

Research on Artificial Intelligence Technology Empowering Physical Education from the Perspective of Tao Xingzhi's Physical Education Thought

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Abstract

Based on Tao Xingzhi's physical educational thought, this study explores the application of artificial intelligence (AI) in school physical education. It finds that while AI can improve the effectiveness of physical education teaching, it also has certain drawbacks. In light of the current realities of school physical education, this study proposes a journey of reshaping school physical education from three dimensions: the theoretical level, the practical level, and the institutional level, aiming to provide a reference for the reform of school physical education.

Keywords

Tao Xingzhi's physical education thought; artificial intelligence; physical education

1. Introduction

At present, the application of artificial intelligence technology in school physical education has driven the transformation of educational paradigms in three aspects: shifting from “health first” to “holistic development”, from “empiricism-driven” to “data computing-driven”, and from “one-way knowledge transmission by teachers” to “intelligent multi-directional interaction between teachers and students”. Guided by Tao Xingzhi's physical education thought, how to reconstruct educational scenarios by leveraging technologies such as virtual reality (VR), algorithm recommendation and sports big data has become an urgent issue to be addressed in the field of education.

2. The Evolution from “Unity of Knowledge and Action” to “Integration of Digital Intelligence” in Tao Xingzhi's Physical Education Thought

Tao Xingzhi is universally recognized as an educator and thinker in China, and his physical education thought of “health first” has exerted a profound impact on people. Compared with fame and fortune, physical health must take precedence—good health is indispensable for a quality life and productive work. Mr. Tao Xingzhi once publicly urged his relatives, friends, colleagues, students and farmers to exercise regularly. A compelling testament to his “health first” philosophy is the letter he wrote to Hu Shi, advising him to attach importance to physical health. His educational outlook of “life is education” has pointed out the direction for the subsequent operation of schools. School education must not be divorced from social life; only then can the students cultivated be valuable to society. Tao Xingzhi advocated the educational concept of “unity of teaching, learning and doing”, encouraging teachers and students to accomplish teaching and learning tasks through “doing”—this is truly dynamic education, enabling students to apply what they have learned. On the basis of the above educational thoughts, he constructed a trinity theoretical system of “health ontology, life-oriented physical education concept, and practical teaching method”. Tao Xingzhi championed “life-oriented physical education”, stating that “We are convinced that health is the starting point of life, and thus the starting point of education.”[1] In a speech delivered at Nankai School in 1925, he put forward that “To be a complete person, one needs three elements: a healthy body, independent thinking, and a professional career.”[2] In summary, Tao Xingzhi's physical education thought emphasizes that physical education is not only a physical exercise activity, but also an educational process to consciously cultivate one's “self-governance ability and team spirit”. He actively advocated the integration of physical exercise with real life and daily practices through the “unity of teaching, learning and doing”.

3. Artificial Intelligence Technology Extending Tao Xingzhi's Physical Education Thought

3.1. The Paradigm Shift from “Health First” to “Holistic Development”

Tao Xingzhi's “health first” thought is a distillation and refinement of the concept of “knowledge and action” in traditional Chinese philosophy. In 1923, he put forward that “Physical education is the foundation of education; without a sound body, there can be no sound mind.” He called on people to “all become important members and stalwarts in building a 'scientific fortress of health', and work together to ensure the triumph of the 'health first' principle.”[3] This educational philosophy broke the shackles of the traditional Confucian doctrine that valued literary pursuits over martial arts, and served as a crucial underpinning for the theory of “mind-body

monism”.

Guided by educational philosophies such as “strengthening moral education and cultivating people” and “curriculum-based ideological and political education”, school physical education is gradually shifting from the previous paradigm that only emphasized “physical health” while neglecting students’ emotions to one that prioritizes students’ “holistic development”, by virtue of artificial intelligence technology. In physical education, the full utilization of artificial intelligence technology for multi-dimensional data collection, storage and analysis—including tracking students’ sports movement trajectories, monitoring their physiological indicators and regulating their emotional states—facilitates students’ learning of sports theories and practice of sports skills. The new physical education paradigm organically integrates multiple dimensions such as students’ sports skill acquisition, physical fitness improvement, emotional communication, psychological growth, social adaptation and moral cultivation, thus effectively promoting their “holistic development”.

