Exploration of the Value and Path of Artificial Intelligence Empowering Physical Education Teaching in Rural Primary Schools --Taking Lion Experimental Primary School in Lion Town, Qichun County as an Example

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Abstract: Under the background that the country vigorously advocates "China's Education Modernization 2035" and "Education Informatization 2.0 Action Plan", the deep integration and development of artificial intelligence and education has become the general trend. This paper takes physical education teaching in rural primary schools as the research entry point, selects Lion Experimental Primary School in Lion Town, Qichun County, Hubei Province as a case, and uses literature research, case study, and descriptive research methods to systematically explore artificial intelligence from two aspects of value and path. Research on empowering primary school physical education teaching. After research, it is found that there are not only opportunities for policy support, concept renewal and technology popularization, but also difficulties in concept lag, lack of digital literacy of teachers and lack of resources in rural primary school physical education teaching. the value of artificial intelligence empowering physical education teaching in rural primary schools has three aspects, namely, personalized activation of students, precise empowerment of teachers, and ecological reconstruction of management. Student personalized activation refers to the use of artificial intelligence technology to design a personalized teaching plan for each student, bringing students an interesting learning experience and safety guarantee; Precise empowerment of teachers refers to relying on artificial intelligence technology to accurately analyze students' learning conditions, and support teachers in data-driven teaching decisions, process-based teaching management, and teaching boundary expansion; the ecological reconstruction of management refers to the establishment of a process evaluation system and a digital collaborative platform through artificial intelligence technology to realize the ecological reconstruction of rural primary school physical education teaching management. In order to achieve the above goals, this paper creates a teaching application approach dominated by the closed-loop data of "perception-image-intervention" and covering the whole process of "pre-class-in-class-after-class", and relies on "school-teacher-student" the practical path supported by the three collaborative mechanisms. With the goal of promoting smart physical education teaching, education fairness and quality improvement in similar rural primary schools, it provides theoretical reference and practical paradigm for smart physical education teaching.

Keywords: Artificial Intelligence; Primary School Physical Education Teaching; Value; Path

1. Introduction

At present, the world is experiencing a new technological revolution and industrial transformation driven by artificial intelligence (AI), and its influence has penetrated into all fields of society. Education is a major undertaking related to the future of the country and individual development. Its deep integration with artificial intelligence has become an irreversible trend of the times. National programmatic documents such as "China's Education Modernization 2035" and "Education Informatization 2.0 Action Plan all propose: to actively promote the deep integration of new-generation information technologies such as artificial intelligence with education and

teaching, use intelligent technology to solve educational problems, innovate education and teaching models, lead education modernization with the support of education informatization, and ultimately achieve fairer and higher-quality education [1, 2]. Under the general direction of the national education digitalization strategy, "smart education" has become the main trend of education development. How to effectively apply cutting-edge technology to specific subject teaching, especially those traditional physical education subject teaching that has been demonstrated by teachers and judged by experience, has become an important topic that needs to be studied urgently.

Primary school physical education is an important course for cultivating students' physical and mental health, tempering their will and quality, cultivating team spirit and lifelong physical education consciousness in the compulsory education stage. It plays an irreplaceable role in implementing "five educations simultaneously" and cultivating students' comprehensive quality. However, there are still many practical difficulties for the current primary school physical education teaching practice, especially for the vast number of rural primary schools represented by the Lion Experimental Primary School in Lion Town, Qichun County. First, the "sub-subject" concept of emphasizing intelligence and ignoring physical education is still deeply rooted, and the educational function of physical education has not been fully understood and valued; Second, the teachers are weak and unbalanced, and there is a serious lack of professional physical education teachers, which cannot meet the requirements of personalized and precise teaching; Third, the teaching methods and evaluation methods are single, mostly relying on teachers' experience observation and final examinations, which cannot make scientific and comprehensive evaluation and feedback on students' motor skills, learning process, and physical and mental health; Fourth, there are obvious differences in teaching resources, especially intelligent teaching equipment and platforms, between urban and rural areas. These existing problems will limit the improvement of rural primary school physical education quality and the overall development of students. Because of its unique characteristics of data perception, intelligent analysis, real-time feedback and personalized recommendation, artificial intelligence technology provides a new way and powerful technical means to solve various problems in rural primary school physical education teaching and innovate rural primary school physical education teaching mode. Therefore, exploring how physical education teachers understand and adopt artificial intelligence technology, and how artificial intelligence can effectively empower physical education teaching in rural primary schools is not only an inevitable requirement to respond to the national strategy, but also an urgent need to solve the real pain points of physical education teaching and promote the high-quality development of physical education.

