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Research on the Application of Generative Artificial Intelligence in Physical Education Teaching

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Abstract: With the iterative upgrading of generative artificial intelligence (Generative AI), the application fields of AI technology are constantly expanding. In college physical education teaching, the application of Generative AI has become increasingly common, and its advantage of "assisting teaching and learning" is more prominent. Based on this, teachers should correctly understand the transformation advantages of "physical education + artificial intelligence", apply Generative AI to the theoretical and practical links of physical education teaching, enhance the digital literacy of teachers and students, strengthen critical thinking in the application of AI technology, and avoid the problem of technology abuse. At the same time, teachers should also focus on the characteristics of physical education teaching, use Generative AI to improve the curriculum evaluation mechanism, and take multiple measures and make progress from multiple dimensions to transform the technical advantages of Generative AI into the high-quality development advantages of college physical education.

1. Introduction

With the development of science and technology, Generative AI, as a modern emerging technology with strong data processing and simulation capabilities, has penetrated into all aspects of our daily life. Represented by technologies such as "Doubao" and "DeepSeek", Generative AI has developed rapidly and been gradually applied in various fields, setting off a wave of reform in the digital transformation of education[1]. When applied to college physical education teaching, Generative AI can generate intuitive and vivid simulation scenarios, optimize the design of physical education teaching, improve the pertinence of teaching guidance through accurate data analysis, and realize the dual innovation of college physical education concepts and teaching models.

In addition, generative AI can also achieve intelligent interaction with students through natural language processing technology. It can answer the difficult questions students encounter during physical exercise and provide real-time feedback, thereby significantly enhancing students' learning experience and engagement. Especially in the integrated teaching of interdisciplinary knowledge such as exercise physiology, sports injury prevention, and nutritional health, generative AI can quickly generate easy-to-understand popular science content. This helps students establish

awareness of scientific exercise and further expands the breadth and depth of physical education teaching.

2. Strengthen the Cognition of Digital Value and Promote the Transformation of Physical Education Teaching

Generative AI boasts numerous advantages such as diverse functions, convenient operation, and low application costs. It holds significant application value in college physical education teaching and serves as a key driver for the digital and intelligent transformation of traditional physical education. Generative AI tools represented by "DeepSeek" provide strong support for college physical education teaching—teachers only need to input clear instructions, and the system can immediately generate solutions. For instance, when a teacher designs a basketball training course, they can input the following instruction: "Design a 40-minute basketball training course for sophomore students. The course should include warm-up exercises, technical movement teaching, fun practice, and evaluation & summary sessions, and also incorporate group competitions and students' experience-sharing. Please provide a specific implementation plan." After receiving the instruction, the system will design a course teaching plan in accordance with the user's requirements. For teachers, this plan serves as a "reference for suggestions"—they can refer to the time allocation for each session, the key and difficult points prompts for teaching in each part, and the fun practice items. Finally, the teachers still need to optimize and adjust the plan based on specific teaching objectives, students' actual conditions, and the school's resource allocation to complete the final teaching design [2].

With the assistance of Generative AI, it is possible to accurately identify students' physical characteristics, record their physical fitness test data, and use these as the basis for teaching design. Particularly in students' physical education and health management, the advantage of Generative AI in personalized design is even more prominent. For example, it can design a "lightweight weight loss plan" for overweight students, providing them with a scientific training schedule, dietary nutrition matching, daily exercise duration, and exercise taboos. All these measures can improve students' healthy exercise level and inject more humanistic care into physical training. Therefore, teachers should deeply recognize the application value of Generative AI to promote the digital transformation of college physical education teaching.

Not only that, generative AI also demonstrates unique value in sports psychological counseling. For instance, regarding issues such as competition anxiety and poor team collaboration, AI can generate psychological adjustment plans, provide suggestions like relaxation training and attention-focusing techniques, and even simulate conversational scenarios to help students relieve stress. This dual empowerment of "technology + humanity" makes physical education no longer limited to physical training, but also extends to the level of mental health education, realizing comprehensive education for students.