3.2. Innovating the Scenario-based Application of “Life Is Education”

Tao Xingzhi advocated “life-oriented physical education”, and in his school physical education practice, he established a diverse and versatile system of physical education courses closely linked to daily life. The integration of physical education with daily life is an inevitable trend in the reform of physical education[4]. This educational philosophy emphasizes that physical education should not be confined to specific time periods and venues; instead, it ought to become a natural component running through students’ daily lives. Students can make use of natural objects for physical exercise anytime and anywhere, which also subverts the conventional belief that physical activities can only be carried out within fixed time and spaces. In the era of artificial intelligence, classroom teaching of school physical education is no longer restricted by venue limitations. Instead, immersive technologies such as virtual reality (VR) and augmented reality (AR) provide a broad platform for the practice of “life is education”, enabling students to experience the excitement and thrill brought by a variety of sports events without leaving their homes.

3.3. Enhancing the Intelligentization of “Unity of Teaching, Learning and Doing”

Tao Xingzhi advocated physical exercise and fitness, emphasized the unity of teaching, learning and doing, integrated it into real life, and attached importance to pursuing the actual effect of fitness.[5] Every spring and autumn, the school would jointly hold sports meetings with the rural areas around the school, and most of the competition events were closely related to the local farmers’ lives. Such an educational philosophy that combines knowledge construction with practical action is similar in spirit to contemporary theories such as constructivist learning theory and situated cognition theory. Empowered by artificial intelligence technology, school

education is undergoing a paradigm shift from empiricism-based teaching to data intelligence-driven education. Through the input of data intelligence technology, this new education model scientifically, efficiently and intelligently realizes the reconstruction of various elements of school education and the innovation of education and teaching methods, and achieves a closed-loop ecosystem of education and teaching featuring “precision teaching, autonomous learning and creative practice”, providing an artificial intelligence-based solution for the contemporary transformation of Tao Xingzhi's educational thought.

4. The Weaknesses of High-Tech Artificial Intelligence Technology

4.1. Risk of Technological Alienation

As we all know, although artificial intelligence technology has many advantages, it is ultimately a machine tool that requires operation and use by humans. In practical physical education teaching, if it is improperly used or overly relied on, it will often lack the care of humanistic feelings, or it will not be closely connected with Tao Xingzhi's educational philosophy. This will result in the collection and analysis of sports data being simplified into quantitative biological indicators such as heart rate, blood pressure and oxygen intake of students during sports. However, the humanistic feelings such as the inspiration, supervision and encouragement brought by teachers' personal charm in the process of physical education and teaching may be eliminated by digital technology. Thus, it will be difficult for students to obtain spiritual guidance, spiritual enlightenment, humanistic care and ideological education. The lack of humanistic feelings in classroom teaching is obviously not conducive to students' mastery of physical education knowledge, and is especially not conducive to students' personal growth and development.

4.2. Practical Dilemmas of the Proliferation of Virtual Scenarios

Tao Xingzhi's life education theory advocates that school education should aim at social transformation. “Running a school and transforming society are one and the same thing, not two separate things.... Running a school without the mission of social transformation is purposeless, meaningless and lifeless. Therefore, education is social transformation, and teachers are the leaders of social transformation”[6]. School education is to cultivate students' ability to influence society or transform nature, and physical education is an important part of school education, shoulder the responsibility of improving students' physical fitness and cultivating good moral character. It is undeniable that VR/AR technology can simulate many virtual sports scenarios, enabling students to conveniently experience the excitement and thrill of different sports, but the physical exercise experience in students' real life cannot be replaced by it. Only through real physical exercise can students master sports skills and knowledge, learn to communicate and cooperate with others, enhance team

awareness, identify the drawbacks existing in sports events, further improve and transform the inadequacies of sports, and continuously improve and transform society after entering it.

