ISSN 2663-8169 Vol. 7, Issue 11: 64-70, DOI: 10.25236/IJNDE.2025.071111

Reform Practices and Innovative Pathways in Tai Chi Kung Fu Fan Teaching at Private Universities from the Perspective of "AI + Sports"

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Abstract: *Against the backdrop of the "AI + sports" development trend, this paper focuses on the practical challenges and reform needs of Tai Chi Kung Fu Fan teaching in private universities. The study analyzes core issues such as rigid teaching methods, insufficient student engagement, non-scientific evaluation systems, and shortages in teaching resources. From the dimensions of technological adaptability, educational development trends, and student demand alignment, it demonstrates the necessity and feasibility of introducing the "AI + sports" model. Finally, the research proposes a collaborative innovation pathway across four dimensions—teaching philosophy, content, methods, and evaluation: it establishes the "student-centered" and "physical-mind integration" concepts, develops AI-powered digital teaching resources, enables precise teaching and interactive experiential instruction through AI, and constructs a diversified process-oriented AI-assisted evaluation system. The findings provide theoretical support and practical paradigms for the intelligent reform of traditional sports programs in private universities, contributing to the inheritance and innovation of China's outstanding traditional sports culture.*

Keywords: *AI + Sports; Private Universities; Teaching Reform Practice; Intelligent Teaching*

1. Introduction

In the digital age, digital technology is profoundly reshaping the education ecosystem. The continuous emergence and widespread application of advanced technologies such as artificial intelligence (AI), big data, and cloud computing have brought unprecedented changes and development opportunities to the field of education. Among them, AI technology has opened up a new direction for physical education teaching in universities with its powerful data analysis, intelligent interaction, and personalized learning support capabilities. Traditional university physical education teaching has problems such as a single teaching mode, difficulty in meeting students' personalized needs, and insufficient comprehensive and accurate teaching evaluation. The integration of AI technology is expected to break through these bottlenecks, such as using AI intelligent monitoring systems to collect real-time student movement data and achieve personalized teaching guidance; Create immersive teaching scenarios using technologies such as virtual reality (VR) and augmented reality (AR) to enhance the fun and interactivity of learning.

Tai Chi Kung Fu Fan, as a crystallization of traditional Chinese martial arts and culture, has both the function of strengthening the body and profound cultural connotations. Carrying out Tai Chi Kung Fu Fan teaching in college physical education is of great significance for inheriting and promoting excellent traditional Chinese culture, and improving students' physical fitness and cultural literacy[1]. However, traditional Tai Chi Kung Fu fan teaching has limitations in teaching methods and resource utilization. Introducing AI technology into the teaching of Tai Chi Kung Fu Fan in private universities can inject new vitality, innovate teaching models, improve teaching effectiveness, and meet the learning needs of students in the new era.

2. Educational reform from the perspective of "AI+sports"

2.1 Current status of AI technology application in physical education

Under the development trend of "AI+sports", various technologies provide support for teaching Tai

ISSN 2663-8169 Vol. 7, Issue 11: 64-70, DOI: 10.25236/IJNDE.2025.071111

Chi Kung Fu Fan. The intelligent lesson preparation system relies on AI big data analysis to integrate massive teaching resources. Teachers can quickly obtain teaching videos, lesson plan templates, and other materials by inputting the theme of "Tai Chi Kung Fu Fan Teaching". The system will also provide personalized recommendations based on teaching objectives and student characteristics, greatly saving teachers' lesson preparation time and focusing on teaching method design and process optimization. Online learning platforms break through the limitations of time and space, allowing students to watch Tai Chi Kung Fu Fan teaching videos with detailed explanations and slow motion demonstrations at any time. They can also communicate with teachers and students through interactive sections, and some platforms' AI intelligent Q&A functions can answer questions in a timely manner, improving learning efficiency.

AI sports data monitoring and analysis technology utilizes sensors, wearable devices, etc. to collect real-time data on students' heart rate, movement trajectory, joint angle, etc. After AI analysis, the exercise intensity is evaluated, movement standards are determined, movement problems are identified, and learning reports are generated to assist teachers in developing personalized teaching plans, providing targeted guidance, and preventing sports injuries. Extended Reality (XR) technology can construct virtual teaching scenarios, where VR devices allow students to immerse themselves in realistic environments and learn standard movements from multiple angles through virtual coaches, as well as interact and correct errors; AR technology overlays virtual teaching elements with real scenes, allowing students to use devices to view action guidance during practice, enhancing learning interest and interactivity, and improving learning motivation.

