

Original Research Article

Research on the empowering effect and practical path of artificial intelligence in Wushu courses in universities

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Abstract: As an indispensable part of university physical education, university Wushu courses undertake important missions to strengthen college students' physical fitness, inherit traditional Chinese martial culture, and cultivate students' sportsmanship and patriotism. Traditional Wushu teaching is confronted with prominent problems: Rigid teaching modes, lack of individualized guidance, delayed correction of movement errors, simplistic evaluation systems and low-level student learning motivation. Under educational digital transformation, artificial intelligence technologies including motion pose recognition, intelligent movement comparison, big data analysis and digital teaching resource generation provide innovative solutions for university Wushu curriculum reform. By adopting literature review and logical analysis, this paper explores AI's multi-dimensional strengths in developing teaching resources, optimizing classroom training, realizing differentiated teaching, improving evaluation mechanisms and supporting after-class practice. It analyzes the inherent limitations of AI application and builds a human-machine collaborative teaching framework for university Wushu scenarios. The results show that artificial intelligence can effectively make up for the shortcomings of conventional Wushu teaching, optimize teaching systems and raise teaching efficiency. Nevertheless, educators should rationally recognize AI's technical boundaries and avoid over-reliance on technology. Human-machine collaborative teaching will boost the digitalization, standardization and modernization of university Wushu courses.

Keywords: artificial intelligence; university Wushu courses; physical education teaching; teaching reform; human-machine collaboration

1. Introduction

1.1. Research background

Digital transformation serves as a core direction for higher-education reform in China, and smart physical education has drawn wide attention in campus construction. As a representative carrier of fine traditional Chinese culture, Wushu has been offered as a public PE course in many universities, covering basic routines, Tai Chi, apparatus exercises and Sanda for undergraduates of all majors.

Traditional university Wushu teaching follows the pattern of teacher demonstration, student imitation and repeated practice. Most public Wushu classes are large-group teaching with 40-60 students per class. Restricted by class time, Wushu teachers can hardly deliver targeted guidance for every student. Most college students have no Wushu foundation. Incorrect postures, stances and force application cannot be corrected in time, which forms ingrained faulty movements and weakens teaching effects.

Besides, traditional Wushu teaching is limited by monotonous teaching materials and rigid teaching procedures. Disconnected after-class training and one-sided final assessment hinder the continuous improvement of students' martial skills. Artificial intelligence breaks time-space constraints and teacher-resource bottlenecks in traditional teaching. It supplies new technical support to reconstruct Wushu classrooms, innovate teaching modes and perfect evaluation systems, which is of great practical value for high-quality development of university Wushu education.

1.2. Research significance

Theoretical Significance: This study enriches the theoretical system integrating artificial intelligence

and university physical education. It clarifies the application logic and boundaries of AI in Wushu teaching, improves the theoretical framework of smart Wushu education, and offers theoretical references for digital reform of university PE.

Practical Significance: Aiming at typical teaching difficulties including insufficient personalized tutoring, disconnection between in-class and after-class training and unscientific evaluation standards, this paper puts forward operable AI-supported solutions. Diversified digital resources and intelligent auxiliary tools can stimulate college students' learning enthusiasm, standardize Wushu movements, and combine skill training with cultural inheritance so as to comprehensively improve the overall teaching quality of university Wushu courses.

1.3. Research methods

Literature Review: Relevant papers, academic reports and policy documents about AI-enabled physical education, university Wushu teaching innovation and smart campus sports are retrieved from CNKI, Wanfang and international academic databases to establish a theoretical basis for this research.

Logical Analysis: Combined with the characteristics of university Wushu teaching and technical features of artificial intelligence, this paper analyzes AI's empowering value and existing drawbacks, and summarizes feasible paths for human-machine collaborative teaching.

2. Predicaments of traditional Wushu teaching in universities

2.1. Lack of individualized tutoring under large-class teaching mode

Large-class arrangement prevails in university public Wushu courses. Teachers need to finish unified demonstration, routine explanation and collective error correction within limited class hours. One teacher cannot observe and adjust movements for dozens of students at the same time. Students with poor physical coordination or zero foundation are likely to develop wrong movement habits. Without timely targeted intervention, it is difficult for them to master standard Wushu techniques.

2.2. Subjective teaching standards and insufficient quantified evaluation

High-quality Wushu pursues the unity of form, spirit, strength and intention. Conventional teaching mainly depends on teachers' nakedeye observation and personal experience to assess movement quality. Teachers often give descriptive feedback such as "unstable center of gravity" or "stiff movement", lacking objective quantitative data. Students cannot visually find gaps between their own movements and standard models. Consequently, many learners only pursue superficial similarity rather than real technical standardization.

2.3. Outdated teaching resources and rigid classroom forms

Most universities still take printed textbooks, on-site demonstration and prerecorded videos as main teaching resources. Single resource forms fail to match contemporary college students' digital learning habits. The repetitive "demonstration-imitation-practice" mode easily leads to learning burnout. Many students take part in training passively with little in-depth understanding of cultural connotations behind Wushu routines.

2.4. Disconnection between in-class teaching and after-class training

Wushu courses have limited class hours. Mastery of complete routines requires persistent after-class practice. However, students cannot obtain professional guidance after leaving sports venues. Without auxiliary error-correction channels, self-practice may cause movement distortion and routine forgetting. The separation of classroom learning and afterclass consolidation restricts sustainable improvement of students' Wushu competence.

