Hybrid Teaching Mode of Physical Education with Sports Games Based on Artificial Intelligence

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Abstract

This paper explores the cultivation methods of students' physical ability and comprehensive quality from the education modes of "game + sports" and "artificial intelligence + sports", and puts forward the mixed teaching method of "physical education + artificial intelligence + games" based on the application of artificial intelligence in the process of physical education. This hybrid teaching method does not only entrust the initiative and discourse power of physical education to students through game elements by increasing students' interest in physical education, but also it can use artificial intelligence to provide algorithm and data guarantee for realizing the goal of smart physical education. At the same time, this study provides theoretical guidance for the informatization and intellectualization of physical education and health teaching, and it has important practical significance to realize the educational function and value of physical education and health curriculum.

Keywords: artificial intelligence, machine learning, sports games, deep learning.

1. Introduction

Improving teachers' application ability of information technology is considered to be the bottleneck problem in the development of education informatization. The reform of physical education curriculum is to promote the professional development of physical education teachers [1]. Especially with the guidance of the new generation of information technology, the role of artificial intelligence in primary and secondary education mainly relies on the team of teachers to complete [2]. Many countries are attaching the great importance to the research and development of artificial intelligence, such as the United States, Germany, France, Japan, South Korea and other countries, according to the different cognitive characteristics of students [3]. With a new technology and new knowledge, artificial intelligence is being brought into disciplines, majors, courses, textbooks, classrooms, teaching plans and students' minds, so that students can have basic awareness, basic concepts, basic literacy and basic interest in artificial intelligence [4].

How to realize the objectivity, timeliness, process and diversity of physical education and health learning evaluation by means of modern information technology is also the key to intelligent physical education teaching model [5]. Therefore, it is necessary to take schools as the main battlefield for cultivating artificial intelligence talents in order to fully popularize artificial intelligence education among students, add artificial intelligence courses and knowledge, further promote students' intelligent education, and improve students' artificial intelligence literacy [6]. In particular, the technology of artificial intelligence is being used to physical education or sports activities and constantly forming the teaching concept of "smart sports", which can cultivate a large number of high-end artificial intelligence talents with innovative ability and cooperative spirit [7]. At the same time, the traditional way of PE teaching overestimates its teaching function. Students can not find their own position in the whole physical education classroom because of the traditional single, mechanical teaching method, and students can only passively follow the teacher's guidance to learn sports skills, and students are also passively follow the teacher's guidance to practice training. This kind of sports teaching is too dull and boring, which seriously discourages students' interest in learning [8]. In view of this problem, this paper studies a new teaching model of "physical education + artificial intelligence + games" to promote the development of physical education based on the teaching concept of "smart physical education". This new model is to entrust the initiative and discourse power of physical education to students, and strive to introduce the game elements that students are interested in [9]. Combined with big data, virtual reality, cloud computing and other artificial intelligence technologies, physical education can effectively improve students' interest in learning, make students strive to be the master of physical education, so that they really fall in love with physical exercise, establish good physical exercise habits, and further improve their comprehensive quality [10]. Therefore, how can physical education get rid of the dilemma that it cannot teach students according to their aptitude based on artificial intelligence technology, and it will make teachers' "teaching" fully adapt to students' individual differences, and it will make students' "learning" no longer limited to the content taught in class. This will become an important topic in the new era of physical education and health teaching.

Most scholars study the means to improve students' interest in sports learning based on the above research literature. Although a few literatures put forward to add games into the physical education process, it is only for the purpose of exerting students' subjective initiative in learning. These research results did not enrich students' physical education learning resources and activity environment. There are also a few scholars who study how to apply educational informatization means to physical education links, but this part of the research results only provide cognitive and communication tools of physical education.

2. Theoretical

Compared with the previous research literatures, this paper integrates artificial intelligence and game-based methods into physical education teaching by exploring the mode of "sports + artificial intelligence + games". The research of this paper is not only to overcome the traditional physical education is too dull, boring, seriously hit the students' interest in learning, but also to better promote the development of physical education.