In addition, generative AI can assist teachers in the intelligent management and recommendation of teaching resources. Based on the teaching progress and student feedback, the system can automatically push relevant resources such as video tutorials, academic papers, and case analyses. This helps teachers continuously update their knowledge bases and improve teaching quality. Especially in aspects like the history of sports events, the evolution of rules, and the analysis of international competitions, AI can provide a large amount of structured background knowledge, enrich classroom content, and stimulate students' interest in learning.

3. Promote the Upgrade of Intelligent Technology and Implement Digital Physical Education Practice

To integrate Generative AI into the practice of college physical education teaching, we should start from specific sports events, take technology empowerment as the orientation, focus on scenario implementation, and aim at improving effectiveness. Through these efforts, we can achieve the upgrade of intelligent teaching, make "digital physical education classes" the norm, and highlight the advantages of digital technology in physical education teaching [3].

For example, in the "serving skills" training of a volleyball class, "Doubao" can generate multiple versions of training plans. Teachers design progressive challenge tasks based on factors such as the number of students in the class, the difficulties in serving, and practical requirements, and the system will generate 3D action diagrams. It uses visual data to analyze the correlation between the arm-swing angle and the ball-tossing height, and prompts that "tossing the ball too high may easily lead to the deviation of the hitting point"—these are common problems in students' training. With the prompts from the AI system, students can reduce the occurrence of such problems.AI can also assist students in completing physical fitness tests and formulate appropriate training plans based on their physical characteristics. For example, if the system detects that a student's physical fitness data fails to meet the standards, it will suggest focusing on elastic band arm-swing exercises to improve the student's arm strength and thus enhance the accuracy of serving.

During sports training, students can wear smart bracelets to monitor their movement trajectories. By comparing students' actual performance with the preset movement trajectories, the system can automatically generate thermal images, with problematic parts highlighted. For example, if the system detects that a student "lacks wrist strength," the wrist area will be displayed in red to draw the student's attention. At the same time, the system will put forward specific modification suggestions, such as "lift the elbow as if holding a bowl, and hit the ball as if cracking a whip," to help students master the improvement methods.

During the activity review process, AI can automatically generate analysis reports that reflect students' performance metrics such as ball-tossing accuracy and hit success rate. Meanwhile, it identifies typical issues, including insufficient arm-swing range and uncoordinated waist force application. Based on these recommendations, teachers can adjust their key teaching focuses and further optimize physical education plans using data feedback, thereby facilitating the implementation of digital physical education practices.

Beyond assisting with movement techniques, generative AI is also playing an increasingly important role in tactical training. For example, in team sports such as football and basketball, AI can generate tactical simulation animations based on historical game data, demonstrate the advantages and disadvantages of different formations, and even simulate the possible reactions of opponents—helping students understand the key points of tactical execution. Teachers can use these simulation results to deliver practical explanations, enhancing students' tactical awareness and team coordination skills.

In addition, generative AI can be applied to the intelligent management of sports venues. By connecting to IoT (Internet of Things) devices, AI can monitor real-time venue usage, equipment status, environmental parameters, and other data, automatically generating usage reports and maintenance recommendations to improve venue operation efficiency. For instance, based on course schedules and pedestrian flow predictions, the system can intelligently recommend venue allocation plans, avoiding resource conflicts and increasing utilization rates.

4. Enhance Digital Core Literacy and Strengthen Critical Thinking in Technology Application

The application of AI requires teachers to possess a certain level of digital literacy. Teachers need to master the usage of AI tools, such as how to input task instructions accurately, how to guide the thinking and expression styles of AI, and how to improve the precision of AI's answers to questions. Proper use of AI tools often achieves twice the result with half the effort. When using AI tools, teachers should also pay attention to data security, especially regarding the privacy protection of personal information of both teachers and students, to avoid the risk of data leakage.

Generative AI has indeed brought significant convenience to physical education in colleges and universities. However, physical education teachers must view the instrumental and auxiliary nature of AI rationally and avoid falling into the trap of technological dependence. AI can empower teaching and serve as a support tool, but it cannot replace teachers in conducting teaching activities. While the physical education plans generated by AI may seem perfect, they inevitably have aspects that are disconnected from students' actual learning situations. This is because the plans and suggestions proposed by AI are based on algorithms, whereas real-world teaching must be carried out in line with students' actual learning conditions [4].

