

A New Approach to Enhancing College Basketball Teaching through AI Technology

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Abstract: Driven by the national strategies of Fitness for All and Building a Strong Sporting Nation, basketball teaching undertakes the important mission of improving students' physical fitness, cultivating sports literacy and teamwork ability. With the characteristics of intelligence, precision and personalization, AI technology can not only optimize the overall teaching process and stimulate students' learning interest, but also improve teaching quality and help students enhance their basketball skills and core sports literacy. Based on this, this paper explores new approaches for AI technology to empower college basketball teaching, aiming to provide theoretical references for the reform of college basketball teaching.

Keywords: AI; Colleges and universities; Teaching reform; Basketball; Physical health; Digitalization

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1. Introduction

Basketball can not only strengthen students' physical fitness and temper their willpower, but also cultivate their sense of teamwork, competition and innovation, which meets the core requirements of simultaneous development of five educations in college talent training in the new era. With the in-depth advancement of quality-oriented education and the continuous deepening of college physical education teaching reform, basketball teaching, as an important carrier of college physical education, has attracted much attention for its teaching quality and educational effectiveness^[1]. Under the modern education system, digitalization and intelligence have become important trends of college physical education teaching reform. With its core advantages of motion capture, big data analysis and virtual simulation, AI technology can accurately address the pain points and difficulties in college basketball teaching, inject new vitality into the innovative development of basketball teaching, help optimize the whole teaching process, enrich teaching forms and content, and improve the accuracy and effectiveness of teaching.

2. Advantages of AI technology in empowering college basketball teaching

2.1. Promoting personalized teaching and improving students' learning efficiency and quality

College students vary greatly in physical fitness, basketball foundation and learning needs, and traditional basketball teaching is difficult to accurately adapt to individual differences of students at different levels. In class and during practice, intelligent devices and AI systems can collect various data of students in real time, such as basketball foundation, physical fitness, learning progress, mastery of movements, learning interest and preference. Through algorithm analysis, they can accurately identify each student's strengths and weaknesses, clearly judge their learning needs and development directions, and form an exclusive personalized learning portrait^[2].

Based on the final comprehensive data, teachers can customize teaching plans for students with different needs and levels, realizing the precise matching of teaching content, progress and methods. In addition, the AI system can track students' learning status in real time, analyze learning effects and existing problems, and provide one-on-one personalized learning suggestions and guidance for students, effectively mobilizing students' learning initiative and enthusiasm, and improving the overall learning effect^[3].

2.2. Achieving accurate action feedback and enhancing the pertinence and professionalism of basketball teaching

The core of basketball lies in the standardization and coordination of movements. The detailed control of each technical movement directly affects the efficiency of students' skill improvement and subsequent development potential. Artificial intelligence technology has real-time feedback and accurate capture functions, which can bring precise empowerment to basketball teaching^[4]. Intelligent recognition and big data analysis technology can conduct all-round and high-precision real-time capture of basketball movements, accurately record every detail of the movements, including shooting angle, backspin of the basketball, wrist force rhythm during dribbling, step frequency and center of gravity change of defensive sliding steps, realizing quantitative analysis and scientific interpretation of basketball movements^[5]. Based on these data, teachers can comprehensively understand students' learning achievements, movement weaknesses and basic abilities, adjust teaching priorities and guidance methods, optimize teaching processes, and improve the professionalism and pertinence of teaching. Meanwhile, by comparing students' movements with standard ones, the root causes of problems can be accurately located. Students can understand their shortcomings in movements from the aspects of force mode, body coordination and movement rhythm, clarify the direction of improvement, and enhance the pertinence of learning.

2.3. Innovating teaching modes and stimulating students' learning initiative and enthusiasm

At present, students' sports interests and needs have changed. College basketball teaching can not only rely on teachers' fixed oral explanations and demonstrations, but also need professional technical means to help students understand complex movement skills and tactical arrangements. With the characteristics of interactivity and intelligence, AI technology enables students to carry out interactive learning and immersive practice in a virtual environment through core functions such as virtual simulation, intelligent interaction and gamification design. They can also interact with the AI system in real time, get timely feedback on learning effects and answers to questions, improving the fun and attractiveness of learning, thus stimulating students' learning interest and active participation awareness^[6]. Meanwhile, teachers can organically combine online

independent learning with offline practical teaching, allowing students to use fragmented time to carry out online basketball knowledge learning, skill practice guidance and tactical understanding consolidation through intelligent devices, breaking the limitations of time and space and improving the flexibility and convenience of learning.

