

Analysis of Opportunities, Challenges, and Pathways of Digital Empowerment in Physical Education of Vocational Schools

Liu Shuang*

Henan Polytechnic University, Henan, Jiaozuo, China

*Corresponding author: 2713076866qq.com

Abstract: The digitalization of education is an important breakthrough for China to open up a new track for education development and shape new advantages for education development. The rise of digitalization has brought opportunities for the development and reform of physical education teaching in secondary vocational schools. The purpose of this study is to explore the opportunities of digitalization in physical education teaching in secondary vocational schools, analyze the difficulties faced in its implementation, and propose effective optimization paths. Through digital empowerment, it is expected to improve the quality and efficiency of physical education teaching, stimulate students' interest in learning, and promote the modernization process of physical education teaching in secondary vocational schools.

Keywords: Digitalization; Vocational schools; Physical education teaching

1. Introduction

With the rapid development of information technology, the wave of digitalization is sweeping across the globe at an unprecedented speed and breadth, profoundly changing the development patterns of various industries. In this context, the education sector is also experiencing unprecedented opportunities for transformation, especially vocational education, which serves as an important bridge connecting school education and vocational skills training, making the innovation of its teaching models and methods particularly significant. Important instruction that digital education is an important breakthrough for our country to open up new avenues for educational development and to shape new advantages in educational development has pointed out the direction for vocational education and has also brought a brand new development opportunity for physical education, which is a traditional and crucial field. As an indispensable part of the curriculum system in vocational schools, physical education not only concerns the enhancement of students' physical health but also serves as an important pathway for cultivating their teamwork spirit, resilience, and other comprehensive qualities. However, traditional physical education teaching is often limited by the singularity of teaching resources, teaching methods, and evaluation systems, making it difficult to meet the diversified and personalized learning needs of students in the context of the new era. The rise of digitalization, with its powerful information processing capabilities and limitless resource linking potential, provides strong technical support and infinite possibilities for the transformation and upgrading of physical education in vocational schools.

2. The Concept, Connotation, and Significance of Digitalization

2.1. The Concept and Connotation of Digitalization

Digitalization refers to the process by which organizations create unique value for users by recombining information, resources, and digital technologies to achieve business objectives. Currently, the digital technologies referred to include cloud computing, big data, the Internet of Things, mobile internet, artificial intelligence, and others, which bring unique value to users^[1].

2.2. The Significance of Promoting Digitalization

The report of the 20th National Congress of the Communist Party of China first proposed digital education, promoting digital education, and building a lifelong learning society for all and a learning-oriented country, marking that digital education has become an important strategic goal and pointing the direction for educational work in the new era. Accelerating the construction of a digital China means adapting to the new historical position of our country's development, fully implementing the new development concept, cultivating new momentum through information technology, using new momentum to drive new development, and creating new brilliance through new development.

3. Opportunities for Digital Empowerment in Physical Education Teaching of Vocational Schools

3.1. Guidance from National Strategic Positioning

The national strategic positioning plays a vital role in promoting the construction of the digital system of school physical education. It is manifested in the fact that policy support and guidance are the core of national strategic positioning. The state has formulated a series of policy documents, such as the Action Plan for Education Informatization 2.0 and the Acceleration of Education Digitalization to Build an Education Power, which provides clear guidance and direction for the construction of a digital system of school physical education. At the policy level, the state encourages innovative teaching methods and means, and promotes the deep integration of information technology and physical education. For example, through the introduction of smart wearable devices, virtual reality technology and other advanced means, the fun and interactivity of physical education teaching are improved, and students' interest and participation in learning are stimulated. Capital investment is an important driving force for national strategic positioning. The state has increased investment in the digitalization of school physical education by setting up special funds and providing financial subsidies. These funds are not only used to purchase advanced digital teaching equipment and software, but also to support teacher training, curriculum research and development, and the construction and sharing of digital teaching resources. In addition, the state also encourages social capital to participate in the digital construction of school physical education, and broadens funding channels through public-private partnerships (PPP) and other models, so as to provide more financial guarantees for the digitalization of school physical education; The national strategic positioning promotes the research and development of digital technology in school sports. The state encourages universities, scientific research institutions and enterprises to participate in the research and development of the digitalization of school physical education through the establishment of scientific research projects and scientific research platforms. These studies not only focus on the application of digital technology in physical education teaching, but also deeply explore how digital technology can better serve the realization of physical education teaching goals. For example, through big data analysis, students' exercise data can be analyzed to provide teachers with more accurate teaching feedback and personalized teaching suggestions. Through artificial intelligence technology, intelligent assistance and personalized guidance for physical education teaching are realized.

