Exploration of the Learning Path of College Students' Badminton Motor Skills Assisted by Multimedia Technology and AI Feedback

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Abstract: Badminton motor skills are crucial for hitting the ball. Colleges and universities should focus on using multimedia technology and AI feedback technology to assist badminton teaching, helping students master badminton skills and improve the effectiveness of badminton sports. Based on this, this paper studies the application of multimedia technology and AI feedback in the learning of college students' badminton motor skills, expounds on its application value, and proposes specific application strategies. The aim is to help college students learn badminton motor skills efficiently and provide new ideas and practical references for reforming physical education teaching in colleges and universities.

Keywords: Multimedia technology; AI feedback; College students; Badminton; Motor skills; Learning path

1. Introduction

With the continuous development of science and technology, the applications of multimedia technology and artificial intelligence (AI) in the education field are becoming more extensive. Badminton is a sport that integrates strength, speed, and coordination, and it has high requirements for athletes' motor skills [1]. Traditional badminton teaching has limitations and is difficult to meet the diverse learning needs of students. Multimedia technology + AI feedback can assist teaching. Multimedia technology, with its rich forms of expression such as high-definition videos and animated demonstrations, can vividly display the details of badminton movements. AI feedback can provide accurate analysis and personalized suggestions based on students' movement data [2]. Therefore, exploring the assistance of these two in teaching badminton sports skills is of great value and can bring new changes to physical education teaching.

2. The significance of multimedia technology + AI feedback in assisting college students' learning of badminton motor Skills

2.1. Contributing to the improvement of badminton teaching quality

The integration of multimedia technology and AI feedback can bring new vitality to badminton teaching. In practical applications, teachers can use slow-motion playback of high-definition videos to allow students to capture the details of muscle force and joint rotation of professional players at the moment of hitting the ball [3]. With the help of the AI motion analysis system, teachers can provide real-time guidance on students' movement deviations and offer corrective suggestions, making teaching more refined and greatly improving teaching quality and effectiveness.

2.2. Facilitating the innovation of educational technology

The application of multimedia technology and AI feedback is a vivid practice of educational technology innovation. It is not simply the superposition of technologies but a deep integration of physical education teaching and cutting-edge technologies [4]. For example, machine learning algorithms can be used to analyze many students' movement data to optimize teaching content and schedule arrangements. Virtual reality and augmented reality technologies can be used to create immersive teaching scenarios, stimulating students' learning interests and opening up new paths for the innovative application of educational technology in the field of physical education [5].

2.3. Promoting the enhancement of students' physical literacy

Multimedia technology and AI feedback-assisted teaching can develop students' physical literacy in many aspects [6]. For example, by guiding students to watch professional match videos and analysis materials, students can deepen their understanding of badminton sports culture and tactical systems. With the help of the AI system, personalized training suggestions can be provided to help students develop customized training plans and cultivate their self-learning and self-management abilities. Relying on online interactive communities for interactive communication can exercise students' communication and collaboration skills, promoting the improvement of multiple abilities of students [7].

3. The learning path of college students' badminton motor skills assisted by multimedia technology + AI feedback

3.1. Building badminton motor skill teaching resources to form a rich teaching database

To effectively meet the learning needs of students, schools can use multimedia technology to create a comprehensive and rich teaching resource system with different sections. In the basic movement section, teachers can use high-definition videos to show the standard forms and force-generating key points of basic movements such as grip postures, serving actions, and basic footwork in slow motion and from multiple angles. With the detailed explanations of professional coaches, students can clearly understand the essence of each movement. In the advanced skills section, teachers can introduce skills such as precise drop-point control of high-long serves and the application of explosive power in smashes. By using the method of analyzing actual combat cases, complex techniques can be broken down into multiple steps for students to learn and imitate. In the badminton movement principle section, teachers can use animation technology to create vivid demonstration animations to simulate the movement trajectory of the human body in badminton sports and

visually display the coordinated operation of muscles and bones under different movements, helping students better understand the movement principles. Teachers should continuously introduce the latest research results and new training methods in the badminton field to provide students with comprehensive and cutting-edge knowledge. In addition, schools should establish a regular update mechanism, pay close attention to the development trends of badminton sports, and timely collect innovative technologies and tactics in domestic and international competitions, as well as the latest sports training theories to ensure that teaching resources are always in line with the times [8].

