetics		Explore the implementation of sports aesthetics courses and the benefits to students
Combining environmental science with outdoor physical activities	Outdoor education		Analyze the implementation of outdoor education activities and the benefits to students
	Ecological sports projects		Discuss the design and implementation of environmental sports projects
Combining vocational education with physical education courses	Career discussions		Introduce the design and effectiveness of vocational education courses
	Internship opportunities		Discuss the specific implementation of internship opportunities and student feedback
Combining physical education with special sports	Special sports integration		The combination of physical training and special sports and their advantages
	Reform of assessment system		Propose an adaptive assessment system reform plan based on students' psychological development level and needs
	Evaluation in stages		Establish a staged learning evaluation method to gradually enhance students' professional identity and internal motivation

Table 2 introduces the theme design of physical training courses in colleges and universities combined with different subject backgrounds, including nutrition, psychology, technology, history, art, environmental science, vocational education and physical training specialties. Each theme provides specific course design content, such as nutrition assessment plan, mental health education, data analysis, sports history course, dance and creative expression, outdoor

education, career discussion and special sports combination. Through these interdisciplinary course designs, it is aimed to integrate multidisciplinary knowledge and improve students' overall quality and professional ability.

4.5. Teaching Mode and Method

The physical training professional course of Lingnan Normal University adopts teaching modes such as classroom teaching and practical training. In classroom teaching, traditional and modern methods are combined, and various teaching methods such as lectures, discussions, case analysis, on-site guidance, etc. are combined with multimedia teaching and online course teaching methods to help students establish a solid theoretical foundation and enhance classroom interactivity. In terms of practical training, various physical training tests and training projects are carried out using the sports laboratories and gymnasiums on campus. At the same time, students are organized to participate in community sports activities and internships in professional sports projects to enhance their practical operation ability and social service awareness. Off-campus internships provide students with a wealth of internship positions through cooperation with fitness centers, sports clubs, school sports departments and other units, and are equipped with instructors to follow up and guide to ensure the quality of internships.

Lingnan Normal University adopts a hybrid teaching model, combining theoretical learning with practical operations, and improves students' comprehensive quality and innovation ability through flipped classrooms and project-based learning. In addition, through the mutual evaluation of teachers and students combining process evaluation and final evaluation, the learning effect of students is evaluated more comprehensively to ensure the scientificity and fairness of teaching as much as possible. The diversified teaching model not only stimulates students' interest in learning, but also improves teaching effectiveness and students' practical ability, providing a strong guarantee for cultivating high-quality physical training professionals.

5. Difficulties and Challenges

5.1. Difficulty in Subject Integration

Physical training requires the integration of knowledge from multiple disciplines such as sports science, medicine, nutrition, and psychology. It is difficult to integrate these disciplines. This is mainly reflected in the teaching ability of physical training teachers. Teachers not only master theory and practical operations, but also apply them to teaching to subtly influence students. Since the theoretical systems, research methods, and practical applications of different disciplines are different, integrating multiple disciplines into a complete curriculum system is a major challenge.

5.2. The Teaching Staff Needs to Be Strengthened

The practical training of different teachers varies in their ability to combine theoretical knowledge. Teachers are required to think about the "education" value of the course during the teaching process and expand the height, breadth, and depth of the course. This is both a challenge and an innovation, requiring teachers to continuously learn knowledge of their own disciplines, while combining knowledge from other disciplines to enhance the integration and application of disciplines. Due to the limited number of high-level interdisciplinary teachers, teachers are deficient in interdisciplinary knowledge reserves, teaching methods, and scientific research capabilities, which affects the development of their teaching quality under the interdisciplinary concept. Teachers should actively obtain higher-level physical training qualification certificates to improve their own professional level.

5.3. Rough Course Theme Design

The breadth and depth of the course content cannot be balanced, resulting in unreasonable connection and logical relationship arrangement between courses, which is a problem that needs to be solved in the design process. The choice of which subject in the course needs to be improved in theme design, lacking systematic research and accurate design. And the corresponding course evaluation system is not well established, resulting in the unclear impact of theme design on students' learning effect.

5.4. Single Classroom Teaching Mode

Interdisciplinary teaching mostly maintains the traditional classroom teaching mode, where teachers output and students passively accept. Few teaching methods such as flipped classroom, cooperative teaching (providing specific cases and implementation effects), project-based learning (discussing the specific steps of project implementation and student feedback), case analysis (analyzing the results and inspiration of actual cases), and field trips are used. The single teaching mode is not conducive to improving students' interest in learning, may limit their actual operation ability, and is not conducive to students' ability to actually apply innovation.

5.5. Difficulty in Student Adaptation

There are differences between individual students. Different backgrounds lead to different understanding and acceptance of interdisciplinary content. The differences in adapting to courses are large, which makes it difficult for teachers to grasp students' learning situation. In addition, due to the interdisciplinary background, the course evaluation system of the physical training major is not perfect enough, which makes it impossible to give students timely evaluation and feedback. Teachers cannot grasp whether students have mastered the basic knowledge of multiple disciplines. This may cause students to have a heavy learning burden when taking new courses, affecting learning outcomes and interests.