3.2. International exchange and cooperation interaction

International exchanges and cooperation provide a valuable opportunity for the construction of a digital system for school physical education teaching, so that countries can share and learn from international best practices. Through participation in international conferences, seminars, workshops and other activities, educators can learn about successful cases and innovative practices in the digitalization of physical education in other countries. These best practices may include advanced instructional design concepts, effective strategies for the use of technology, and pedagogical methods that promote student engagement and interest. In addition, international exchanges also promote the cross-border sharing of educational resources. For example, online courses, interactive teaching materials, virtual labs, these resources can be opened to educators and students in other countries through international platforms, so as to achieve the global optimal allocation of educational resources; Promote international standards and certifications. With the global spread of digital physical education, countries are beginning to focus on how to ensure the consistency of teaching quality and standards. Through international exchanges and cooperation, countries can jointly develop international standards and evaluation systems for the digitalization of physical education teaching to ensure that teaching content, teaching methods and technical applications meet certain quality standards. At the same time,

the establishment of an international accreditation system will also help to enhance the international recognition of digital physical education teaching. By obtaining international accreditation, schools and teachers can demonstrate that their digital physical education teaching standards meet international standards, thereby enhancing their international competitiveness; Provide a diverse learning experience. International exchange and cooperation provide a diversified learning experience for the school's physical education teaching. This cross-cultural exchange and learning helps to broaden students' horizons and improve their international awareness and intercultural communication skills. In addition, international exchanges have promoted innovation in digital physical education teaching methods. For example, by working with international partners, schools can introduce new instructional technologies and tools, such as augmented reality (AR), virtual reality (VR), to provide students with a more immersive and interactive learning experience. These new technologies can not only stimulate students' interest and motivation in learning, but also improve their learning effectiveness and satisfaction.

3.3. Introduction of modern information technology

The introduction of modern information technology has injected new impetus into the construction of the digital system of school physical education^[2]. With the popularization of the Internet, various online education tools and platforms have emerged, providing a new teaching channel for school physical education. These platforms can not only support functions such as live lectures, recording and playback, but also enable remote interaction, so that students can receive professional sports instruction at home. For example, with video conferencing software, teachers can observe students' movements in real time and make corrections, while the recording feature allows students to review what they have learned at any time to deepen their understanding. In addition, some specialized physical education platforms also provide rich teaching resources, such as teaching plans, teaching videos, teaching cases, which provide great convenience for teachers' teaching; Virtual reality and augmented reality. Virtual Reality (VR) and Augmented Reality (AR) technologies have revolutionized physical education. Through VR technology, students can experience various sports scenarios such as simulated football matches, basketball training, so as to train efficiently without leaving the classroom. AR technology can superimpose virtual elements into the real environment to create a more vivid and interesting learning experience for students. Modern information technology can also provide precise data feedback and artificial intelligence technology to help teachers better understand student learning and adjust teaching strategies accordingly. For example, through smart wearable devices, teachers can monitor students' heart rate, speed, strength and other physiological indicators in real time, so as to judge students' exercise status and training effect. This data-driven physical education not only improves the pertinence and efficiency of training, but also reduces the risk of sports injuries; Online collaboration and resource sharing technology. Modern information technology has also facilitated the ease of online collaboration and resource sharing. With cloud storage and online collaboration platforms, teachers and students can easily share teaching resources, study notes, assignments, and more. This collaborative approach not only improves the utilization of teaching resources, but also promotes communication and interaction between teachers and students. Some online education communities and forums also provide teachers and students with a wealth of learning resources and communication platforms, so that they can learn from each other and progress together.

3.4. Development of digital network resources

The development of digital network resources provides a new opportunity for the construction of a digital system of physical education teaching in schools. manifested in the acceleration of information and data transmission; Provide schools with data analysis and management tools; Support the development of multimedia educational resources in three aspects. First of all, from the perspective of information and data transmission, the popularization of digital network resources has greatly improved the timeliness and interactivity of physical education^[3]. Traditional physical education is often limited by time and space, but digital networks have broken down this barrier. Whether it's lesson plans, course content, or student training data and feedback, they can be updated and shared instantly through the web platform. This not only makes the communication between teachers and students smoother, but also provides the possibility of new teaching modes such as distance teaching and online tutoring. No matter where they are, students can participate in physical education through the online platform, which greatly broadens the boundaries of physical education. Second, digital network resources provide schools with powerful data analysis and management tools. By collecting and analysing students' training data, fitness status, skill level and other information, schools can more accurately grasp each student's physical education learning status, so as to develop more personalized teaching plans. At the

