Application Strategy of Artificial Intelligence in Physical Education Teaching Reform

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Abstract: This article focuses on the application of artificial intelligence (AI) in the reform of physical education (PE). With the continuous advancement of PE reform, the traditional teaching mode has changed to diversification, and cultivating students' comprehensive development has become the core goal. In this context, it is of great significance to explore the role of AI in it. Through theoretical analysis, this article expounds the correlation between AI and PE reform, analyzes its application advantages and difficulties, and puts forward targeted application strategies. It is found that AI can bring advantages such as personalized teaching and rich resources to PE, but it faces difficulties such as technical cost and teacher's ability limitation. Based on this, this article puts forward some strategies such as strengthening the top-level design of technology and teaching integration, improving teachers' AI application ability, and ensuring data security and privacy, so as to promote AI to play a better role in the reform of PE and help the modern development of PE.

1. Introduction

In today's digital age, the field of education is undergoing profound changes. As an important part of the overall education system, PE is also facing new opportunities and challenges [1]. The traditional PE teaching model is gradually unable to meet the needs of modern education development in teaching methods, teaching resources and individualized attention to students. In this context, the rise of AI technology has brought new opportunities for the reform of PE [2].

At present, AI has widely penetrated into various fields. In the field of education, AI provides technical support for the innovation and optimization of teaching mode by virtue of its powerful data processing and analysis capabilities and personalized service capabilities [3]. For PE teaching, the application of AI is expected to break through the limitations of traditional teaching and realize the intellectualization, individualization and high efficiency of the teaching process [4].

The purpose of this study is to explore the application strategy of AI in PE reform. On the one hand, by tapping the application potential of AI in PE teaching, this article explores how to use it to improve the quality and effect of PE teaching, so as to meet the requirements of the new era for the cultivation of talents' physical quality and sports literacy. On the other hand, it analyzes the problems and dilemmas that AI may face in the application of PE, and puts forward practical application strategies to provide theoretical support and practical guidance for promoting the modernization of PE.

2. Overview of AI and related theories of PE teaching reform

AI is a technical science that simulates, extends and expands human intelligence. Its origin can be traced back to the middle of the 20th century, and now it covers many fields through continuous development. In the PE teaching scene, machine learning and deep learning are the key technologies [5]. Machine learning allows computers to make predictions through data learning mode, such as predicting future performance trends based on students' past sports data. As a branch of machine learning, deep learning can accurately analyze students' complex movements with the

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help of deep neural network. Intelligent sensing technology is also very important. All kinds of sensors can collect the data of students' heart rate and speed in real time, which provides scientific basis for teaching.

The reform of PE teaching aims at reforming in many aspects, such as teaching concept, mode and evaluation. Traditional PE teaching pays more attention to skill transmission, while modern teaching concept emphasizes student-centered and pays attention to students' physical and mental health and comprehensive development [6]. In the teaching mode, we advocate breaking through the single classroom teaching form and introducing diversified teaching methods, such as online and offline mixed teaching. Teaching evaluation is no longer limited to sports performance, but changes to diversification, and comprehensively considers students' learning attitude and progress. The core goal of PE reform is to cultivate students' good physical quality, master sports skills, form lifelong sports consciousness, and promote students' comprehensive development in physical, psychological and social adaptability.

AI brings many opportunities for PE reform. It can provide personalized teaching programs based on individual differences of students to meet the learning needs of different students [7]. At the same time, with the help of technology to integrate rich teaching resources, such as virtual sports scenes, broaden students' learning channels. In the teaching process, through real-time monitoring and feedback, students can be helped to correct their actions in time and improve their learning effect. In addition, AI helps to build a more scientific and comprehensive teaching evaluation system. The demand of PE reform also promotes the application and innovation of AI in the field of education, and promotes the continuous optimization of technology to better serve PE.

3. Advantages and difficulties of AI in the reform of PE

3.1. Application advantages

With the help of big data analysis, AI can deeply understand each student's physical condition, sports ability, learning style and other information, so as to tailor personalized PE teaching programs for students [8]. For example, for students with weak physical fitness and poor coordination, the system can arrange some basic and step-by-step training programs and adjust the training intensity and frequency. This method of teaching students in accordance with their aptitude effectively meets the learning needs of different students and helps to improve the effect and enthusiasm of students' PE learning.

