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# Research on the Application and Development Strategies of Digital Technology in Physical Education in Private Universities in Guangdong Province

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***Abstract:*** *In the context of the coordinated advancement of educational digital transformation and the "Healthy China" strategy, digital technology has become the core engine driving the high-quality development of university physical education. This paper takes private universities in Guangdong Province as the research object, using methods such as literature review and logical analysis, to systematically explore the current application status, core issues, and deep influencing factors of digital technology in physical education teaching. By drawing on advanced practical experiences from both domestic and international sources, a targeted development strategy system is constructed. The research shows that digital technology has been initially applied in physical education teaching in private universities in Guangdong Province, achieving phased results in expanding teaching time and space and improving teaching efficiency. However, there are still problems such as shallow application level, unbalanced resource allocation, insufficient digital literacy of teachers, and poor adaptability of models. The root causes lie in limited funding, lack of teacher training, incomplete management system, and lagging teaching concepts. Based on this, this paper constructs a four-dimensional coordinated development strategy of "funding guarantee - teacher training - resource construction - management optimization", providing theoretical references and practical inspirations for promoting the deep integration of digital technology with physical education teaching in private universities in Guangdong Province, resolving application difficulties, and achieving the connotative development of physical education.*

***Keywords:*** *Digital technology; Guangdong Province; Private universities; Physical education teaching*

## 1. Introduction

In the context of the deepening digital transformation in education and the synergy of the "Healthy China" strategy, digital technology has become the core engine driving the innovation of university physical education teaching models and enhancing the quality of education. Its deep integration with physical education teaching has become an inevitable trend for the high-quality development of higher physical education. Guangdong Province, as a strong educational province and a development hotspot for private higher education, private universities, with their flexible management mechanisms, have become important participants in the reform of physical education. However, constrained by factors such as capital investment and teacher quality, their physical education teaching still faces practical challenges such as monotonous content, rigid models, and insufficient personalized guidance.

Digitalization and intelligence in education will become the core driving force for the reform of the national education system [1]. Currently, the application of digital technology in university physical education teaching has gradually become widespread. The application of technologies such as intelligent perception, motion capture, and big data analysis has effectively solved the pain points in traditional physical education teaching, such as difficult action correction, data tracking, and insufficient implementation of personalized teaching, promoting the transformation of teaching from "experience-driven" to "data-driven". However, compared with public universities, private universities in Guangdong Province have obvious shortcomings in the application of digital technology, such as insufficient hardware facilities configuration, scarce digital teaching resources, uneven digital literacy of teachers, and low compatibility between technology and teaching, resulting in the failure to fully release the educational value of digital technology.

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Most existing research focuses on public universities or the overall university group. There is a lack of targeted research on the application of digital technology in physical education teaching in private universities in Guangdong Province, and it fails to fully combine their school-running characteristics and resource endowments to propose feasible development strategies. Based on this, this paper focuses on the actual situation of physical education teaching in private universities in Guangdong Province, summarizes the current status and existing problems of digital technology application, analyzes the deep causes of the application difficulties, and explores the digital technology integration paths and development strategies that are suitable for the development of private universities, with the aim of enriching the research results of university physical education digital teaching and providing theoretical references and practical lessons for improving the quality and efficiency of physical education teaching in private universities in Guangdong Province and achieving connotative development, and helping private universities cultivate new era college students with lifelong exercise awareness and digital literacy.

## 2. Core concepts and theoretical foundation

### *2.1 Definition of core concepts*

The core concepts of this article are mainly defined as two dimensions: digital technology and sports teaching in private universities. The integration of these two aspects constitutes the core category of the research. Digital technology refers to a technical system centered on computer technology, communication technology, and intelligent technology, relying on data collection, transmission, analysis, and application to achieve efficient information processing and interaction. Combined with the sports teaching scenario, it specifically includes intelligent sports monitoring equipment, motion capture systems, online teaching platforms, and big data analysis tools, etc. Its core characteristics are intelligence, convenience, personalization, and dataization. It is the core support for promoting the innovation of sports teaching models.