For example, an AI-generated football training plan may include a professional breakdown of the "4-3-3 formation", but it fails to take into account that most players in the team are beginners. If this plan is directly applied, it will inevitably cause chaos in teaching. Therefore, teachers should draw on the advantages and innovative points of the AI plan, and at the same time optimize and adjust the plan based on the actual learning situation of students. For instance, replacing the complex "4-3-3 formation" with a simplified "3-2-1 basic formation" will be more conducive to students’ practical training. Another example is that the AI plan may set 1.8 meters as the standard ball-tossing height. However, for female students or male students with shorter heights, this value can be flexibly adjusted. It is not advisable to set goals that exceed students’ actual capabilities just because of a "standard value".

Therefore, in the application of Generative AI, teachers must always clarify its instrumental nature. Only in this way can a new type of physical education classroom featuring "student-centered, teacher-led, and AI-assisted" be constructed, and the "digital physical education" literacy of both teachers and students be improved in practice.

To further enhance teachers' digital literacy, universities and colleges can organize specialized training on generative AI, covering content such as tool usage, case discussions, and ethical safety. This training helps teachers establish a correct perspective on technology. At the same time, teachers should be encouraged to conduct action research on AI-assisted teaching, accumulate practical cases, and develop replicable application models.

At the student level, it is also necessary to gradually cultivate their ability to collaborate with AI. For example, in physical education assignments, students can be guided to use AI for self-checking of movements, formulating personal exercise plans, and other tasks. However, it is also important to emphasize critical thinking—teaching students to judge the rationality of AI suggestions and avoid blind adherence. Through this approach, students can not only improve their physical education skills but also develop stronger adaptability and innovation capabilities in the digital age.

5. Optimize Physical Education Curriculum Content and Improve Intelligent Evaluation Mechanisms

Generative AI can be used to optimize physical education curriculum content and realize the effective integration of digital physical education resources. For example, in traditional martial arts teaching materials, AI can generate decomposed images of different schools and different moves for students. Moreover, it can also provide students with graphic analysis of martial arts traditional

culture, such as the origin of Tai Chi, its schools and branches, the development and evolution process of Tai Chi culture, the health benefits of practicing Tai Chi, and the precautions for practice. This helps to create curriculum content characterized by "multidisciplinary integration" and promotes the development of students' physical education cultural literacy[5].

In the evaluation of physical education courses, Generative AI can conduct "millimeter-level" accurate movement analysis. For example, in long jump training, AI can collect data on students' stride length and stride frequency, record changes in the body's center of gravity at the moment of take-off, the angle of the knee joint, and other information, generate more than ten items of quantitative data, and point out problems in students' movements. For instance, the system may prompt that 31% of students have problems with disordered run-up rhythm, and 45% of students have insufficient ankle force. These problems are difficult to detect through conventional observation, but AI can capture these movement details and form visual data. Teachers can then analyze which of these problems are individual and which are universal based on the evaluation data. One-on-one guidance can be provided for individual problems, while key explanations can be given to the whole class for universal problems. This improves the feedback and application value of evaluation results, making teachers' evaluation and guidance more targeted. In short, making good use of AI tools can optimize physical education curriculum content and build an efficient physical education classroom that integrates teaching and evaluation.

6. Conclusion

Generative AI technology is always in a state of dynamic upgrading and continuous iteration. Therefore, in college physical education teaching, teachers should pay attention to the selection of Generative AI resources, improve the adaptability of AI tools to physical education curriculum teaching, and accelerate the realization of the goals of intelligent and digital physical education. In teaching practice, teachers should be aware of the application boundaries of AI tools, view the application advantages and shortcomings of Generative AI tools with a rational and critical attitude, and be able to learn from strengths and make up for weaknesses to apply them reasonably and appropriately. Looking forward to the future, there is still great potential to be tapped in the application of AI technology. This requires teachers to proceed from the orientation of college physical education reform and the real needs of students, promote the intelligent innovation of physical education teaching, and build a physical education classroom that is "AI-empowered, intelligent and efficient".

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