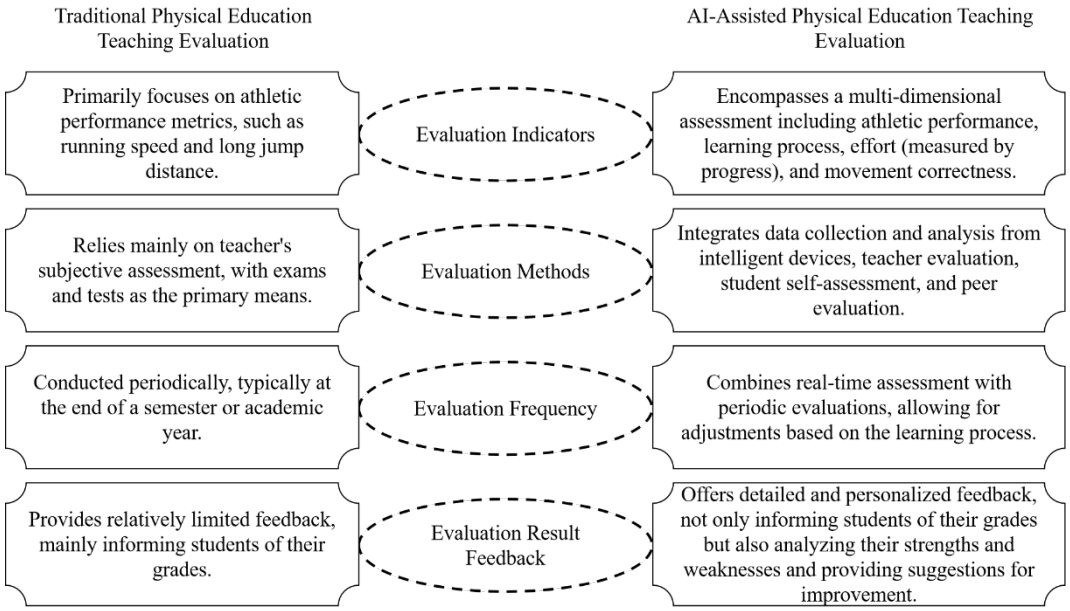

Figure 1 Comparison between traditional PE teaching evaluation and AI-assisted PE teaching evaluation

By integrating all kinds of resources, AI has broken the time and space limitations of traditional

PE. A variety of teaching materials, such as online courses, virtual sports scenes and action demonstration videos, provide students with more diversified learning channels. Students can not only learn with teachers in class by using these resources, but also choose appropriate content to consolidate and expand their learning after class.

The application of intelligent devices and sensors in PE makes it possible to monitor students' sports data in real time. Key data such as heart rate, movement trajectory and movement accuracy are collected and analyzed in real time, and teachers or systems can give students feedback and guidance in time. AI helps to build a diversified and comprehensive teaching evaluation system [9]. It no longer only pays attention to students' sports achievements, but also comprehensively evaluates students' learning process, efforts and progress. By tracking students' sports learning data for a long time, students' sports learning situation can be more accurately evaluated and scientific basis can be provided for teaching adjustment. Specific comparison of different evaluation dimensions can refer to Figure 1.

3.2. The dilemma faced

The application of AI technology in PE teaching needs the support of certain hardware equipment and software platform. Hardware prices such as smart wearable devices and motion monitoring instruments are relatively high, and schools need to invest a lot of money to equip these devices on a large scale. At the same time, the development and maintenance of software platform suitable for PE teaching also needs continuous financial support, which limits the application and promotion of AI technology in some schools to some extent. At present, some PE teachers have limited knowledge of AI technology. They may not be familiar with the operation and application of related technologies, and it is difficult to effectively integrate AI into daily teaching. For example, many teachers lack relevant professional knowledge and skills on how to use data analysis software to analyze students' sports data and how to adjust teaching strategies according to the analysis results, which requires strengthening teachers' technical training and professional development.

In the process of PE teaching, a large amount of personal data generated by students involves privacy issues. Once these data are leaked or abused, it may bring adverse effects to students. For example, if students' health data, exercise habits and other information are obtained by criminals, they may be used for commercial purposes or cause other security risks. Therefore, how to ensure data security and students' privacy is an urgent problem to be solved in the application of AI in PE teaching. The application of AI in PE teaching may cause a series of educational ethics problems. On the one hand, algorithm bias may lead to unfair evaluation of students, and due to the possible limitations of algorithm design, unfair evaluation results may be produced for some student groups. On the other hand, over-reliance on AI technology may lead to the decline of students' interpersonal skills and lack of face-to-face interaction and communication, which is not conducive to students' comprehensive development.