2. Opportunities and Challenges Faced by Physical Education Teaching in Rural Primary Schools

2.1 Opportunities

First, the national strategic orientation is clear, which has given strong policy support to the digitization of physical education teaching. Documents such as China's Education Modernization 2035 and Education Informatization 2.0 Action Plan regard promoting the deep integration of intelligent technology and education and teaching as a key task. This is not only a conceptual advocacy, but also supported by financial projects at all levels, pilot projects, and evaluation guidance. It creates a policy window for rural primary schools to strive for resources and carry out practice, and creates a macro environment that encourages innovation.

The second is the internal driving force of the evolution of teaching concepts, which needs the help of technology. the current educational philosophy is student-oriented, emphasizing the cultivation of core literacy and individuality. the "one-size-fits-all" training method and empirical evaluation method in traditional physical education teaching are increasingly unable to meet the new requirements. [3] The data perception, personalized analysis and instant feedback capabilities of artificial intelligence technology can just provide key technical support for individualized teaching and process evaluation, so that advanced educational concepts can be implemented in physical education classrooms. Operational grip. [4]

Third, the reduction of technology costs and the diversification of solutions make it more

accessible. With the advancement of technology and the continuous development of the market, the prices of hardware such as motion sensors and smart imaging equipment are getting lower and lower, and the one-time investment threshold for schools that focus on cloud data analysis is also getting lower and lower. the application schemes are becoming more and more diversified. From simple physical fitness data management to complex sports posture analysis, schools can choose appropriate entry points according to their own actual conditions and conditions, and gradually carry out in-depth and characteristic exploration.

2.2 Challenges

Table 1. Basic Situation of Physical Education in Lion Experimental Primary School in Lion Town, Qichun County

Indicator category	Project	status quo	dilemma
Faculty strength	Full-time PE teacher	3 persons	Shortage of teachers
	Teacher-student ratio (physical education)	1:299	Difficult to achieve personalized guidance
	Average age of teachers	40 years old	Inadequate digital literacy
Hardware Resources	Number of standardized basketball courts	1	Insufficient basic conditions
	Existing smart devices	None	Hardware resource shortcomings
	Campus Network Coverage	full coverage	Weak foundation for technology application
Student situation	Total number of students in school	897 persons	-
Teaching status quo	Main evaluation methods	Summative testing is the main test	Shallow evaluation
	Have you tried AI teaching tools	Haven't tried	Weak foundation for practice

Although opportunities are ahead, there are also many challenges on the road to smart sports classrooms, especially for rural schools.

The first major problem is backward concepts and deviations in understanding. the inertial thinking of emphasizing intelligence over body still exists among some managers, teachers and parents, resulting in insufficient understanding of the value of physical education, especially the necessity of digital investment in it. Some teachers regard technology as a "airs" to increase the burden, or are afraid of difficulties, lack the intrinsic motivation to actively learn and apply it, and create "soft barriers" in concept.

The core problem is the structural lack of teachers' digital literacy and professional development. Rural primary school physical education teachers are often in a single professional background, training opportunities are few. Although they can master the teaching of motor skills, most of them are not capable of effectively applying artificial intelligence tools to the design, implementation and data analysis of teaching. the literature also pointed out that insufficient technical support and lack of teachers' intellectual literacy are common practical dilemmas. [5] Without teachers' initiative and professional ability as an intermediary, no matter how advanced the technology is, it cannot produce actual teaching effects.