3. Multi-dimensional empowerment of artificial intelligence for university Wushu courses

3.1. Construct diversified digital teaching resource library

AI technologies such as intelligent video segmentation and 3D motion modeling can decompose

standard Wushu routines (Changquan, Tai Chi, Nanquan etc.) into segmented postures, slow-motion demonstration and skill explanation materials. Generative AI sorts out Wushu origins, martial-morality theories and sports-injury-prevention knowledge, and produces diversified teaching materials including graphics, short videos and exercise banks.

Wushu teachers can assign targeted resources for preview, classroom explanation and review in accordance with teaching progress. Digital resources compensate for defects of traditional textbooks, promote integration of skill training and cultural education, and enhance the completeness of Wushu curriculum systems.

3.2. Real-time intelligent movement correction to solve large-class teaching difficulties

Computer-vision-based human pose recognition captures skeletal key points through ordinary cameras and accurately identifies deviations in basic stances, punches and palm movements. In collective practice, the AI system continuously monitors all students, marks error positions and sends voice reminders, acting as a full-time intelligent teaching assistant.

AI frees teachers from repetitive basic error-correction work. Teachers can focus on explaining force-application principles, attack-defense meanings and routine artistic conception. The teaching mode that "AI calibrates external forms while teachers deliver internal connotations" greatly improves classroom teaching precision.

3.3. Support differentiated teaching to achieve student-centered instruction

College students have uneven Wushu foundations: Some have long-term training experience while most beginners lack physical coordination. Unified teaching progress cannot satisfy learners at different levels. Through big data, artificial intelligence records each student's movement accuracy, error frequency and learning progress, automatically identifies individual weaknesses and realizes learner stratification.

For beginners, the system emphasizes basic-stance training; intermediate learners obtain targeted practice for routine coherence; advanced students receive difficult-skill promotion plans. Customized learning paths break the "one-size-fits-all" mode and realize differentiated instruction.

4. Limitations of artificial intelligence applied in university Wushu teaching

4.1. Technical deficiencies in motion recognition

AI pose recognition mainly evaluates external movement forms, joint angles and motion trajectories. It cannot identify Wushu's internal core elements including force transmission, breathing coordination, rhythm and artistic conception. Students may get qualified external postures but rigid power output without real Wushu charm. Furthermore, limb occlusion during fast routines or apparatus exercises lowers algorithm recognition accuracy.

4.2. Potential over-dependence on technology

If students rely excessively on AI automatic error prompts, they will lose initiative to perceive and reflect on movement principles. Learners may mechanically imitate postures without understanding attack-defense logic, leading to "empty forms without essence". Technology may become an obstacle for students to experience Wushu's intrinsic value.

4.3. Insufficient hardware support on campus

Many universities are short of intelligent cameras, AI teaching terminals and supporting software platforms in gymnasiums. AI-assisted Wushu teaching mostly stays at pilot-trial stage rather than full-scale popularization, which hinders wide promotion of smart teaching modes.

5. Optimization paths of AI empowering university Wushu courses

5.1. Adhere to human-machine collaborative teaching principle

The core principle is "teachers play the leading role and artificial intelligence acts as auxiliary support". University Wushu teachers take primary responsibilities for curriculum design, theoretical explanation, force-skill teaching, martial-morality cultivation and emotional communication. AI undertakes standardized

auxiliary work: Movement monitoring, automatic error correction, resource display, data statistics and after-class tutoring. Clear functional division avoids the wrong viewpoint that technology can replace human teachers.

5.2. Strengthen infrastructure construction for smart physical education

Universities should increase investment in digital sports facilities. Intelligent shooting equipment and AI teaching terminals shall be deployed in Wushu training venues. Campuses may build exclusive cloud platforms for Wushu teaching so as to realize regular and large-scale application of intelligent auxiliary technology and lay hardware foundations for curriculum digital reform.

5.3. Enrich interactive forms and optimize differentiated teaching design

Based on learning data analyzed by AI, teachers design layered teaching tasks matching students' competence. Combined with virtual digital-human technology, challenge mechanisms and online grading systems, teachers can transform repetitive mechanical training into interactive experience, stimulate learning interest and improve students' willingness for autonomous practice.

5.4. Construct comprehensive evaluation system combining quantification and qualification

Universities shall perfect Wushu course assessment standards. Data indicators from AI serve as quantitative scoring references. Teachers' judgement on learning attitude, martial morality, movement charm and teamwork acts as qualitative criteria. The multi-angle assessment system fulfills the fundamental task of fostering virtue through physical education.

6. Conclusion

University Wushu courses are important carriers for physical education and traditional-culture inheritance. Various defects of traditional teaching have long restricted teaching-quality improvement. Artificial intelligence shows prominent strengths in digital-resource development, intelligent error correction, personalized instruction and scientific evaluation. It effectively copes with such problems as insufficient individual guidance, disconnection between in-class and after-class learning and simplistic assessment, and brings new chances for university Wushu curriculum reform.

Nevertheless, artificial intelligence has inherent limitations. It cannot perceive internal strength, artistic conception and martial morality pursued by Wushu. Teaching innovation for university Wushu must stick to student-oriented concepts and construct a human-machine collaborative mode led by teachers and empowered by AI. Technology shall serve rather than dominate teaching. While enhancing students' Wushu skills, universities should attach importance to inheriting Chinese martial culture and cultivating students' sports character, and promote sustainable, digital and high-quality development of university Wushu education.

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