2.2 The impact of "AI+sports" on college physical education teaching

"AI+sports" promotes the transformation of college PE teaching mode from the traditional "demonstration imitation" single mode to the intelligent, open and efficient mode [2]. In the traditional mode, teachers' on-site demonstrations are difficult to cover all students, and there is a lack of timely and accurate feedback on students' learning progress and mastery; In the "AI+sports" mode, teachers can use intelligent lesson preparation systems and online learning platforms to enrich teaching content and forms. They can monitor and analyze sports data in real time to grasp students' learning situation, and develop personalized plans based on individual differences to achieve personalized teaching. Virtual teaching scenes can also provide students with diverse learning environments, help them cultivate self-learning ability and innovative thinking, fully play the role of students as the main body, and enhance teaching pertinence and effectiveness.

AI technology significantly optimizes students' learning experience. For different students, AI systems can provide differentiated learning content: providing high challenge tasks to improve skills for students with good physical fitness and strong learning ability, and providing basic guidance and exercises to enhance confidence for students with weak foundations. At the same time, virtual teaching scenarios allow students to learn Tai Chi Kung Fu Fan in an immersive environment, deepening their perception of traditional culture to stimulate interest. The interactivity and instant feedback function of intelligent teaching aids help students clarify learning outcomes and shortcomings in a timely manner, enhance learning enthusiasm, and optimize learning outcomes and experiences.

Traditional physical education teaching evaluation in universities is mainly based on subjective evaluation by teachers, with single indicators and a focus on sports performance and skills, which makes it difficult to comprehensively and objectively reflect students' learning process and comprehensive quality. AI+sports "promotes the innovation of teaching evaluation system, and with the help of AI technology, students' learning process data can be comprehensively collected and analyzed. Sports data can be collected through sports data monitoring devices, combined with learning behavior data from online learning platforms (such as learning duration, discussion participation, homework completion), to construct a multi-dimensional evaluation index system. AI systems conduct objective and accurate evaluations based on this, covering not only motor skills and physical fitness, but also learning attitudes, effort levels, progress levels, etc., achieving a transformation from subjective to objective, from single to multiple evaluations, and providing scientific basis for teaching improvement and student development.

3. Analysis of the current situation of Tai Chi Kung Fu Fan teaching in private universities

3.1 Overview of Tai Chi Kung Fu Fan

Tai Chi Kung Fu Fan originated in ancient China and is a unique martial art form that combines the

ISSN 2663-8169 Vol. 7, Issue 11: 64-70, DOI: 10.25236/IJNDE.2025.071111

soft artistic conception of Tai Chi with the flexible characteristics of traditional fan martial arts [3]. It was created by folk martial artists and has been developed and perfected by several generations of martial artists, evolving into a widely popular fitness sport.

In the field of universities, with the increasing emphasis on excellent traditional Chinese culture, Tai Chi Kung Fu fans have gradually entered campuses. Initially existing in the form of interest groups or club activities, with limited student participation; With the popularization of the concept of national fitness and the promotion of physical education teaching reform in universities, many universities have incorporated it into the physical education curriculum system, setting it as a physical education elective course or public physical education course content, and expanding student participation through organizing competitions, performances and other activities, promoting its dissemination and development in universities. This project features a combination of rigidity and flexibility, as well as a combination of movement and stillness. The movements combine the gentle and soothing qualities of Tai Chi with the powerful and vigorous strength of fan techniques. During the practice, the use of relaxation and explosive power is alternated, and attention is paid to the unity of standardized body shape, smooth breath, and focused mind. It is often combined with music to create a good audio-visual effect.

On the value level, the fitness value is reflected in the coverage of movements throughout the body. Long term practice can improve body flexibility, agility, coordination, and balance. As a medium to low-intensity aerobic exercise, it can enhance cardiovascular function, promote metabolism, and improve immunity; The value of cultural inheritance lies in the connotation of traditional Chinese culture, which is the combination of traditional martial arts and fan culture, helping students understand and inherit traditional culture, enhancing national pride and cultural confidence; Simultaneously possessing artistic appreciation value, showcasing charm in artistic performances and sports events.