same time, these tools can help schools monitor and evaluate the PE teaching process holistically, including key indicators such as curriculum engagement, student satisfaction, and achievement of teaching goals. These data not only provide strong support for the continuous improvement of teaching quality, but also provide a scientific basis for schools to optimize resource allocation and improve teaching efficiency^[4]. In addition, digital network resources have greatly enriched the multimedia educational resources of physical education. Traditional physical education often relies on limited teaching resources such as paper textbooks and physical equipment, while the digital network provides students with a large number of multimedia materials such as video tutorials, animation demonstrations, and online interactive games. These materials not only make the teaching content more vivid, vivid and easy to understand, but also greatly stimulate students' interest and enthusiasm in learning. Through advanced technologies such as virtual reality (VR) and augmented reality (AR), students can even conduct sports training in a virtual environment and simulate real game scenarios for a more realistic and immersive learning experience^[5].

3.5. Data-driven analytical learning

Data-driven analysis and learning provides a new reform direction for the construction of digital system of school physical education teaching. First, data-driven analytical learning provides unprecedented personalized learning support for physical education. By collecting and analyzing a large amount of data on students' learning process, such as sports performance, physical fitness indicators, skill mastery, the system can accurately depict the learning characteristics and needs of each student^[5]. Based on this data, teachers can tailor a learning plan for each student, providing targeted training recommendations to ensure that each student learns at a pace and difficulty that suits them, thereby maximizing learning outcomes. Second, data-driven analytical learning plays an important role in monitoring the quality of physical education. Through comprehensive data analysis of the teaching process and results, the school can grasp the overall status of physical education teaching in real time, including curriculum implementation effect, student engagement, teacher teaching quality and other dimensions. These data provide an objective and quantitative evaluation basis for education managers, which is helpful to find and solve problems in teaching in a timely manner, and ensure the quality and effectiveness of physical education. Furthermore, data-driven analytical learning has shown great potential to improve educational decision-making. Traditional educational decision-making often relies on empirical judgment and subjective feelings, while data-driven analysis and learning provides a more objective and accurate decision-making basis for education managers through scientific data analysis and prediction. Whether it is the optimization of curriculum setting, the innovation of teaching methods, or the allocation of educational resources, it can be accurately adjusted based on the results of data analysis to maximize the educational benefits^[6]. This data-based decision-making method not only improves the scientificity and effectiveness of decision-making, but also promotes the rational allocation and efficient use of educational resources.

4. The dilemma of digital empowerment of physical education teaching in secondary vocational schools

4.1. Urban-rural disparity restricts the development of digital sports and exacerbates the “digital divide”

The rural-urban divide is particularly evident in the field of digital sports. Due to the differences in economy, technology, resources and other aspects, the digital sports facilities in rural areas are relatively backward and cannot meet the needs of the majority of villagers and students. This gap not only restricts the development of digital sports in rural areas, but also puts rural students at a disadvantage in enjoying digital sports resources, further exacerbating the “digital divide”.

4.2. The physical education curriculum is out of touch with the social trend and cannot meet the new requirements of talent training

With the advent of the digital age, the traditional physical education curriculum can no longer meet the new requirements of modern talent training. The teaching content of traditional physical education courses focuses on the teaching of sports skills and knowledge, while ignoring the cultivation of students' digital literacy and innovation ability^[7]. The teaching methods of traditional physical education courses are outdated, and the teaching methods of traditional physical education courses are

mainly based on teachers' explanations and demonstrations, and students passively accept knowledge and skills. This makes students struggling to cope with the resources and challenges of digital sports.

4.3. The insufficient development of digital literacy of teachers and students restricts the development of digital physical education teaching

The digital literacy of teachers and students is one of the key factors for the high-quality development of digital physical education. At present, the digital literacy of physical education teachers and students is generally low, which restricts the further development of digital physical education. Physical education teachers are deficient in the application of digital technology, the innovation of teaching methods, and the development of curriculum resources, and students lack the ability to learn and innovate digitally.

4.4. There is a lack of policies and regulations on sports digitalization, and information and data security problems are frequent

With the rapid development of digital sports, relevant policies and regulations are not perfect, which leads to frequent information and data security problems^[8]. In the digital era, the broadcast rights, event data and personal privacy of sports events have become important commercial resources, but there is a lack of effective legal protection and regulatory mechanisms. As a result, the digital sports field is facing many problems such as copyright protection, data security, and privacy protection.