4. The application strategy of AI in PE reform

4.1. Strengthen the top-level design of the integration of technology and teaching

Table 1 Reference Table for AI PE Teaching Fund Allocation in Schools of Different Sizes

School Size (Number of Students)	Fund Allocation Amount (RMB Ten Thousand Yuan)	Main Uses
500-1000 students	30-50	Equipment procurement, basic teacher training
1001-2000 students	50-80	Advanced equipment procurement, advanced teacher training
Above 2000 students	80-120	High-end equipment procurement, in-depth teacher training, and technology R&D cooperation

The government and education departments should actively formulate relevant policies and strongly encourage schools to introduce AI technology to promote the reform of PE. In terms of

capital investment, a special fund is set up to support schools to purchase AI sports teaching equipment, such as intelligent sports bracelets and motion capture systems. At the same time, according to the size of the school and the actual needs, a detailed fund allocation standard is formulated, as shown in Table 1. In equipment procurement, establish a standardized procurement process and quality standards to ensure the stability and applicability of equipment. For teacher training, a hierarchical and classified training plan is formulated to improve teachers' AI application ability.

It is very important to establish comprehensive and scientific standards and norms for the application of AI in PE. From the point of view of data collection standards, the frequency, accuracy and range of all kinds of data collection are clearly defined. For example, the heart rate data of students should be collected accurately every minute and during the whole exercise. The standard of teaching platform construction covers the usability of interface design and the integrity of functional modules. The evaluation index system should be constructed from multiple dimensions. Refer to Table 2 to comprehensively evaluate students' learning effect and teachers' teaching quality.

Table 2 Evaluation Index Weight Table for AI-Assisted PE Teaching

Evaluation Item	Specific Indicator	Weight
Student Learning Effectiveness	Improvement in Motor Skills (40%), Enhancement in Physical Fitness (30%), Increase in Learning Interest (15%), Cultivation of Lifelong Physical Activity Awareness (15%)	100%
Teacher Teaching Quality	Rationality of Instructional Design (30%), Proficiency in Technology Application (25%), Effectiveness of Instructional Guidance (25%), Innovation in Teaching (20%)	100%

4.2. Improve teachers' AI application ability

Carry out multi-level and diversified AI technical training for PE teachers. The primary training mainly covers basic technical principles, such as the concept of AI, the basis of machine learning, etc., so that teachers have a preliminary understanding of technology. Intermediate training focuses on the use of commonly used teaching tools and software, such as sports data analysis software and intelligent teaching platform operation. Advanced training focuses on teaching design and implementation, teaching teachers how to make personalized teaching plans based on student data, and improving teachers' practical application ability through case analysis and practice drills.

Set up a special teacher AI teaching innovation award to reward teachers who actively explore the innovative application of AI in PE and achieve good teaching results. Reward forms include material rewards, such as bonuses and training opportunities; Spiritual rewards, such as honorary certificates, public recognition, etc. At the same time, teachers' achievements in AI teaching will be incorporated into the performance appraisal and professional title evaluation system to stimulate teachers' enthusiasm for active learning and application.

4.3. Guarantee data security and privacy

Advanced data encryption technology is adopted to encrypt the key information of students' sports data in the process of collection, storage, transmission and use, so as to ensure that the data will not be stolen or tampered with. For example, SSL encryption protocol is used in data transmission. Implement access control and set different permissions. Only authorized teachers and administrators can access specific data. Anonymization, in the process of data analysis and use, removes the information that students can identify, and reduces the risk of privacy disclosure.

Formulate a strict data security management system and clarify the data use rights. It is stipulated that teachers, technicians, etc. should follow a specific process to apply when using student data, and explain in detail the purpose, scope and duration of use. Establish a data security audit mechanism, regularly check the data usage, find and deal with potential data security problems in time, and effectively protect the data security and privacy of students.

5. Conclusions

Under the general trend of PE reform, AI shows great application potential and value. From the perspective of application advantages, it realizes personalized teaching and customizes the scheme according to the individual differences of students to meet different learning needs; Enrich teaching resources, integrate all kinds of materials with technology, and broaden learning channels; Provide real-time feedback and guidance, and assist students to correct their actions through intelligent equipment; Optimize the teaching evaluation and build a comprehensive and scientific evaluation system. However, the dilemma it faces cannot be ignored. The high cost of technology application limits the large-scale promotion of schools; The limitation of teachers' ability affects the effective integration of technology and teaching; Data security and privacy issues are prominent, which are related to students' vital interests; Educational ethics issues lead to thinking, which may lead to unfair evaluation and the decline of students' interpersonal skills.

In order to break through these difficulties, the application strategy proposed in this article has important practical significance. Strengthen the top-level design, guide the integration of technology and teaching with policy support and standard system; Improve teachers' ability, and make teachers better control AI through training and incentive mechanism; To ensure data security and privacy, we should take a two-pronged approach from the technical and institutional levels. In the future, with the gradual implementation and improvement of these strategies, it is expected to realize the deep integration of AI and PE, push the reform of PE to a new height, effectively promote the comprehensive development of students' physical, psychological and social adaptability, and achieve the modernization transformation of PE.

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