Sports teaching in private universities in Guangdong Province specifically refers to the sports course teaching, extracurricular sports activities, and movement skill training related educational activities carried out by universities established by social forces and approved by the education administrative department in Guangdong Province. Compared with public universities, it has the characteristics of flexible school management mechanisms, diverse funding sources but relatively limited resource allocation, and a focus on application-oriented talent cultivation. Its sports teaching not only undertakes the basic task of enhancing students' physical fitness and cultivating sports skills, but also shoulders the important mission of adapting to the needs of application-oriented talent cultivation and implementing the "Healthy China" strategy.

### *2.2 Theoretical foundation support*

This research mainly relies on three theories to provide theoretical support for the deep integration of digital technology and sports teaching in private universities in Guangdong Province and the construction of development strategies. First, the constructivist learning theory, which emphasizes that learning is a process in which learners actively construct knowledge. Digital technology builds immersive and interactive teaching scenarios, providing platforms for students to engage in autonomous learning and cooperative exploration, which meets the needs of autonomous learning and personalized improvement of sports skills in sports teaching. It provides a core theoretical basis for empowering the innovation of sports teaching models with digital technology. Second, the technology acceptance model, whose core lies in explaining the degree of acceptance and willingness to use of individuals towards technology. Its core variables include perceived usefulness and perceived ease of use, which can be used to analyze the acceptance of digital technology by sports teachers in private universities in Guangdong Province, their application willingness, and influencing factors, providing theoretical support for optimizing the promotion strategy of digital technology application and improving its effectiveness. Third, the lifelong education theory, which emphasizes the continuity and lifelong nature of education. Digital technology breaks the time and space limitations of sports teaching, enabling effective connection between in-class teaching and extracurricular exercise, helping students cultivate lifelong exercise awareness and ability, which is highly consistent with the long-term goals of private university sports teaching, providing theoretical guidance for the long-term application of digital technology in sports teaching. The three theories support each other and jointly constitute the theoretical system of this research, ensuring the scientificity and rigor of the research.

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## 3. The current situation, problems and influencing factors of digital technology application in physical education teaching in private universities in Guangdong Province

### *3.1 Application status and preliminary achievements*

Digital transformation is the inevitable trend for the development of university physical education in the future. Through strategies such as enhancing the digital literacy of physical education teachers, promoting the modernization of the physical education environment, and establishing a sound digital teaching system for physical education, it can help promote the high-quality development of physical education in Chinese universities [2]. Under the dual promotion of the in-depth implementation of the national education digital strategy action and the deployment of educational digital transformation in Guangdong Province, private universities in Guangdong Province, based on their own educational positioning, actively adapt to the trend of physical education reform, gradually promote the deep integration of digital technology and physical education teaching, and after phased exploration, have achieved preliminary results, laying a solid foundation for the further deepening of technology application. At the level of teaching implementation scenarios, most private universities have introduced mainstream online teaching platforms such as Superstar Learning Platform and Yu Classroom, systematically uploading digital resources such as physical education course materials, specialized skill teaching videos, assessment and evaluation standards, and sports safety knowledge, achieving online sharing and efficient transmission of physical education teaching resources, effectively solving the prominent problems of time and space limitations and poor resource transmission in traditional physical education teaching, providing convenient support for students' after-class self-study and skill consolidation. At the same time, some private universities with better conditions have equipped with intelligent sports wristbands, physical fitness monitoring instruments, and motion posture collection equipment, established a mechanism for collecting and analyzing students' physical fitness data, achieving regular tracking of heart rate, exercise intensity, physical indicators, etc., providing objective data support for teachers to accurately grasp students' physical fitness status and scientifically adjust teaching content and progress[3]. At the level of teaching mode innovation, some universities have actively explored the integration path of digital technology and skill courses, applying motion capture technology, three-dimensional modeling technology to basketball, martial arts, aerobics and other specialized courses, through real-time capture of students' motion postures, comparing standard action parameters, assisting teachers in accurately identifying students' movement deviations, achieving personalized error correction guidance, effectively improving the targetedness and efficiency of skill teaching, breaking the single mode of "teacher demonstration - student imitation" in traditional skill teaching. In addition, the application of digital technology has further promoted the coordinated connection of in-class physical education teaching and extracurricular sports activities. Some private universities have built extracurricular self-study platforms through digital forms such as online sports, sports data ranking, and online sports competitions, effectively stimulating students' initiative and enthusiasm for sports exercise, gradually forming a "classroom teaching leading, extracurricular exercise extending" sports education pattern, effectively promoting the improvement of students' physical fitness level and the cultivation of lifelong exercise awareness.