3. Problems existing in the traditional college basketball teaching mode

3.1. Incomplete construction of the teaching system

In the context of the new era, college students are generally characterized by flexible thinking, quick acceptance of new things and advanced cognitive level. Traditional basketball teaching usually follows the fixed mode of “classroom explanation, playground demonstration and group practice”, which is relatively single and solidified. It is difficult to keep up with students’ diversified learning needs and fragmented time arrangement, and hard to stimulate students’ learning interest^[7]. More importantly, this fixed mode lacks a flexible adjustment and adaptation mechanism, cannot meet the diversified requirements of college basketball teaching in the new era, and is difficult to take into account students’ personalized development characteristics. Meanwhile, basketball teaching in some colleges is mostly carried out according to the established curriculum syllabus, only focusing on basic technical movements and simple tactical theories. The content system is relatively static and difficult to adjust and optimize dynamically in time according to students’ actual level, classroom performance and the development of sports technology, resulting in the disconnection between teaching content and students’ skill improvement rhythm, and failing to meet the learning needs of students at different levels.

3.2. Large individual differences among students

College basketball teaching covers students from different majors, grades and growth backgrounds, who have obvious differences in multiple dimensions. The unified and standardized teaching mode ignores students’ individual differences, leading to the disconnection between teaching content, progress, methods and students’ actual needs, and it is difficult to stimulate students’ initiative and enthusiasm fully^[8]. Specifically, in terms of physical fitness, students naturally differ in height, weight, physical ability, flexibility, explosive power and other aspects. The unified teaching intensity and training standards make it difficult for some students to adapt to the rhythm of basketball teaching. In terms of basketball foundation, students master different levels of basketball knowledge and skills. The same teaching content and progress easily lead to students with a poor foundation failing to keep up with the overall rhythm, thus affecting the learning effect.

3.3. Insufficient guidance accuracy

With the continuous development of the college education system, basketball has become a highly popular sports event and the core teaching content of physical education courses. Teachers need to not only optimize the teaching process, but also provide all-round guidance for students’ movement skills and tactics^[9]. In the traditional teaching mode, teachers mainly observe students’ movements with their naked eyes and judge the standardization and deficiencies of movements based on their own experience. They cannot capture tiny deviations in movement details, such as slight errors in body angle, deviations in force timing and hidden problems in body coordination, making it difficult to solve the problem of non-standard movements fundamentally. The implementation of basketball tactics involves multiple complex dimensions such as

teamwork of team members, accurate selection of running routes and correct judgment of passing timing. It is difficult for teachers to monitor the tactical implementation process of each group of students in an all-round way, lacking accurate analysis and targeted solutions to specific problems ^[10].

4. New approaches for AI technology to empower college basketball teaching

4.1. Introducing AI teaching tools to realize precise teaching of basketball movements

Technical teaching is the basic link of college basketball teaching. The standardization and accuracy of movements directly determine the space and upper limit of students' subsequent skill improvement. AI technology can solve the pain points of inaccurate movement correction and lack of targeted guidance in traditional basketball technical teaching, realizing the digitalization, precision and systematization of technical teaching. Firstly, wearable devices, computer vision and intelligent recognition technology can capture all-round movement data of students' basketball movements in real time, such as subtle indicators of body joint angles, force trajectories, movement rhythms and body balance, turning abstract movements into quantifiable and analyzable data, and making objective judgments and accurate evaluations of movements ^[11]. In this way, students can clearly understand their shortcomings in movements, clarify the direction of improvement, and avoid the formation of wrong movement stereotypes.