The fundamental challenge is the systemic inadequacy of multidimensional resources. One is the limitation of hardware and financial resources. Basic conditions such as a stable network, necessary smart terminals (sports bracelets, AI cameras), and data processing platforms may not be perfect in rural schools, or cannot be continuously updated and maintained. [6] The second is the lack of matching teaching aids. Many smart sports products on the market are developed based on urban schools. Their content, difficulty, and operation methods are not fully compatible with the level of teachers, student characteristics, and venue conditions of rural schools. "acclimatization". the third is the lack of systematic support mechanism. the lack of continuous funding guarantee, normalized technical training system, evaluation mechanism to encourage teachers to explore and innovate, and consensus on home-school coordinated promotion make it easy for technology applications to stay at the level of isolated and unsustainable attempts.

3. the Value of Artificial Intelligence Empowering Physical Education Teaching in Rural Primary Schools

The empowerment of artificial intelligence is not simply superimposing tools together, but to complete the reshaping of value from three aspects: individual students, teacher roles, and teaching ecology. For Lion Experimental Primary School in Lion Town, Qichun County,

the value is reflected in the following three aspects.

3.1 Student Development: Personalized Activation

The most fundamental value of artificial intelligence is to accurately promote the development of each student.

One is to truly teach students in accordance with their aptitude. Using wearable devices, visual sensors and other means to obtain students' physical fitness indicators (heart rate, speed) and skill indicators (movement trajectory, angle) during exercise, artificial intelligence can generate personalized exercise prescriptions. Set challenging goals suitable for students' current level, overcome the disadvantages of traditional "one size fits all" teaching, and enable every student to make progress in the zone of proximal development. the second is to create an immersive and interesting learning experience. Creating a "gamified situation" [3] with the help of AI technology(treating running as a "fantasy adventure"), giving instant action comparisons and virtual rewards can greatly mobilize students' internal motivation. "Become" I want to practice ", thereby increasing participation and persistence. the third is to create scientific security guarantees that rely on data. Real-time monitoring of students' sports heart rate, fatigue index and other physiological indicators, the AI system can issue excessive exercise warnings in a timely manner, changing safety supervision from relying on teachers' empirical judgments to scientific intervention relying on physiological data, greatly reducing the probability of sports injuries.

3.2 Teacher Teaching: Precise Empowerment

Artificial intelligence enables teachers to get rid of complicated repetitive and transactional labor, and also endows teachers with new professional capabilities.

One is that data-driven precise teaching decisions can be made. Teachers can use AI analysis reports to clearly understand the skills of the class as a whole and individual students, physical development trends, and common mistakes, so that the determination of teaching priorities, the selection of grouping methods, and the intervention of individual tutoring are all based on objective data. Improve the scientificity and pertinence of teaching. the second is to realize automated and efficient process management. Transactional work such as attendance, score records, and classroom organization password issuance can be completed by AI. AI can also conduct a preliminary screening of students' action techniques, enabling teachers to focus more on instructional design, personalized guidance, and teacher-student interaction. the third is to expand the boundaries of teaching and innovate teaching methods. AI provides teachers with strong support and tools for arranging interdisciplinary topic learning (mathematics and science in sports) and executing project-based learning, prompting the transformation of teachers' roles from "curriculum executors" to "curriculum innovation architects".

3.3 Management Synergy: Ecological Reconstruction

The value of artificial intelligence will eventually flow out of the classroom, promoting the improvement of the school physical education ecology.

One is to create a process and developmental scientific evaluation system. AI can collect data from various aspects such as students' sports participation, skill improvement, and physical fitness changes in a semester to form a dynamic digital portrait. the evaluation method has changed from only looking at the final test results in the past to focusing on progress, effort, and comprehensive literacy. Process evaluation, the evaluation results are more comprehensive and fairer. the second is to create a digital home-school-community collaborative education platform. Through the APP or platform, information such as students' classroom performance, physical fitness reports, and personalized exercise suggestions can be safely synchronized to parents, guiding families to participate in the supervision and encouragement of students' physical exercise; It can even integrate the data of community sports venues to form a sports health promotion network linked by "school, family, and community", and extend physical education to the cultivation of healthy lifestyles. [7]

4. The Path of Artificial Intelligence Empowering Physical Education Teaching in Rural Primary Schools

According to the actual situation of Lion Experimental Primary School in Lion Town, Qichun County, artificial intelligence

empowerment cannot pursue one-step technology accumulation, but should follow the logic of "core drive, scene application, and system support" to form a sustainable and iterative implementation way.