There are roughly 10 directions of AI application: personalized recommendation, face recognition; Driverless cars, intelligent customer service chatbot, machine translation, medical image processing, image search, voice print recognition, intelligent outbound robot, smart speaker.

Physical education is not only to enhance students' physical quality and awareness of physical exercise, but also it can spread and carry forward the spirit of sports, and lead students to inherit sports culture together. In sports activities and games, students can understand sports culture and sports spirit, and students can promote the development of sports, and cultivate the consciousness of physical exercise of the whole people, which is the correct education way. The traditional and rigid teaching methods and educational means can not make students recognize sports culture and spirit. Physical education should enable students to get a rich experience of sports activities, rather than sports training.

By exploring the "sports + artificial intelligence + game" model, this paper integrates artificial intelligence and game-based methods into physical education teaching, and quantitatively studies the loading time, response rate and safety benchmarks of various data types, and studies the creative integration of artificial intelligence and game dynamics in the field of physical education. This model cleverly uses machine learning algorithms combined with game elements to create a hybrid teaching model that not only develops students' physical abilities, but also their sportsmanship and engagement.

The goal of physical education should be to cultivate students' sports spirit and sports consciousness in sports games and reduce the pressure of students participating in sports courses and sports activities. Moreover, physical education promotes students' learning and development of physical education in a holistic way. In this way, physical education can be integrated into relaxed and pleasant activities to improve students' sports awareness, sports literacy and sportsmanship. In students' physical education, this requires students to experience and understand sports activities and physical education through different environments and links [11]. Through a variety of sports activities, it can improve the physical quality and exercise the psychological quality, so as to achieve the purpose of promoting the physical and mental development of students [12]. At the same time, with the advent of the era of artificial intelligence, physical education needs more information dissemination and digital technology to solve the problem of teaching and learning. Artificial Intelligence technology is one of the key technologies of intelligent robots. Its main goal is to imitate thinking activities such as reasoning, proof and design carried out by human brain, so that machines can complete some complex tasks that require experts to complete [13]. Its content involves computer science, biology, psychology, linguistics, mathematics and other disciplines, which is the convergence and integration of interdisciplinary and multi-field knowledge [14]. Therefore, the new model of "artificial intelligence + game + physical education" brings changes to physical education, but also the traditional physical education models can not provide contents for students. Compared with the results of previous relevant studies, the advanced nature of this study is mainly reflected in three breakthroughs.

AI has unlimited potential and broad prospects in the field of education. The emergence of these advanced technologies not only indicates that the field of education is about to usher in a revolutionary change driven by artificial intelligence, but also provides strong technical support for

achieving higher quality and more personalized education. In this context, the research and application of the new model of "artificial intelligence + education" is particularly important and urgent.

2.1. The value choice of "Games + Physical Education"

Sports games in physical education can be divided into indoor sports games and outdoor sports games. Most indoor sports games do not require more complex tools and strictly standardized venues, simple and easy. However, most of the sports games are outdoor games in physical education related to sports, and the advantage is to improve the physical quality of students in the outdoor games, which has a good promoting effect. Compared with other traditional sports activities, both indoor and outdoor sports games have stronger exercise properties and these should be less difficult than professionally trained sports activities [15]. Therefore, physical education should choose a less confrontational games, but also include a certain amount of fun and sports culture. This education mode of "Games + Physical Education" should be able to meet the requirements of students' choice of sports activities, and the physical consumption of students should also be controllable. This education mode of "Games + Physical Education" can also be carried out in the form of a small team to enhance the sense of cooperation within the student team. Teamwork consciousness and teamwork spirit are important components of sports spirit and sports culture spirit [16]. Through low-difficulty sports games, students make up small groups to play games and play against each other. In this way, students can realize the importance of teamwork in sports games. The value selection of "Games + Physical Education" is shown in **Fig. 1**.