4.3. Shortcoming of Artificial Intelligence Technology — Lack of Humanistic Emotion

Tao Xingzhi's "unity of teaching, learning and doing" contains profound educational philosophy, which has been guiding the development of school education. However, it is by no means easy to effectively implement it in practical teaching. On the one hand, teaching and educating people is a complicated and time-consuming task; teachers need to have profound professional knowledge, be good at innovation, and respond to unexpected incidents in teaching at any time. On the other hand, it also shows that students are different from one another, requiring teachers to invest emotion, adopt differentiated teaching methods, and teach students in accordance with their aptitude, so as to cultivate them into pillars of society. At present, with the advantages of artificial intelligence, schools can mechanically and procedurally impart sports knowledge and skills to students, but such instrumental teaching lacks the care of humanistic emotion. To enable artificial intelligence to assist teachers in playing a greater role in teaching, it is necessary to put forward higher requirements for teachers' ability of "educating people".

4.4. Hidden Worries of Data Ethics and Educational Equity

The introduction of artificial intelligence technology into the physical education teaching platform system, on the one hand, enables students to experience the fun of sports in virtual scenarios; on the other hand, it can also assist teachers in tedious work such as demonstration, explanation and error correction in physical education teaching, effectively reducing the heavy workload of teachers in physical education. However, if the collection and storage of numerous students' sports data are poorly managed, it may lead to the leakage of privacy data by unscrupulous merchants, or the commercial exploitation of sensitive information such as students' sports interests, hobbies and habits. Whenever teachers and students browse and search for sports knowledge and skills, the big data platform will prioritize the recommendation of popular sports events, forcing them to conduct sports consumption or accept the sports events pushed by the system platform. On the contrary, some unpopular sports events, despite their high sports value, are ruthlessly ignored. In addition, the number of sports events suitable for disabled students pushed by big data systems is extremely small. All these have further aggravated the unequal distribution of sports education resources, and also contradicted the educational thought of "education for the public good" advocated by Tao Xingzhi.

5. The Journey of Reshaping School Physical Education — Making Ingenious Use of Artificial Intelligence Technology

5.1. Theoretical Level: Constructing a New Paradigm of Physical Education Integrating “Technology-Humanities”

Tao Xingzhi's educational thought of "health first" has always influenced traditional physical education. With the advent of the artificial intelligence era, it is imperative to endow "health first" with brand-new vitality through artificial intelligence, and at the same time, enrich the soul of artificial intelligence-based educational thought. Establishing a physical education model with a high degree of integration of "data technology-humanistic feelings" can not only fully demonstrate the high-tech nature of artificial intelligence technology, but also maintain the care for students' humanistic feelings. On the one hand, this new physical education paradigm can give play to the effectiveness of artificial intelligence technology, such as rapid collection, storage and analysis of sports data, and provision of improved exercise plans. On the other hand, it can also reduce teachers' workload, enabling them to have abundant energy to pay attention to students' humanistic emotions and make up for the lack of humanistic feelings in artificial intelligence technology. Therefore, when building an AI-based physical education curriculum platform system, teachers' personal charm, humanistic emotions, collective spirit, courage to strive and other humanistic goals must be scientifically integrated into it. In this way, we can shield the shortcomings of the instrumentalization of artificial intelligence technology, and ensure that the AI-based physical education curriculum platform system can better serve students' physical exercise, and promote the physical and mental health development of students.

5.2. Practical Level: Innovation from “Classroom-Centered” to “Full-Scenario Education”

As Tao Xingzhi put it, life should be “healthy, labor-oriented, scientific, artistic and social-transforming”. Tao Xingzhi's description of sports meetings goes like this: “We kick shuttlecocks, practice martial arts; fly kites, chop with axes; carry manure buckets, wield hoes; lift stone loads, climb mountain peaks; temper our skills well, sports are not for showing off.”[7] Mr. Tao Xingzhi has always upheld that physical fitness should be connected with life, and physical exercise should make full use of daily necessities. With the advent of the artificial intelligence era, teachers can innovate physical education platforms according to students' sports skill levels and sports laws. While connecting with real life, they can guide students to experience the joy of sports in the created sports scenarios, thus awakening students' inherent instinct for sports. Therefore, it is necessary to build intelligent sports scenarios by virtue of artificial intelligence, so as to achieve the goal of comprehensively cultivating students in “school-family-society” full scenarios.