### *3.2 Core application problems*

Although progress has been made in application, the application of digital technology in physical education teaching in private universities in Guangdong Province still has many prominent problems. First, the application level is relatively shallow, most universities still remain at the basic level of resource sharing and data collection, lacking in-depth applications such as big data analysis and intelligent personalized teaching, failing to fully leverage the educational value of digital technology. Second，resource allocation is unbalanced, some private universities are limited by funds, the update of digital teaching equipment is lagging and insufficient, and there are no suitable digital resources for physical education teaching, resulting in significant differences in application among different universities and courses. Third, the digital literacy of teachers is insufficient, some physical education teachers lack the ability to operate digital technology and the ability to integrate teaching design, unable to deeply combine digital technology with physical education teaching content and teaching methods, affecting the effectiveness of application. Fourth, the adaptability of application is insufficient, most digital technology applications are simply copied from public universities' models, without considering the characteristics of applied-type talent cultivation in private universities and the actual needs of students, resulting in a disconnection between technology application and teaching goals.

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### *3.3 Deep influencing factors of the problems*

The various problems mentioned in the previous text regarding the application of digital technology in physical education teaching in private colleges in Guangdong Province are not isolated but arise from the combined constraints of multiple deep-seated factors such as funds, teachers, management, and concepts. These factors are interrelated and mutually influential, jointly hindering the deep integration of digital technology and physical education teaching. A systematic analysis from the root cause is necessary. From the perspective of fund supply, the fundraising model of private colleges differs fundamentally from that of public colleges. Their main sources of funds rely on tuition income and social donations, lacking stable support and preferential treatment from government fiscal funds, and the total amount of funds is relatively limited. In the process of resource allocation, most private colleges adopt the strategy of "prioritizing the development of advantageous disciplines", focusing their limited funds on fields with distinctive educational characteristics and strong employment competitiveness. However, the sports discipline, as a non-core discipline, has its funds significantly reduced for digital resource procurement, intelligent teaching equipment updates, and digital teaching platform upgrades, directly resulting in lagging digital hardware facilities for physical education teaching and a scarcity of high-quality digital resources, becoming a material bottleneck restricting the application of digital technology. Analyzing from the aspect of teacher, the digital literacy of the teaching staff is the core support for the effective application of digital technology, and the construction of sports teacher teams in private colleges in Guangdong Province has obvious shortcomings. In the teacher recruitment process, most private colleges overly focus on the sports teaching skills and specialized teaching abilities of teachers, while the assessment weights for digital literacy indicators such as digital teaching ability and digital teaching design ability are relatively low. This leads to some newly recruited teachers lacking basic digital teaching foundations. At the same time, private colleges lack a systematic and complete digital literacy training system for teachers do not carry out stratified and categorized special training based on the characteristics of sports teaching, and lack effective incentive mechanisms, making it difficult to motivate teachers to actively learn digital technology and explore integrated teaching models, resulting in the inability to effectively enhance teachers' digital teaching abilities and failing to meet the actual needs of the deep integration of digital technology and physical education teaching. From the perspective of management mechanism, a complete management system and assessment mechanism are important guarantees for the standardized application of digital technology. Currently, most private colleges in Guangdong Province have not established a special management system for the application of digital technology in physical education teaching, lack clear regulations on the use of digital resources, equipment maintenance, and teaching application standards, and do not incorporate the application effectiveness of digital technology into the performance evaluation system of physical education teachers. This leads to teachers lacking clear guidance and constraints in the application process, with application behaviors being arbitrary, and it is difficult to achieve standardized and regular application. From the perspective of teaching philosophy, some college managers and physical education teachers have insufficient understanding of educational digital transformation, still adhering to the traditional sports teaching philosophy of "teacher dominance and passive acceptance by students", and have not deeply understood the important value and application path of digital technology in sports teaching. They lack the awareness of actively innovating teaching models and promoting technological integration, subjectively restricting the deep penetration and efficient application of digital technology in physical education teaching.