5. The path of digital empowerment of physical education teaching in secondary vocational schools

5.1. Balance the rational allocation of educational resources to solve the “digital divide” and the rights and interests of students

First, optimize the allocation of educational resources. The State has increased its investment in education, especially in rural and remote areas, to ensure the balanced development of basic education.

The government optimizes the allocation mechanism of education funds, and make differentiated allocation according to the needs of regions, schools and students to ensure the effective use of resources; Strengthen teacher training and enhance teachers' professional quality and teaching capacity, especially in rural and remote areas. Implement a teacher rotation system, promote the balanced distribution of urban and rural teacher resources, and improve the teaching quality of rural schools; Strengthen school infrastructure, especially in rural and remote areas, to ensure a safe and comfortable learning environment for students. Promote the informatization of education, equip advanced teaching equipment and network resources, and narrow the gap between urban and rural schools in terms of hardware. Second, innovate the way of providing educational resources. Make full use of Internet technology to develop high-quality digital education resources, such as online courses, virtual labs, to provide students with diversified learning paths. Promote the “Internet + education” model, use the network platform to realize the sharing and interaction of educational resources, and narrow the education gap between urban and rural areas and regions; Encourage schools to establish cooperative relations with enterprises, universities, research institutions, to jointly develop educational resources and improve the quality and efficiency of education. Promote the assistance model of “famous schools + weak schools”, and improve the education level of weak schools through resource sharing and teacher mutual assignment; Make full use of community resources, such as libraries, museums, science and technology museums, to provide students with rich extracurricular learning and practice opportunities. Finally, we need to reshape the education equity ecosystem. The State formulates and improves relevant policies to ensure the equitable distribution and effective use of educational resources. The government strengthens oversight in the field of education to prevent waste and misuse of resources; Encourage all sectors of society to participate in education, and provide support and assistance for education through donations, volunteer services, etc; Strengthen education and publicity, and raise the awareness and importance of education equity in the whole society; Strengthen the establishment of mechanisms for the protection of students' rights and interests, ensure that students' lawful rights and interests are protected in the course of education, pay attention to the educational needs of special groups of students, such as students with disabilities and poor students, and provide them with targeted support and assistance.

5.2. Review the goals of school physical education and improve the digital literacy of school teachers and students

First of all, it is necessary to reconstruct the goal of educating people and improve the cultivation mechanism of digital literacy in school sports. In the new education goals, digital literacy should be clearly regarded as an important part of physical education, and its role in improving students' comprehensive quality and promoting the formation of lifelong sports awareness should be emphasized. Digital literacy includes not only the ability to use digital tools, but also the ability to acquire, analyze, evaluate, create, and disseminate digital information, which are essential skills for modern students. The state is to establish a scientific digital literacy evaluation system, regularly assessing students' digital literacy levels, so as to adjust teaching strategies in a timely manner and ensure that every student can improve their digital literacy. The assessment system should cover many aspects such as students' skill level, information processing ability, and innovative thinking when using digital technology. Secondly, the digital physical education training of physical education teachers should be strengthened to improve the digital practice ability of physical education teachers. The government regularly organizes digital technology training for physical education teachers, covering digital teaching design, digital education resource development, and the use of digital teaching platforms. Through training, PE teachers can be proficient in various digital tools and effectively integrate them into PE teaching practice; The Government encourages PE teachers to integrate digital technology to innovate teaching methods and means, such as using virtual reality technology to simulate sports scenarios and using big data to analyse students' sports performance. Through innovative teaching methods, students' interest in learning is stimulated, and the attractiveness and effectiveness of physical education teaching are improved. In the training of physical education teachers, the awareness of digital literacy cultivation should be strengthened, so that teachers can realize the importance of digital literacy to students' growth and take the initiative to integrate it into daily teaching. Through the guidance and demonstration of teachers, students' awareness of digital literacy is cultivated, so that they can consciously use digital technology in their daily life to improve their physical literacy.