Table 2. Suggestions on the Phased Implementation Path of AI-Empowered Physical Education in Lion Experimental Primary School, Lion Town, Qichun County

Implementation phase	Core Objectives	core driver layer	Emphasis of teaching application	Key points of supporting system construction
Short term (within 1 year)	Pilot launch Concept ice-breaking	Introduce 1-2 low-cost sensing devices (such as heart rate bracelets) to initially establish data collection capabilities	Pilot "Real-time Monitoring in Class" in Grades 1-2	Organize 1-2 AI general education trainings for teachers and establish a preliminary incentive mechanism
Medium term (2-3 years)	data driven Process optimization	Build a simple data platform to realize the "sports portrait" of individual students	Popularize the closed loop of "pre-class preparation-in-class regulation-after-class feedback" and explore gamified teaching	Cultivate backbone teachers and create a community of practice within the school; Perfect Home-School Interactive Module
Long-term (3-5 years)	Ecological reconstruction Feature formation	Realize multi-form data fusion, support precise intervention and predictive analysis	Form a mature "PE+X" interdisciplinary curriculum system and school-based characteristics	It will be embedded in the school's smart education ecosystem to realize the data collaboration of school, home and society

4.1 Core Driver: Build a Closed Data Loop

The core of empowerment is to let data flow and generate value.

One is that it can be perceived three-dimensionally. According to the actual situation of Lion Experimental Primary School, the necessary data acquisition terminals should be arranged reasonably. Lion Experimental Primary School uses the existing cameras on campus to do basic behavior analysis, and uses low-cost sports bracelets to monitor heart rate and activity; Use mobile APP to record the process of skill learning, etc. the second is that it can make intelligent portraits. Use the cloud or local simple analysis tools to convert the collected original data into a "digital portrait" of the physical fitness, skills, interests, risks and other aspects of the individual student and the class as a whole. Third, it can intervene precisely. According to the portrait, the system or teachers can generate personalized training suggestions, learning resources or risk warnings to achieve a closed loop from data to teaching actions.

4.2 Teaching Application: Throughout Before, During and After Class

Integrate data capabilities into all aspects of teaching.

One is before class. School teachers can carry out precise lesson preparation based on the class learning report given by the AI system (skills mastery in the previous class, overall physical fitness), so as to reduce the disadvantages of Lion Experimental Primary School wasting a lot of energy on pre-class lesson preparation due to insufficient teachers, preset hierarchical teaching goals and activities. the second is in class. Lion Experimental Primary School can conduct pilot projects in grades 1-2 to establish preliminary data collection, real-time monitoring, use AI for real-time attendance and grouping, and feed back students' movements (shooting posture comparison, etc.) in real time through large screens or student terminals. the real-time physiological data dynamically adjusts the exercise load to realize intelligent classroom regulation. Third, after class. the system automatically pushes personalized home exercise tasks or fun challenges to students; Provide teachers with detailed classroom teaching analysis reports to provide basis for teaching reflection and improvement.

4.3 Support System: Ternary Collaborative Support

The effective implementation of technology is inseparable from the guarantee of the system.

One is the school level. It is necessary to integrate and upgrade, formulate a step-by-step smart sports development plan, give priority to solving infrastructure problems such as networks, and choose suitable, open, and easy-to-maintain technical solutions; Establish a system to