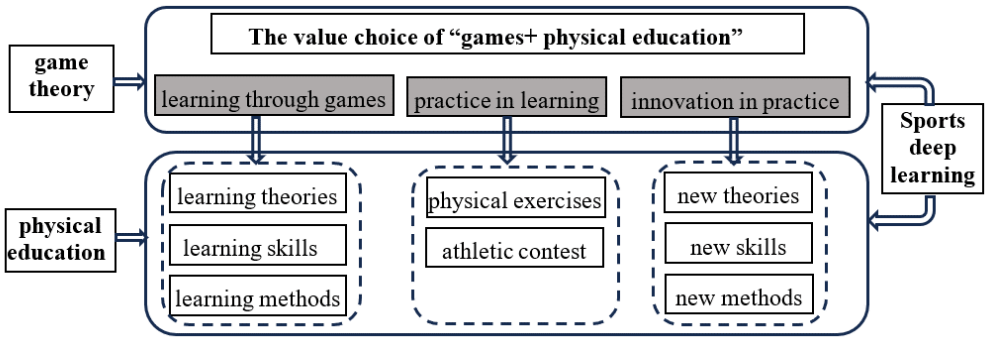

Fig. 1. Value selection of "Games+ Physical Education"

2.2. The teaching interest of "Games + Physical Education"

The education model of "Games + Physical Education" takes sports games as part of students' sports activities, which can increase the interest of sports teaching. Compared with the traditional sports teaching mode, most of the students' sports activities in the past were boring running training or single sports training. Traditional teaching content are boring and traditional in physical education and teaching methods, which leads to students' resistance to physical education courses, and students' enthusiasm is low to participate in sports activities. Therefore, compared with the teaching mode of the traditional physical education, physical education has not greatly improved the physical quality of students, nor has it spread the corresponding sports culture and spirit. In the links and courses of the physical education, the part of sports games should be added to get closer to students' daily life and enhance the interest of physical education [17]. This also means that students' enthusiasm and initiative will be higher in the process of physical education. Moreover, through the

guidance of sports games, students will increase their seriousness in class. This can improve the efficiency of sports teaching, but also can spread sports culture and sports spirit. Through interesting sports games, the appropriate amount of exercise can also meet the needs of students with different physical qualities [18].

2.3. "Artificial Intelligence + Physical Education" to the smart education

(1) The connotation of the smart education. Artificial Intelligence education can simulate human learning behavior through computer technology and Big Data analysis to acquire new knowledge or new skills in specific fields. At present, the mainstream algorithm of machine learning is deep learning, which provides algorithm and data guarantee for artificial intelligence education applications. Both machine learning and deep learning are the key technologies with the application of artificial intelligence in education. Artificial Intelligence education realizes the mutual conversion between data that can be processed by computers and text language that can be understood by humans based on this technology. At the same time, artificial intelligence education can also simulate the process of human vision processing image information through image acquisition, filtering and adjustment, feature extraction and other technologies, so as to provide information and basis for solving complex problems, including question and answer system, educational data display, intelligent decision-making and so on. In the field of physical education, this technology can realize some functions of the man-machine interaction such as face recognition, photo search, dynamic vision, video codec and so on. For example, the functions such as the human-computer interaction include voice interaction, brain-computer interaction, somato-sensory interaction, emotional interaction, etc., which has realized virtual reality, augmented reality, emotional computing, biometric recognition and other tasks in the field of physical education [19]. The education model of "Artificial Intelligence + Physical Education" is shown in **Fig. 2**. The mixed teaching method proposed also just fills the gap in related research literature in this paper.