6. Solutions

6.1. Strengthen Interdisciplinary Research and Cooperation

Encourage physical training majors to cooperate with university teachers in related disciplines such as medicine, nutrition, and psychology to strengthen communication and learning among teachers. Establish interdisciplinary research centers or teams, hold academic seminars and workshops regularly, and promote communication and cooperation among disciplines. Create conditions for mutual learning and exchange in universities, organize seminars between different disciplines on campus, and jointly carry out teaching and scientific research projects.

6.2. Improve the Teaching Staff

Improve the interdisciplinary teaching ability of existing teachers by introducing high-level interdisciplinary teachers and carrying out teacher training and further study programs. Cooperate with well-known universities and research institutions at home and abroad, introduce experts with rich interdisciplinary backgrounds, and regularly organize teachers to participate in academic exchanges and training activities in related fields.

6.3. Optimize Course Design

According to the characteristics of interdisciplinary, reasonably set the course content, focus on the combination of theory and practice, and ensure the scientificity and systematicness of the course system. Invite experts from various disciplines to participate in the course design, set up a modular optimization combination of core courses and elective courses, and provide flexible learning paths and course selection.

6.4. Improve Teaching Models, Methods and Means

Adopt diversified teaching methods and means, such as case teaching, project teaching, experimental teaching, etc., to improve students' learning interest and participation. Introduce modern educational technologies such as online courses and blended teaching to enhance classroom interactivity and practicality, and help students better understand and master interdisciplinary knowledge. Add the flipped classroom teaching model to break the traditional classroom teaching model, minimize the theoretical output of teachers, and let students practice more and think more, so as to have a deeper understanding of what they have learned and become the masters of the classroom.

6.5. Provide Student Support Services

Establish a sound student support system to help students adapt to interdisciplinary courses and improve learning effects. Teachers require students to preview new courses in advance so that students can grasp the ideas of the course in advance. The course sets up an academic tutor system, provides personalized learning guidance and consulting services, and carries out academic counseling and learning skills training to help students solve difficulties and problems in learning.

7. Conclusion

The construction of physical training courses in colleges and universities needs to face challenges in discipline integration, faculty, course design and student adaptation. Through strengthening interdisciplinary research and cooperation, improving faculty, optimizing course design, improving teaching methods and providing student support services, we can effectively deal with these challenges, build a high-quality interdisciplinary physical training course system, promote the all-round development of students, and improve the level of physical training course construction in colleges and universities.

References

- [1] Xu Haiyun, Yin Chunxiao, Guo Ting, et al. A review of interdisciplinary research [J]. Library and Information Work, 2015, 59 (5): 119-127.
- [2] Guan Lingxiang. Research on the path to improve the teaching effect of physical education theory courses under the perspective of subject integration [J]. Contemporary Sports Science and Technology, 2022, 12 (20): 54-56.
- [3] Wang Shunran. The meaning of boundaries: theory and practice of interdisciplinary and cross-cultural [N]. Chinese Social Sciences Journal, 2023-01-06 (8).
- [4] Ministry of Education. Compulsory Education Physical Education and Health Curriculum Standards (2022 Edition) [M]. Beijing: Beijing Normal University Press, 2022: 11.
- [5] Zhang Hua. On understanding-based interdisciplinary learning [J]. Basic Education Curriculum, 2018 (22): 7-13.
- [6] Hu Kuijuan. (2018). Exploration and practice of physical training professional curriculum construction in sports colleges. Bulletin of Sports Science and Technology (06), 8-9+22.
- [7] Ye Ying, Zhang Jiarong, Zhang Hui. The relationship between knowledge flow and interdisciplinary research [J]. Library and Information, 2020 (3): 29-33.
- [8] Zhang Yuanliang, Xue Yuan. (2023). Characteristics of interdisciplinary knowledge flow in sports science based on citation analysis. Journal of Shanghai Institute of Physical Education (04), 61-70+104.

- [9] Z.W. Zhang, J.N. Wang: Crane Design Manual (China Railway Press, China 1998), p.683-685. (In Chinese).
- [10] C. Li, W.Q. Yin, X.B. Feng, et al. Brushless DC motor stepless speed regulation system based on fuzzy adaptive PI controller, Journal of Mechanical & Electrical Engineering, vol. 29 (2012), 49-52.
- [11] China National Standardization Management Committee. Specifications of Crane Design (China Standardization Press, China 2008), p. 16-19.
- [12] J. Liu, E.L. Chen and Z.T. He: Journal of Shi Jia Zhuang Railway Institute (Natural Science), Vol. 22 (2009) No. 4, p.40-42.
- [13] Q. D. Zeng, Q. E. Li: Progress in Civil Engineering, Vol. 32 (2012) No. 9, p. 3077-3080.
- [14] Information on <http://www.weld.labs.gov.cn>.