encourage teachers to explore and apply. For example, formulate a phased smart sports development plan for Lion Experimental Primary School: in the near future, give priority to solving network infrastructure and initially establishing data collection capabilities; In the medium term, on the basis of the pilot project, establish a simple physical education teaching data management platform; In the long run, build a smart sports ecology integrating "classroom teaching-extracurricular exercise-home-school collaboration", etc., and form an AI sports teaching model with rural learning characteristics. Considering the fact that the technical maintenance force of Lion Experimental Primary School is weak, the school should first choose equipment with easy operation, friendly interface, and perfect after-sales service, avoid blind pursuit of high-end and complex equipment, and lower the technical threshold for independent exploration. Aiming at the possible fear of difficulties and the inertial concept of "emphasizing intelligence and ignoring body" of teachers in Lion Experimental Primary School. "Especially in the field of physical education teaching, due to the long-term emphasis on practical skills, teachers' awareness and acceptance of artificial intelligence technology is relatively low, making it difficult in curriculum design, teaching implementation, and effect evaluation. Give full play to the advantages of artificial intelligence"[6] The second is the teacher level. It is necessary to transform and improve, and carry out "targeted" training. For example, Lion Experimental Primary School organizes 1 to 2 AI general education trainings for teachers. Instead of pursuing a comprehensive mastery of complex technologies, focus on learning to use AI-generated reports, improve teaching, and operate commonly used tools to solve specific problems; Establish a "learning community"[8] for teachers, to share experiences. the third is the student level. Literacy cultivation is required. In the application, guide students to correctly understand the tool attributes of AI, cultivate students' independent ability to interpret their own exercise data and manage personal exercise plans, and prevent excessive reliance on technology.

5. Conclusion

Under the background of the full implementation of the national education digitalization strategy, the deep integration of artificial intelligence and education and teaching has become a strong driving force for promoting the high-quality development of basic education. After decades of development primary school physical education teaching has formed a basic model in the curriculum system teaching methods evaluation mechanism and other aspects have formed a basic model. However, due to the shortage of teachers, lack of resources, and extensive evaluation in rural schools, the traditional teaching model cannot adapt to the new requirements of intelligent transformation for a while, resulting in high conceptual barriers in physical education teaching in rural primary schools represented by Lion Experimental Primary School in Lion Town, Qichun County, teachers' low digital literacy, and prominent shortcomings in hardware resources.

Based on the above questions, this article proposes that in line with the characteristics of the era of artificial intelligence technology empowering education, with the goal of promoting the fairness and quality improvement of physical education in rural primary schools, and promoting artificial intelligence empowering physical education teaching in rural primary schools, it is necessary to take a "data closed loop" the practical path is driven by the core, the whole-process teaching application is the scene, and the ternary collaboration is the supporting system ". It not only has a positive effect on solving the plight of physical education in Lion Experimental Primary School and improving the effect of educating people, but also has a positive effect on promoting the digital transformation of physical education in similar rural schools and narrowing the gap between urban and rural education. the path also has certain reference significance.

Based on my own understanding of the application theory of artificial intelligence education, this article is still relatively simple. For the complex proposition of the deep integration of technology empowerment and rural education, it analyzes its value and dilemma, and the writing is shallow; the ability to put forward its practical path is limited. In the following research, we will continue to improve it in depth.

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References

[1] Zhu, Y. (2019). New National Initiatives of Modernizing Education in China. ECNU Review of Education, 2(3), 353-362.
[2] Zou, D., & Burhanudeen, M. (2023). Digital Transformation and Smart Education in China: Current Status and Challenges. Creative Education, 14(6), 1753-1762.
[3] Zhang Song. Research on the Role Transformation of Primary School Physical Education Teachers and Curriculum Integration Practice under the Background of AI Era [C]//Hubei Sports Science Society. Abstracts of Papers of the Third Hubei Sports Science Conference. Primary School Affiliated to Tongji Medical College, Huazhong University of Science and Technology, 2025:363-365.
[4] Zheng Huaqin. Research on the Strategy of Artificial Intelligence Technology Empowering Physical Education Teaching in Primary Schools [J]. Teachers, 2025, (19):116-118.
[5] Dong Quanjiang. Research on the Application of Artificial Intelligence in Primary School Physical Education Teaching [D]. Nanjing Institute of Physical Education, 2025.
[6] Ding Na. the Value, Challenge and Optimization Path of Artificial Intelligence in Physical Education Teaching in Primary and Secondary Schools [J]. Ice and Snow Sports Innovation Research, 2025, 6(12):107-109.
[7] Yang Yuyao. Research on the Integration of Artificial Intelligence into Physical Education Teaching in Primary Schools [J]. Stylistic Goods and Technology, 2025, (08):170-172.
[8] Ren Chunmao, Tan Heng. From Vulnerability to Anti-Vulnerability: Paradigm Transition and Path Construction of Rural Teachers' Professional Development in the Digital Intelligence Era [J]. Educational Theory and Practice, 2026, 46(08):35-41.