5.3. Strengthen the construction of school infrastructure and consolidate the digital foundation of school sports

First of all, lay out the infrastructure in the field of school sports. According to the size of the school, the number of students and the needs of sports development, the layout of the school's sports infrastructure is comprehensively planned, including sports venues, sports equipment, fitness facilities. The government formulates a detailed implementation plan to promote the construction and upgrading of sports infrastructure in stages and steps to ensure that resources are effectively utilized; When building sports infrastructure, attention should be paid to diversity to meet the needs of students of different ages and interests. At the same time, schools are encouraged to build personalized sports facilities according to their own characteristics and resources, such as football fields, basketball courts, badminton courts, as well as climbing walls, swimming pools and other special projects; The government has established and improved the maintenance and renewal mechanism of sports infrastructure, and regularly inspected, repaired and upgraded facilities to ensure that the facilities are safe, reliable and sustainable. The government encourages schools and social forces to participate in the maintenance and management of facilities, forming a synergy to improve the efficiency of facilities. Second, we need to broaden the ways to raise funds for the construction of digital infrastructure in the field of sports. The government should play a leading role in encouraging schools, enterprises and social forces to participate in the construction of digital infrastructure in the field of sports by formulating relevant policies and providing financial subsidies. The government has established diversified financing mechanisms, including government subsidies, corporate donations, social financing, to form synergies and promote the rapid development of digital sports infrastructure. The state explores innovative financing models such as PPP and BOT, and eventually increases the construction of digital education infrastructure in remote and backward areas in the west. The government has given policy preferences and financial support to the construction of digital education infrastructure in remote and backward areas in the western region to ensure that these areas can enjoy high-quality digital education resources. The government has set up a special fund to support the construction of digital education infrastructure in these areas, including network facilities, teaching equipment, software resources; The government optimizes the allocation of digital education resources, promotes the sharing and flow of high-quality educational resources, and ensures that students in remote and backward areas in the western region can enjoy the same level of education services as in

cities. Establish a cross-regional platform for sharing educational resources to promote the balanced distribution and efficient use of educational resources; Strengthen digital technology training for teachers in remote and backward areas in the western region, and improve teachers' information literacy and digital teaching capabilities.

5.4. Strengthen the top-level design of policies and regulations, and build a digital system for school physical education

First of all, the corresponding policies, systems, laws and regulations should be formulated at the national and government levels. The state and the government should formulate a long-term development plan for school sports, clarify the goals, tasks and paths for the modernization of school sports, and ensure that school sports are coordinated with the overall national development strategy. The government has established and improved the legal and regulatory system for campus sports, clarified the responsibilities and obligations of governments and schools at all levels, and ensured the smooth development of campus sports; Formulate preferential policies to encourage schools, enterprises and social forces to participate in the modernization of campus sports, and form a diversified and multi-level investment mechanism. Second, local governments should build laws and regulations according to local conditions. Each local government shall, on the basis of the level of local economic and social development and the current situation of the development of school sports, formulate laws and regulations on school sports with local characteristics to ensure the pertinence and effectiveness of the laws and regulations. Local governments need to innovate the system and mechanism of school sports and explore the development model of school sports according to local conditions; The national and government school sports policy system is refined into specific and operational measures, and the timetable and roadmap are clarified to ensure that the policy system is effectively implemented. The government has strengthened guidance and services for school physical education, and promptly resolved problems and difficulties encountered by schools in physical education; Encourage social organizations and the public to participate in the supervision of school physical education work, establish a diversified supervision mechanism, and ensure that school physical education work is open, transparent, and fair. Finally, it is necessary to strengthen the guidance of policy funds for the modernization of school sports. The state and the government should increase investment in the modernization of school sports to ensure that the funding needs of school sports facilities, teacher team construction, and scientific research projects are met. The government regularly evaluates and gives feedback on the use of school sports funds, adjusts the investment and use of funds in a timely manner, and improves the efficiency of fund use; Through financial guidance and policy incentives, schools are encouraged to innovate the system and mechanism of school physical education, and explore the development model of school physical education in line with local conditions. Commendations and awards will be given to schools and individuals with outstanding performance in school physical education, and a positive working atmosphere and incentive mechanism will be formed.

6. Conclusions

Digitalization has brought many opportunities for physical education teaching in secondary vocational schools, such as the guidance of national strategic positioning, international exchanges and cooperation, the introduction of modern information technology, the development of digital network resources, and data-driven analysis and learning, all of which have strongly promoted teaching reform and innovation, expanded teaching boundaries, and improved teaching quality and personalization. However, it also faces difficulties such as the "digital divide" caused by the urban-rural gap, the disconnection of the curriculum from the trend, the lack of digital literacy of teachers and students, and the lack of policies and regulations. In order to realize the digital empowerment of secondary vocational physical education, it is necessary to balance the allocation of educational resources, improve the digital literacy of teachers and students, strengthen the construction of school infrastructure, and improve the top-level design of policies and regulations. In short, although the digital transformation of secondary vocational physical education teaching has a long way to go, it needs to give full play to the advantages of digitalization through the concerted efforts of multiple parties, create a new situation for secondary vocational physical education teaching, and cultivate sports talents who meet the needs of the times.

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