5.3. Institutional Level: Improving the Guarantee System of “Ethical Norms-Ecological Governance”

5.3.1. Improving the Management Order of Artificial Intelligence

At present, in order to improve the teaching environment, it has become an irresistible trend for various schools to introduce artificial intelligence technology into school physical education. However, in the face of reality, the operation of artificial intelligence technology inevitably carries the risk of leaking citizens' personal information, so it is extremely necessary to formulate a Law on the Operational Safety of Artificial Intelligence Technology. For example, it is essential for relevant departments such as the government and schools to formulate basic ethical guidelines for artificial intelligence in physical education, so as to ensure the legitimacy of students' sports data collection, the confidentiality of data storage, and the scientificity of data application. Meanwhile, the collection of sports data must comply with the principle of least necessity, the principle of transparency in algorithm design, and the safety of technology application. In addition, artificial intelligence is not the exclusive preserve of elite education; AI-enabled physical education systems must be equipped with sports courses and programs suitable for disabled and intellectually challenged groups, so that educational equity can be reflected in the application of artificial intelligence technology.

5.3.2. Establishing a Multi-stakeholder Participation System for Data Governance

With its strengths of high technology, large information volume, rapid analysis and efficient provision of personalized exercise programs, artificial intelligence can serve school physical education and promote the in-depth reform and innovative development of physical education teaching. However, it is still in the preliminary stage—artificial intelligence technology requires continuous research, development, innovation and upgrading; human-machine matching needs constant adjustment and adaptation. In particular, it is necessary to weaken the instrumental function of artificial intelligence technology, maximize the leading role of teachers, and ensure that the care of teachers' humanistic feelings for students is reflected throughout the physical education process. Therefore, it is imperative to establish a scientific and efficient data governance system to guarantee the effective application of artificial intelligence in school physical education. To this end, education authorities should organize expert investigations, solicit suggestions from teachers and students, and issue industry standards for the application of digital technology. Schools need to strengthen teachers' training in artificial intelligence technology, equip them with complete AI teaching tools, and ensure that teachers use artificial intelligence technology scientifically to improve the effectiveness of physical education classes. Data software companies must assume the responsibility of ensuring data security and preventing information leakage by developing data encryption software and imple-

menting data information monitoring. Parents, as guardians of students, have the right to be informed of students' participation in physical education activities and to supervise the teaching process in real time to ensure the physical and mental health of students. As mentioned above, a four-in-one artificial intelligence governance system of government-school-enterprise-family should be formed to ensure the safe operation of artificial intelligence technology in school physical education.

5.3.3. Innovating the Evaluation and Incentive Mechanism

In the past, traditional physical education assessment focused more on the summative results of students' performance, while neglecting the process-oriented evaluation of students' emotions, academic progress and learning foundation. In the development and design of AI-enabled physical education in schools, elements such as stimulating students' sports interest, creativity, awareness of technical ethics and digital sports literacy should be scientifically embedded into the AI system. In this way, the artificial intelligence system can clearly record and retrieve the dynamic parameters of students' sports participation process, facilitating schools, teachers and parents to track students' sports progress and personal growth. Whenever students make even slight progress in their sports learning and practice, the artificial intelligence technology will give them praise and positive evaluation.

6. Conclusion

Tao Xingzhi's physical education thought and artificial intelligence technology are like the two wings of school physical education teaching. Artificial intelligence technology has well promoted the intelligent transformation of Tao Xingzhi's physical education thought, and Tao Xingzhi's physical education thought, with its profound humanistic feelings, interacts with it and jointly promotes the innovative development of school physical education. It is undeniable that artificial intelligence technology has built a systematic big data platform, which promotes the in-depth reform and innovative development of school physical education. However, the influence of Tao Xingzhi's physical education thought and profound humanistic feelings on students' growth and development is more profound. Therefore, the future research direction of artificial intelligence technology will surely commit itself to "human holistic development", adhere to the original aspiration of "life is education" in the empowerment of school education by artificial intelligence technology, and inherit the practical wisdom of "unity of teaching, learning and doing".

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