Secondly, data collection and analysis technology can integrate and compare students' movement data, accurately locate the root causes of errors, and generate targeted error correction plans combined with the laws of basketball technical teaching and students' individual characteristics. Teachers can provide step-by-step and operable improvement suggestions for students from the aspects of force mode, body coordination and movement rhythm, guiding students to gradually standardize movements. Finally, algorithm modeling and virtual reality technology can accurately disassemble and visually present movements, breaking down the complex movement system into specific cooperation links, enabling students to understand the core logic and execution points of movements clearly, and improving their in-depth understanding and mastery of movements ^[12]. For example, in basketball shooting training, AI technology can evaluate players' shooting posture, release angle and strength through video analysis and movement recognition, thus helping players gradually correct non-standard movements during training.

4.2. Creating a personalized teaching implementation path to meet the needs of students at different levels

In previous teaching, teachers often found it difficult to evaluate students' learning ability and ignored the differences in ability among students, leading to uneven teaching effects. AI technology can accurately grasp students' individual characteristics through multi-dimensional data collection and in-depth analysis, providing a scientific basis for the implementation of personalized teaching ^[13]. Firstly, the AI system can collect multi-dimensional learning data of students in real time, including basketball foundation level, physical fitness indicators, technical mastery, learning progress and practice frequency. Then, big data analysis technology can comprehensively analyze these indicators, accurately identify each student's strengths and weaknesses, and generate a scientific and detailed data report. Teachers can fully and objectively understand each student's learning status, so as to formulate personalized teaching plans.

Secondly, during students' training, AI devices can comprehensively evaluate students' various performances and provide targeted learning plans. For example, the AI system can design training focusing

on medium and long-range shooting scoring methods for students with insufficient bouncing force but soft touch, and plan special exercises focusing on breakthrough steps for students with good explosive power but weak coordination^[14]. Thirdly, students at different levels have different learning needs. The AI system and intelligent devices can detect students' learning stages and needs, reasonably allocate learning resources, promote the transformation of college basketball teaching from universal teaching to personalized teaching, and improve teaching quality and educational effectiveness.

4.3. Innovating teaching modes to enhance the attractiveness and effectiveness of basketball teaching

The key to reconstructing the teaching mode is to transform artificial intelligence from an external tool into an embedded teaching element, realizing the organic integration of technology and curriculum. Traditional college basketball teaching is mostly limited to classrooms and playgrounds with a single teaching scene, making it difficult for students to temper skills and apply tactics in real competition scenarios. Therefore, relying on 3D modeling, AR, VR and other technologies, teachers can build a virtual environment highly consistent with real basketball courts and competition scenarios, including details such as basketball courts, equipment and referee rules, allowing students to obtain a learning experience similar to real scenes in the virtual environment^[15].

Meanwhile, the AI virtual simulation system can set up diverse interactive teaching links, guiding students to actively participate in learning and practice, complete technical practice, tactical drill and other tasks through virtual operation, and feed back learning effects and operation deviations in real time, helping students adjust movements and strategies in time. For example, simulating tactical confrontations under different competition scenarios and opponent characteristics allows students to simulate tactical execution and teamwork in virtual scenes, and feel the application logic and adjustment methods of tactics in real time. In addition, traditional basketball movement practice is often boring and can easily cause resistance among students. Therefore, teachers can design follow-up practice tasks with AI digital humans, combine movement follow-up practice with fun games, integrate standard movement practice into game tasks, guiding students to take the initiative in movement practice, increasing practice frequency and strengthening movement memory. During follow-up practice, digital humans can capture students' movement data in real time, compare it with their own standard movement models, accurately identify deviations in students' movements, and give timely feedback and guidance, improving the efficiency and quality of technical practice.

5. Conclusion

In summary, AI technology provides a new path for college basketball teaching reform, effectively solving the problems of single mode, insufficient pertinence and weak adaptability in traditional teaching. Through realizing precise teaching of basketball movements, creating personalized teaching implementation paths and innovating teaching modes, the quality of college basketball teaching can be comprehensively improved, promoting the coordinated development of students' physical fitness and sports skills.

Disclosure statement

The author declares no conflict of interest.

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