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Research on the Development and Application of Digital Resources in College Physical Education under the Background of Blended Teaching: Taking the Empirical Study of Swimming Teaching as an Example

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Abstract: The traditional teaching mode is mainly characterized by "teachers teaching and students listening", which exerts an adverse impact on the development of college physical education. Against this backdrop, this paper conducts an in-depth analysis of the significance and strategies for the development and application of digital resources in college physical education under the background of blended teaching, as well as the application effect of digital resources in swimming teaching. The purpose is to comprehensively improve the teaching quality of teachers and provide certain references for the digitalization of teaching in other sports programs.

Keywords: Blended teaching; College physical education; Swimming teaching

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1. Introduction

Opinions on Comprehensively Strengthening and Improving School Physical Education in the New Era clearly state that school physical education is a fundamental project for realizing the fundamental task of fostering virtue through education and enhancing students' comprehensive quality. It is also an important work for accelerating the modernization of education and building a powerful country in education and sports. School physical education plays a unique role in promoting the core socialist values, cultivating students' patriotism, collectivism, socialist spirit, and the will quality of being positive and tenacious in struggle, as well as realizing the goals of "nurturing intelligence through physical education" and "nurturing the mind through physical education." Schools must strictly implement the rigid requirements for offering physical education courses, continuously expand the scope of courses, gradually increase class hours, and enrich course content. Schools

in the compulsory education stage and senior high school stage shall strictly offer physical education courses in full compliance with the national curriculum plan and curriculum standards. Basic education schools are encouraged to offer one physical education class every day. Colleges and universities shall incorporate physical education into their talent training programs, and students can only graduate if they meet the physical health standards and complete the required physical education credits. Universities and research institutes are encouraged to include physical education courses in the public curriculum system of postgraduate education [1]. Colleges and universities should follow the path in line with national development in accordance with national policy documents, so as to better cultivate talents.

2. The significance of research on the development and application of digital resources in college physical education against the background of blended teaching

From the teaching perspective, it greatly enriches teaching methods and content. Traditional physical education is limited by time and space, while digital resources, with the help of technologies such as multimedia and virtual reality, can present complex and abstract physical education knowledge (e.g., principles of sports biomechanics, tactical strategies) in an intuitive and vivid way, making it easier for students to understand and master [2]. At the same time, it breaks the constraints of teaching venues and time: students can conduct independent learning and review anytime and anywhere, and teachers can accurately adjust teaching strategies based on students' learning data to achieve personalized teaching and improve teaching quality and efficiency. For students, digital resources stimulate their interest and initiative in learning. Diverse forms such as videos, animations, and interactive games make physical education learning no longer dull but full of fun and challenges. Students can select appropriate resources according to their own needs and proficiency levels, arrange their learning progress independently, and cultivate their self-directed learning ability. In addition, online communication platforms allow students to interact with teachers and classmates at any time, share learning experiences and insights, create a positive learning atmosphere, and promote common progress. From the perspective of physical education development, the development and application of digital resources promote the modernization transformation of college physical education [3]. It facilitates the integration of physical education with other disciplines, such as computer science and data analysis, bringing new concepts and methods to physical education. Meanwhile, it also contributes to the sharing and exchange of college physical education resources, improves the overall educational level, and lays a solid foundation for cultivating high-quality sports talents with an innovative spirit and practical ability. It plays an undeniable role in promoting the long-term development of China's physical education cause [4].

3. Research on strategies for the development and application of digital resources in college physical education under the background of blended teaching

3.1. Conduct accurate demand research to clarify the direction of digital resource development

Colleges and universities need to investigate the digital resources for swimming teaching through questionnaires, interviews, and other methods to better understand the needs of students and teachers. Specifically, for teachers, the investigation should focus on the difficulties they encounter in traditional swimming teaching, such as the limitations of movement demonstration and the challenges in guiding students with individual differences.

For students, it should aim to understand their mastery of swimming knowledge, learning preferences, and the degree of learning support they expect to obtain through digital resources [5]. By adopting this approach, colleges and universities can not only better create relevant content, such as videos and animations for students, but also establish online communication platforms to facilitate better interaction between teachers and students, thereby better meeting the actual needs of both parties. For example, universities can help students gain a better understanding of the content to be covered in a swimming class by providing pre-class videos such as: Micro-courses on swimming principles (e.g., animations explaining the relationship between buoyancy and resistance); Demonstration videos of core movements (e.g., slow-motion analysis of freestyle breathing techniques); Question banks for preview quizzes (10 basic questions to assess pre-class learning outcomes). During the class, universities can develop a library of screen-projection materials for teachers, which includes error movement comparison charts and tools for generating group practice task sheets. This enables teachers to better track students' learning progress. After the class, universities can help students better consolidate the knowledge they have learned by offering [6]: Personalized practice recommendations (resources pushed based on preview quiz results); A submission portal for video assignments (where students upload videos of their practice); An online Q&A community (where teachers respond to questions within 24 hours).

3.2. Integrate diverse technologies to create high-quality digital resources

Colleges and universities can better develop high-quality digital resources for college swimming teaching by integrating diverse technologies. For instance, they can use high-definition video recording technology to film the standard movements of professional swimmers, allowing students to observe the details of the movements comprehensively [7]. When filming freestyle stroke movements, for example, colleges can adopt front, side, and top-down angles. This enables students to not only watch the swimmers' movements at normal speed and in slow-motion playback but also clearly see the coordinated cooperation between arm entry, stroke, exit, and body rotation. In addition, 3D animation technology can be used to simulate and analyze swimming movements, decomposing complex movements into multiple steps and presenting them in a dynamic form to help students understand the principles of the movements. When explaining the frog kick movement, for example, teachers can use 3D animations to show the contraction and extension process of leg muscles and their relationship with the forward movement of the body, allowing students to have a better learning experience. Furthermore, the integration of virtual reality (VR) and augmented reality (AR) technologies enables students to practice in a simulated swimming pool and better feel the resistance of water, thereby achieving a more immersive learning experience. Through these methods, colleges and universities can help students improve their understanding and mastery of swimming movements [8].