## 4. Drawing on domestic and foreign experience and constructing development strategies for private universities in Guangdong Province

### *4.1 Drawing on advanced domestic and international experiences*

The advanced experience accumulated by domestic and foreign universities in the application of digital technology in physical education teaching provides important reference for private universities in Guangdong Province. On the foreign front, developed countries such as the United States and Japan have established a closed-loop teaching model of "data collection analysis application" based on mature digital technology systems. For example, private universities in the United States have introduced intelligent motion analysis systems, combined with big data technology to accurately locate students' motor skill shortcomings and achieve personalized teaching plan push; Japanese private universities are building an integrated online and offline sports teaching platform, integrating on campus and off campus sports resources, promoting a deep connection between in class teaching and extracurricular independent

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exercise, and balancing skill development and physical fitness improvement. Domestically, public universities in developed eastern regions focus on resource integration and faculty cultivation. For example, some universities in Zhejiang and Jiangsu have established sports digital resource sharing alliances to alleviate the problem of resource imbalance; At the same time, building a hierarchical and classified teacher digital literacy training system to enhance teachers' ability to integrate technology into teaching provides practical reference for Guangdong Province's private universities to solve application difficulties.

### *4.2 Four dimensional collaborative development strategy system*

The digital empowerment of physical education reform in universities has become an important direction for the high-quality development of physical education in current universities. Based on the core characteristics of flexible operation mechanism, limited resource allocation, and emphasis on application-oriented talent cultivation in private universities in Guangdong Province, and in response to the shortcomings and deep constraints of digital technology application identified in the previous section, and drawing on advanced practical experience in digital application of physical education teaching in domestic and foreign universities, a four-dimensional collaborative development strategy system of "funding guarantee teacher cultivation resource construction management optimization" is constructed to comprehensively solve application difficulties, promote the transformation of digital technology and physical education teaching in private universities in Guangdong Province from shallow integration to deep integration, and help promote the connotative development of physical education.

One is to strengthen financial support and overcome material constraints. Based on the characteristics of fundraising in private universities, we will broaden the channels of funding supply and form a diversified funding mechanism of "government guidance, school enterprise cooperation, and social participation". Schools should actively align with the government’s special subsidy policies for educational digitalization and strive for special funds to support the digital development of physical education teaching. They should also deepen school-enterprise cooperation, attract investment and technical support from sports technology enterprises, and jointly build digital teaching practice bases. In addition, schools should take the initiative to connect with social welfare organizations and alumni resources, solicit social donations, and use such funds exclusively for the procurement of sports digital resources and the upgrading of intelligent equipment. The investment of funds adheres to the principle of "priority for essential needs and balanced allocation", prioritizing the protection of essential hardware such as physical fitness monitoring equipment and core teaching platforms, and balancing the digital resources of different universities and physical education courses to narrow the application gap.