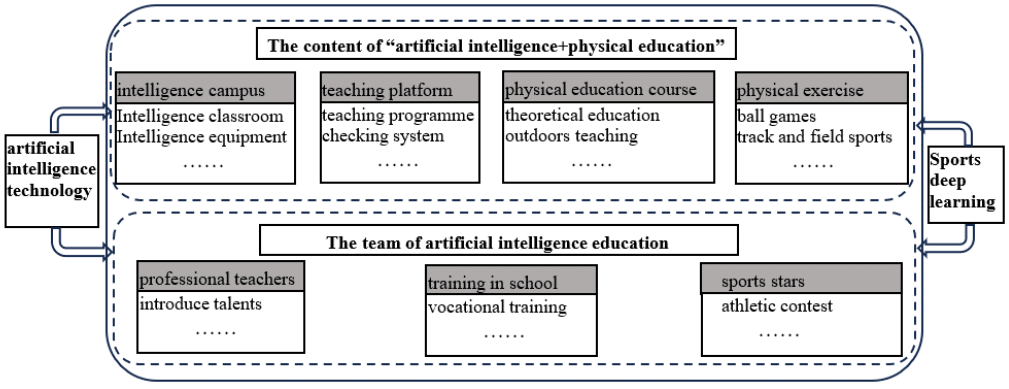

Fig. 2. Education model of "Artificial Intelligence + Physical Education"

(2) Smart education promotes deep learning. With the support of Big Data, virtual reality, cloud computing and other information and digital technologies, Artificial Intelligence has entered schools, which will lead to changes in the teaching of teachers and students. The hybrid education model of man-machine collaboration can enhance the concept of intelligence, clarify the development direction of intelligent education and implement the goal of universal intelligent education. The interaction of artificial intelligence teaching includes the traditional teacher-student interaction, the student-student interaction based on collaboration, and the human-computer interaction with the help of electronic equipment. With the informationized classroom environment built with various

modern equipment, physical education pays more attention to the exploration between teachers and students, the cooperation between students and students, and the ability to integrate information [20]. With the help of various artificial intelligence means, physical education teachers and students discuss and communicate together, and finally solve the problem. Therefore, the education mode is the application of computer, electronic equipment, network and other technologies, which provides a communication platform for the interaction between teachers and students. Based on artificial intelligence technologies, the physical education model of "Artificial Intelligence + physical education" guides the practice of intelligent education with the concept of intelligent education to achieve the purpose of deep learning for teachers and students [21].

The sports evaluation and teaching system can collect, analyze, evaluate and guide the students' sports performance, state, physical fitness and other sports indicators in real time based on video perception technology and artificial intelligence vision algorithm. This can realize the physical education teaching scene, exam scene without influence, intelligent, reduce the physical education teaching load, and enhance the interest of physical education and teaching effect. At the same time, in the physical education exam, artificial intelligence technology has also solved the interference to students, which can not identify illegal actions and other problems, and improve the standard and fairness of physical education exam [22]. For example, in the running test process, the AI intelligent sports evaluation system (as shown in **Fig. 3**) can ensure that students' every sports data becomes clearly visible. With these data, teachers can conduct scientific training guidance, support students to achieve new records, and let "fall in love" with physical education.

Fig. 3. Educational application of "Artificial Intelligence + physical education"

At the same time, Artificial Intelligence(AI) technology can also realize intelligent physical education teaching design. For example, AI technology is used to optimize and design the physical education teaching content and the physical education teaching process. And deep learning technology is used to automatically generate physical education teaching materials or test questions, optimize the teaching process and strategy, and achieve the purpose of improving the teaching effect and efficiency. In addition, AI technology can also complete the intelligent sports assisted teaching task. For example, the use of AI technology to develop intelligent physical education assisted teaching system. According to students' learning status and knowledge background, the system can provide personalized sports learning paths and recommend sports learning resources to help students better master sports skills.

3. Discussion

In order to identify and face several problems prevalent in current physical education, this research creates a hybrid teaching model combining machine learning algorithms with game elements. However, whether this hybrid teaching model can solve the practical problems in the current situation, by quantifying the loading time, response rate and safety benchmark of various data types, this paper integrates artificial intelligence and game-based methods into physical education teaching, and uses practical verification and other research methods to improve the credibility of the model. This allows for a better understanding of the findings.

AI can provide personalized learning programs and teaching suggestions to help students learn and progress better; At the same time, artificial intelligence can provide students with diversified learning resources and efficient learning experiences through intelligent teaching systems, online courses and other means.