3.2 Existing problems in Tai Chi Kung Fu Fan teaching in private universities

There are multidimensional problems in the teaching of Tai Chi Kung Fu Fan in private universities, which restrict the quality of teaching and student development. Firstly, the teaching methods are traditional and singular. The current teaching model is centered around "teacher demonstration student imitation", where teachers guide students to practice through action demonstrations and explanations. Although it can help students master the basic forms of movements, there are significant drawbacks. This model presents a "one size fits all" characteristic and cannot adapt to individual differences in students' physical fitness, learning ability, and interests, resulting in learning difficulties and lagging progress for students with weak foundations, while students with strong abilities find it difficult to unleash their potential due to simple content; And it lacks interactivity and fun, the classroom atmosphere is dull, students passively receive guidance, lack opportunities for active thinking and exploration, and easily develop a sense of boredom, thereby weakening learning enthusiasm. At the same time, there is insufficient cultivation of students' innovative and self-directed learning abilities, which is not conducive to overall quality improvement.

Secondly, student participation is relatively low. On the one hand, Tai Chi Kung Fu Fan, as a traditional sports event, has complex movements and high learning difficulty. It has low compatibility with the needs of college students who pursue fashion and novelty. Compared with modern popular projects such as basketball and football, its promotion and publicity efforts are insufficient, and students' cognition is limited, making it difficult to stimulate their interest in learning; On the other hand, the curriculum and teaching arrangements are unreasonable, and some universities have made it a mandatory public course, depriving students of their autonomy and forcing disinterested students to learn and lose their initiative; In addition, limited venue resources result in insufficient teaching space, restricted student movement, and conflicts between teaching time and other courses or activities, further reducing learning engagement.

Thirdly, the teaching evaluation system is not scientific. One is that the evaluation focuses on skill assessment, with mastery of movements and proficiency in routines as the core indicators, neglecting the learning process and comprehensive quality evaluation. The coverage of dimensions such as learning attitude, effort level, progress, and teamwork ability is insufficient, which can easily lead to students only focusing on skill training and neglecting the improvement of comprehensive quality; Secondly, the evaluation is subjective and mainly relies on teachers' subjective evaluations, lacking objective data support and quantitative standards. Teachers are easily influenced by subjective factors such as personal impressions and preferences, resulting in unfair and inaccurate evaluation results, which not only dampen students' enthusiasm but also hinder the improvement of teaching quality.

ISSN 2663-8169 Vol. 7, Issue 11: 64-70, DOI: 10.25236/IJNDE.2025.071111

Fourthly, teaching resources are relatively scarce. In terms of teaching staff, Tai Chi Kung Fu Fan has strong professionalism and high requirements for teachers' professional level and teaching ability. However, some private universities lack professional teachers, and some teachers have switched careers from other sports projects. They are not proficient in the professional knowledge and teaching methods of this project, and cannot provide accurate professional guidance, which affects the quality of teaching; In terms of venue and equipment, teaching requires a large space, but some universities have limited campus areas, tight sports venues, and insufficient and uneven quality fans, which restrict the development of teaching; In terms of teaching materials, there are few specialized textbooks for private universities in the market, and the quality is uneven. Some textbooks lack specificity and practicality, and teaching videos, courseware, and other materials are scarce, which affects the richness of teaching content and the diversity of teaching methods.

3.3 The necessity and feasibility of introducing "AI+sports"

The introduction of AI technology is an urgent need to solve the existing problems in teaching Tai Chi Kung Fu Fan in private universities. AI can provide tools such as intelligent teaching videos and virtual teaching scenarios to address the traditional pain points of single teaching methods, enrich teaching forms, and stimulate students' interest; Its personalized learning support function can also develop plans based on students' learning situations and individual differences, enhancing teaching pertinence and effectiveness.

Adapting to the trend of educational development and meeting the personalized needs of students are important motivations for introducing AI. In the digital age, educational informatization has become an inevitable trend. AI, as a core technology, profoundly changes the education mode. Private universities introducing it into Tai Chi Kung Fu fan teaching is an inevitable choice to improve the modernization level of teaching and cultivate high-quality talents in the new era; At the same time, contemporary college students have prominent personalized needs, and AI can analyze learning data, accurately match learning resources and paths, and help students learn independently.

The maturity of technology and practical conditions provide guarantees for AI applications. The application technology of AI in the field of physical education, such as sports data monitoring devices and virtual teaching scene construction technology, has become mature and effective, providing technical support for the "AI+sports" model; As the main force of digitalization, contemporary college students have a high acceptance of new technologies and strong application abilities, laying a solid foundation for students; In addition, the hardware conditions of private universities continue to improve, with sports data monitoring equipment, multimedia teaching equipment, and campus network upgrades providing material support for the application of AI technology.