3.2. Building an AI-intelligent feedback online teaching platform for personalized learning

The AI-intelligent feedback online teaching platform is a key measure to promote the learning of college students' badminton motor skills [9]. Schools should focus on building an online teaching platform that integrates sensor technology and deep-learning algorithms to provide students with a personalized learning experience. Sensor technology is used to collect data and obtain various information during students' training [10]. Teachers can attach small sensors to the racket, wrist, ankle, and other parts to capture key data of students' actions such as racket-swinging and moving footwork, generating data such as speed and angle changes for teachers to analyze and evaluate. Deep-learning algorithms are used for data collection and system analysis. They can form a training sample set based on students' racket-swinging action data. Through the screening and standardization of a large number of sample data, machine learning simulation training is carried out to accurately identify different racket-swinging actions. For example, for the racket face direction, it can clearly distinguish the left and right racket faces to understand the hitting direction and route. For the arm position, it can understand the coordination of students' movements and the force-generating points. Auxiliary features such as the transfer of the body's center of gravity and the timing of force generation can improve the comprehensive description of the racket swinging action and help teachers analyze and evaluate students' movement data. Based on the analysis data, teachers can provide personalized learning suggestions for students with the help of the system [11]. For example, if a student's forehand racket swinging action direction is unstable, it can be recommended that the student carry out racket face control exercises and provide specific training methods and practice plans. For students with unreasonable racket drawing methods, specific guidance on adjusting the racket drawing method can be provided to improve the actual effect.

3.3. Building a motor skill learning interactive community to encourage in-depth learning discussions

In badminton sports skill teaching, teachers should focus on building a motor skill learning interactive community to provide multi-dimensional learning support for students and promote their comprehensive mastery of badminton skills.

(1) A perfect user login system should be set up. Students can record their learning processes in the community, record the growth track of their badminton skills through text and pictures, share their learning achievements, display the wonderful moments of badminton competitions, and inspire each other with other learners to achieve common progress.

(2) A special discussion area should be set up [12]. The discussion area can cover a wide range of topics such as badminton techniques, tactics, and competition experiences, and students are encouraged to express their opinions freely. For example, in the technical discussion area, students can discuss issues such as the force-generating techniques of forehand high-long serves and the key points of backhand

receiving actions, and share their experiences and confusions during training. In the tactical discussion area, students can discuss doubles cooperation strategies and singles tactical layouts to broaden their competition horizons.

(3) Badminton professionals should be invited for explanations and guidance. Schools can invite badminton experts, coaches, or outstanding athletes to enter the community to provide professional guidance for students, including the latest training methods, cutting-edge technical analysis, and tactical application cases, and give applicable suggestions to the questions raised by students [13].

3.4. Strengthening teachers' information technology training to enable teachers to adapt to teaching requirements

To effectively adapt to the needs of multimedia teaching, schools should strengthen the information technology training of teachers, improve teachers' information literacy, and give full play to the advantages of new technologies. Schools can plan special training courses, including the use of various multimedia resources on teaching platforms. Starting from basic video editing and audio processing, teachers can master how to edit and splice high-quality badminton teaching video materials to highlight key actions and techniques to meet the needs of different teaching scenarios. The use of image-editing software can be explained to teachers so that they can make beautiful teaching PPTs and schematic diagrams [14]. Teachers can use animation technology to vividly display the complex movement trajectories in badminton sports, such as the changes in body postures and the order of force-generation at the moment of hitting the ball, helping students better understand the key points of movements [15]. Regarding the application of the AI feedback system, schools can invite industry technical experts for system operation guidance, such as explaining how to use various advanced sensor devices to accurately capture students' movement data during badminton training, using professional data analysis software and AI algorithm models to deeply mine the collected movement data, and guiding teachers on how to obtain and analyze data, and provide personalized training suggestions for students based on the data results, recommending specific strength training methods or special practice plans.

4. Conclusion

In conclusion, multimedia technology and AI feedback show significant advantages and broad prospects in the learning of college students' badminton motor skills. In practical applications, schools should focus on building teaching resources, building online platforms, creating interactive communities, and improving teachers' information technology capabilities to improve teaching quality and promote the enhancement of students' physical literacy. Schools should continuously optimize and improve this teaching model, expand its application fields, and promote the intelligent development of physical education teaching in colleges and universities.

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The authors declare no conflict of interest.

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