The second is to focus on teacher training and strengthen the core of technology application. An integrated teacher development mechanism featuring “recruitment, training, and assessment” should be established to address the problem of insufficient digital literacy among physical education teachers. In the recruitment process, assessment indicators should be optimized by increasing the weight of digital literacy criteria such as digital technology application ability and digital teaching design ability, so as to introduce interdisciplinary physical education teachers with both professional sports competence and digital literacy. A hierarchical and classified specialized training system should be built to offer targeted instruction on motion capture technology, big data analysis tools, and other technologies for teachers with varying teaching experience and digital competence. An inter-school teacher exchange platform should be constructed to promote the sharing of digital teaching experience. Meanwhile, the effectiveness of digital technology application should be included in teacher performance evaluations, and incentive mechanisms should be established to stimulate teachers’ enthusiasm for exploring integrated teaching models, thereby comprehensively improving their digital technology operation and teaching integration capabilities.

The third is to optimize resource construction and enhance the level of adaptation and application. Schools should integrate high-quality on-campus and off-campus sports digital resources and build a sports digital resource library that aligns with the applied talent training goals of private universities, covering contents such as professional skill teaching videos, physical fitness monitoring standards, and sports safety knowledge. They should deepen school-enterprise cooperation to jointly develop digital teaching tools and specialized course resources tailored to the characteristics and teaching needs of students in private universities, avoid blindly copying application models from public universities, and highlight practicality and relevance. A dynamic resource update mechanism should be established to supplement cutting-edge teaching resources in a timely manner, ensuring that digital resources keep pace with physical education reform and technological development.

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The fourth is to improve management optimization and strengthen the role of overall planning and guidance. A specialized management system for the application of digital technology in physical education teaching should be established and improved to clarify requirements for digital resource use, equipment maintenance, and teaching application standards. A scientific assessment and evaluation system should be constructed to incorporate the effectiveness of digital technology application and resource utilization efficiency into the evaluation of physical education teaching and teacher performance in universities, thereby strengthening application orientation and institutional constraints. Universities should strengthen overall planning at the institutional level, guide managers and teachers to transform traditional teaching concepts, establish the core concept of "digital empowerment of sports education", and promote the deep application of digital technology from basic resource sharing and data collection to personalized teaching and big data analysis. In this way, the educational value of digital technology can be fully unleashed to support the high-quality development of physical education in private universities in Guangdong Province.

## 5. Conclusion

This article is based on the dual background of educational digital transformation and the "Healthy China" strategy. Taking private universities in Guangdong Province as the research object, it systematically sorts out the current application status, core problems, and deep influencing factors of digital technology in physical education teaching. By drawing on advanced domestic and foreign experience, a four-dimensional collaborative development strategy system is constructed. The main research conclusions are as follows.

Research has found that digital technology has achieved initial penetration in physical education teaching in private universities in Guangdong Province. The application of online teaching platforms, basic sports data collection, and other primary scenarios have gradually become popular, achieving phased results in expanding teaching time and space, and stimulating students' exercise enthusiasm. However, the overall application is still in the stage of "shallow integration", with core problems such as shallow application levels, imbalanced resource allocation, insufficient digital literacy of teachers, and poor model adaptability. The root cause lies in the multiple constraints of limited funding investment in private universities, lack of teacher training mechanisms, imperfect management systems, and lagging teaching concepts.

Domestic and international practical experience has shown that the deep integration of digital technology and physical education teaching needs to be based on the positioning of the school, taking into account both technological adaptability and resource integration capabilities. Based on this, the four-dimensional collaborative strategy of "funding guarantee teacher cultivation resource construction management optimization" constructed in this article is in line with the characteristics of flexible operation of private universities in Guangdong Province, and provides a feasible path for solving application difficulties.

The core value of this study lies in filling the targeted gap in digital research on physical education teaching in private universities in Guangdong Province, combining the application of digital technology with the resource endowment and application-oriented talent cultivation goals of private universities, and constructing a development strategy that combines theory and practice. The limitation of the research lies in the lack of empirical testing on the effectiveness of strategy implementation. In the future, the implementation and effectiveness of the strategy can be further verified through tracking research, case analysis, and other methods. Overall, digital technology is a key lever for improving the quality and efficiency of physical education teaching in private universities in Guangdong Province. Only through multidimensional collaborative efforts can we achieve deep integration of technology application and teaching practice, and help private university physical education achieve connotative development.

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