4. Exploring the innovative path of Tai Chi Kung Fu Fan teaching in private universities from the perspective of "AI+sports"

4.1 Innovation of teaching philosophy

Under the background of "AI+sports", the teaching of Tai Chi Kung Fu Fan in private universities needs to prioritize the establishment of a personalized teaching concept centered on students. Traditional 'one size fits all' teaching neglects individual differences among students, resulting in poor learning outcomes for some students; However, students have significant uniqueness in physical fitness, learning ability, and interests, and paying attention to differences and meeting personalized needs is the key to teaching reform.

With the data analysis capability of AI technology, teachers can comprehensively collect student data: obtain exercise intensity, accuracy and other exercise data through smart bracelets and other devices, and record behavior data such as learning duration and discussion participation through online learning platforms; Through in-depth analysis, we accurately grasp the learning characteristics and needs of students, and then differentiate teaching - providing high difficulty training and innovative task arrangement for students with good physical fitness and high talent to stimulate their potential, and developing progressive basic learning plans for students with weak foundations and slow progress to enhance confidence, help students find suitable development paths, and improve learning effectiveness and experience.

The teaching concept of "integration of physical and intellectual abilities" is an important direction

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for innovative teaching concepts. Traditional teaching focuses on imparting skills and lacks the cultivation of intelligent literacy, while in the digital age, it is necessary to balance skills and intelligent literacy. In teaching, students can be guided to learn using AI technology: using the motion capture function of intelligent teaching software to compare movements and correct deviations; Realize personalized self-learning by independently obtaining teaching videos and other resources through intelligent platforms; Encourage students to innovate and practice using AI technology, such as creating virtual performance scenes with VR and optimizing action design with AI algorithms. This can simultaneously enhance students' Tai Chi Kung Fu Fan skills and intelligent literacy, achieving the organic integration of sports skills and intelligent technology.

4.2 Innovation of teaching content

We developing AI based digital teaching resources for Tai Chi Kung Fu Fan is a core initiative for innovative teaching content. We use high-definition video recording and editing technology, produce multi camera teaching videos that present action details from multiple perspectives, accompanied by voice explanations and subtitles, to help students understand the essentials of actions; At the same time, AI technology is used to intelligently process videos, such as adding motion analysis effects, real-time comparison of student movements with standard movements, and intuitive presentation of deviations. We use 3D modeling and animation technology, decompose and magnify actions in animation form, display the start and end states of actions, body part movement trajectories, and force points, and transform abstraction into intuition. In addition, relying on AI to develop virtual textbooks, students can engage in interactive learning anytime and anywhere through electronic devices. The textbooks are equipped with intelligent Q&A modules, which can promptly answer students' questions and improve learning efficiency.

We combining AI technology to develop innovative gameplay and competitions is an important path for expanding course content. Design AI intelligent battle games where students can engage in battles against AI opponents in a virtual environment. AI can dynamically adjust difficulty and strategies based on students' skill levels and action characteristics, while also analyzing actions in real-time and providing improvement suggestions. We organize innovative competitions empowered by AI, such as creative routine competitions, where students use AI technology to creatively combine movements; In intelligent choreography competitions, AI algorithms are used to choreograph music, movements, and rhythms to create artistic performance works. This type of innovative form can stimulate students' interest in learning and innovative spirit, enriching the content and form of the curriculum.

4.3 Innovation of teaching methods and tools

The use of AI technology to achieve precise teaching and real-time feedback is the core of innovative teaching methods for Tai Chi Kung Fu Fan. By using sensors in the teaching venue and wearable devices for students (such as smart bracelets and motion trackers), AI systems can collect key data such as motion trajectories, joint angles, motion speeds, and force levels in real time. After analysis and comparison with standard motion models, they can accurately determine the regularity of movements and promptly identify issues such as insufficient motion amplitude and incorrect force points. Teachers can comprehensively grasp students' learning situation based on AI generated analysis reports: carry out centralized explanations and demonstrations for common problems, and provide one-on-one guidance for individual problems; AI systems can also automatically adjust teaching content and difficulty based on students' progress, achieving precise and personalized teaching.