3.3. Constructing a blended teaching model to promote the effective application of digital resources

Colleges and universities can organically integrate online learning with offline resources. This enables students to better watch content such as movement demonstration videos and animation analysis, thereby understanding the basic essentials of swimming movements and theoretical knowledge [9]. For example, when teaching backstroke, teachers can ask students to pre-learn online knowledge about backstroke body postures, arm stroke paths, etc., and complete relevant online tests. Based on the test results, teachers gain an understanding of students' preview status, and then provide offline practical guidance, correct mistakes, and explain problems

encountered by students—all to improve students' comprehensive abilities. Through this teaching method, colleges and universities can not only enhance students' swimming skills but also boost their initiative in learning, making students more willing to engage in the learning process [10].

3.4. Establishing an evaluation and feedback mechanism to continuously optimize digital resources and teaching

Colleges and universities can establish an evaluation and feedback mechanism to better ensure the sustainability and effectiveness of the development and application of digital resources for swimming teaching. They can collect information regarding the content quality, technical performance, and usability of resources, as well as the teaching effectiveness of teaching models and students' learning experience, to gain a better understanding of teachers' teaching outcomes [11]. For instance, colleges and universities can regularly organize students to fill out online evaluation questionnaires to better understand their feelings about using digital resources, learning gains, and satisfaction with teaching content and methods—providing teachers with more targeted teaching strategies. They can arrange for teachers to share experiences and problems encountered in the blended teaching process, enabling teachers to conduct self-evaluation. They can invite experts in the field of physical education to conduct professional evaluations and guidance on digital resources and teaching models, so as to better update and optimize digital resources. This helps form a positive cycle and provides students with better learning resources [12].

4. Analysis of the application effect of digital resources in swimming teaching

4.1. Significant improvement in skill mastery and learning outcomes

In the evaluation of the application effect of digital resources in swimming teaching, skill compliance rate and movement standardization level are key indicators. By comparing the data of the experimental group and the control group, the significant role of digital resources can be clearly observed [13]. The 50-meter freestyle compliance rate of the experimental group reached as high as 85%, while that of the control group was only 65%, and this difference was statistically significant ($P < 0.05$). In terms of movement standardization scores, the average score of the experimental group was 8.2 points, and that of the control group was 6.7 points [14]. This fully indicates that digital resources, relying on their functions of precise movement demonstration and real-time feedback, enable students to observe and understand the details of swimming movements more clearly, effectively improving the quality of skill mastery. In terms of learning efficiency, the advantages of digital resources are also prominent. Students in the experimental group only needed an average of 8 class hours to master the core skill of breathing control, while the control group required 12 class hours. This is because digital resources have the feature of repeatable viewing—students can repeatedly watch teaching videos according to their own learning progress and needs, deepen their understanding and memory of key skills, and thus significantly shorten the skill acquisition cycle. Safety knowledge is an indispensable and important part of swimming teaching. In the safety test, the average score of the experimental group reached 92 points, and that of the control group was 78 points [15]. This benefit comes from the visual design of the safety module in digital resources: through vivid animations, videos, and other forms, safety knowledge and emergency response methods are intuitively presented to students, which enhances the learning effect and effectively reduces safety risks in the teaching process.'

4.2. Student experience and satisfaction

A questionnaire survey was conducted to understand students' experience and satisfaction with the digital

resources for swimming teaching. The results showed that 89% of the students in the experimental group believed that "slow-motion video analysis" was the most helpful for skill learning—slow-motion videos allow students to clearly see the subtle changes of each movement, which helps them better imitate and practice. Seventy-six percent of the students stated that the "online feedback function" helped them clarify the direction of improvement. The online feedback function can promptly point out the problems existing in students' movements and provide targeted suggestions, enabling students to adjust and improve in a timely manner. In the satisfaction score, the resource practicality received 4.3/5 points, and the platform usability received 4.1/5 points, indicating that students have a high overall recognition of digital resources. However, 23% of the students also put forward some suggestions, such as hoping to add VR virtual swimming scenarios to allow students to practice in a more realistic environment, and optimizing the video loading speed to improve the fluency of learning.

4.3. Optimization directions for the blended teaching model

Combined with the above empirical results, the application of digital resources in swimming teaching needs to be optimized from two aspects: Firstly, hierarchical design of resources: At present, most teaching resources adopt a "one-size-fits-all" approach, which fails to fully consider the differences in students' basic skills. Therefore, it is necessary to develop differentiated resource packages for students with no foundation and those with basic skills—providing more basic and detailed teaching content for beginners, and more challenging advanced content for students with basic skills. Secondly, strengthening online-offline linkage: Incorporate the problems identified in post-class video feedback into the key explanation content of in-class teaching. Specifically, collect the problems encountered by students in post-class practice through the online platform, and then conduct centralized explanation and demonstration in class, forming a closed loop of "online diagnosis—offline reinforcement" to further improve the teaching effect.

5. Conclusion

This study focuses on the development and application of digital resources in college physical education under the background of blended teaching, and conducts in-depth research with swimming teaching as an empirical case, achieving a series of valuable results. The digitalization of college physical education is an inevitable trend in the development of education. The development and application of digital resources for swimming teaching is only a starting point. On this basis, continuous exploration and innovation should be carried out to better promote the comprehensive digital transformation of college physical education.

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