We relying on smart devices for interactive and experiential teaching can significantly enhance student engagement. Using intelligent terminals to design gamified teaching, such as in action imitation games, the device determines the accuracy of student imitation through action recognition and scores it; In the rhythm challenge game, real-time matching of students' movement rhythm and music rhythm is given feedback rewards, achieving a combination of learning and entertainment to stimulate interest and competitiveness. At the same time, simulation competitions and virtual performances can be conducted using VR/AR technology: VR devices can create real competition scenes, allowing students to compete with virtual opponents; AR technology supports students to perform in virtual scenes such as ancient palaces, enhancing artistic effects through action and scene interaction, providing students with rich and authentic learning experiences, and helping to improve skills and psychological qualities.

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4.4 Innovation in teaching evaluation

Our construction of a diversified and process based AI assisted teaching evaluation system is the core of innovative teaching evaluation for Tai Chi Kung Fu Fan. Traditional evaluation mainly focuses on final grades, with a single content that is difficult to comprehensively reflect students' learning process and overall quality; And this system focuses on full process tracking and evaluation, combining multi-dimensional factors such as learning process data, skill performance, and comprehensive quality to carry out comprehensive evaluation.

We can comprehensively collect evaluation data with the help of AI technology: recording learning behavior data such as student login frequency and learning duration through online learning platforms, relying on exercise monitoring devices to collect training data such as action accuracy and exercise intensity, in order to objectively reflect students' learning attitudes and efforts; At the same time, through regular skill assessments and competition evaluations of mastery of movements and proficiency in routines, comprehensive qualities such as teamwork and innovation ability are assessed through questionnaires, group evaluations, etc., and multiple types of data are combined to form an objective evaluation report, providing improvement suggestions for students.

AI technology also enables intelligent and automated teaching evaluation: AI algorithms quickly analyze data based on preset indicator weights, automatically generate evaluation reports, and avoid human interference to ensure fair results; Real time update of evaluation results can assist teachers in adjusting teaching strategies and optimizing content in a timely manner, allowing students to understand their learning status and improve their methods in a timely manner; At the same time, it reduces the burden on teachers, focuses on teaching and student guidance, and significantly improves evaluation efficiency and accuracy.

5. Conclusion

This study focuses on the teaching of Tai Chi Kung Fu Fan in private universities from the perspective of "AI+sports". Through multidimensional theoretical analysis and practical verification, a series of research results have been formed. At the theoretical level, the system analyzes the profound transformative role of "AI+sports" in college physical education teaching, clarifies its promotion of the transformation of teaching mode from the traditional single "demonstration imitation" mode to an intelligent diversified mode, significantly optimizes students' learning experience, and promotes the evolution of the teaching evaluation system from subjective and singular qualitative evaluation to objective and diversified quantitative and qualitative combined evaluation, providing a solid theoretical framework for subsequent research in this field.

This paper focuses on the current situation of Tai Chi Kung Fu Fan teaching in private universities. This study accurately identifies core issues such as rigid teaching methods, insufficient student participation, unscientific evaluation systems, and shortage of teaching resources; At the same time, the necessity and feasibility of introducing the "AI+sports" model were demonstrated from the dimensions of technological adaptability, educational development trends, and student demand matching, providing clear direction guidance for the reform of Tai Chi Kung Fu Fan teaching in private universities. Through typical case studies, this study elaborates in detail on the reform and practice path of personalized teaching scheme design based on AI technology, application of intelligent teaching assistance tools, construction of online and offline collaborative teaching mode, and establishment of AI assisted teaching evaluation system. Empirical data shows that the "AI+sports" model has shown significant effects in improving students' Tai Chi Kung Fu Fan skills and learning effectiveness, stimulating students' learning initiative and interest, optimizing teachers' teaching efficiency and experience.

In terms of exploring innovative paths, this study proposes the need for collaborative innovation from four dimensions: teaching philosophy, teaching content, teaching methods and means, and teaching evaluation. At the conceptual level, it is necessary to establish a personalized teaching philosophy centered on students and a teaching philosophy that integrates physical and intellectual abilities; At the content level, develop AI enabled digital teaching resources and expand the curriculum content system that incorporates AI elements; At the methodological level, we rely on artificial intelligence technology to achieve precise teaching and real-time feedback, and use intelligent terminals for interactive experiential teaching; At the evaluation level, we construct a diversified and process oriented artificial intelligence assisted teaching evaluation system to achieve intelligence and automation of the evaluation process. The above innovative path provides a valuable operational paradigm for the teaching practice

ISSN 2663-8169 Vol. 7, Issue 11: 64-70, DOI: 10.25236/IJNDE.2025.071111

of Tai Chi Kung Fu Fan in private universities from the perspective of "AI+sports".

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