In the context of the era of artificial intelligence, modern PE teaching and deep learning need to be gamified, digitized and intelligent, which can not only effectively implement the “PE curriculum standards”, improve the efficiency of PE teaching, relieve the pressure of PE teachers and stimulate students’ interest, but also which can achieve high-quality and sustainable development of PE and health teaching. With the research achievements of Zhang Dan (2020), this paper analyzes the reform trend of physical education and deep learning from four aspects: Artificial Intelligence education technologies, Big Data of physical education teaching, sports games teaching method and gamified physical education teaching principles [23], as shown in **Fig. 4**.

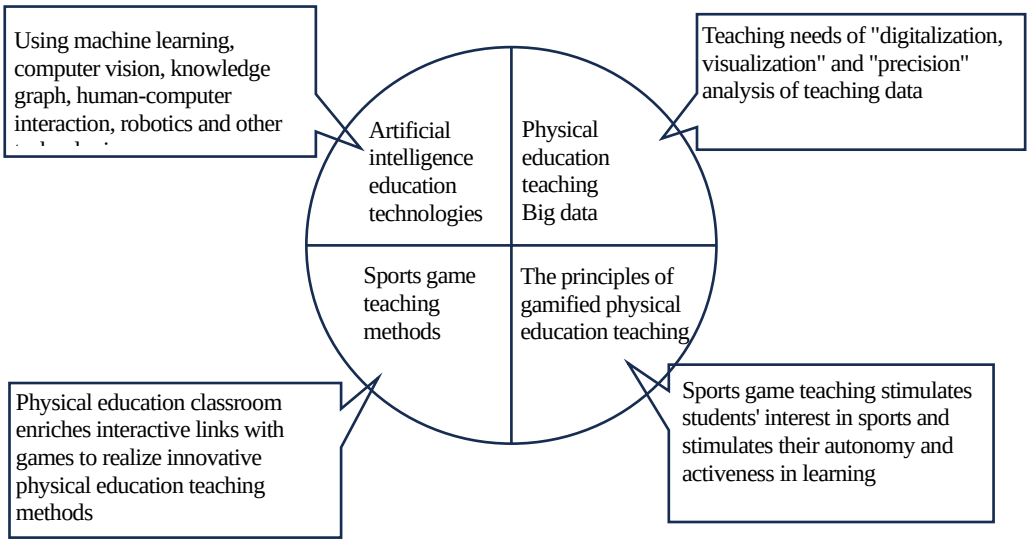

Fig. 4. Reform trends of physical education and deep learning

3.1. Artificial Intelligence education technologies

(1) Machine learning. Using computers to analyze and learn a large amount of sports data, machines can simulate sports learning behavior and acquire new knowledge or new skills in physical education. At present, the mainstream algorithm of machine learning is deep learning, which

provides algorithm and data guarantee for artificial intelligence education applications. Both machine learning and deep learning are the key technologies for the application of artificial intelligence in education.

(2) Computer vision. The computers can simulate the process of human vision processing image information by image acquisition, filtering and adjustment, feature extraction and other technologies, so as to provide information and basis for solving complex problems. The main applications of computer vision in the field of physical education include face recognition, photo search, dynamic vision, video codec and so on.

(3) Knowledge graph. The computers can connect the physical education information into a network in the form of "relationship" by the semantic processing of information and the interconnection organization, so as to visually present the core structure and development trend of sports. The main applications of knowledge graph in the field of physical education include question answering system, educational data display, intelligent decision making, etc.

(4) Human-computer interaction: The computers naturally integrate the virtual world with the objective world. In order to realize the effective and free exchange of information between machines and humans. This technology mainly includes voice interaction, brain-computer interaction, somato-sensory interaction, emotional interaction, etc. Its main applications in the field of physical education include virtual reality, augmented reality, emotional computing, biometric recognition.

3.2. Big Data for physical education teaching

In the current era of big data, artificial intelligence has been used in all aspects of life, and how to effectively combine artificial intelligence with physical education can be expanded from the following points.

(1) Building a cloud communication platform. At present, the communication methods are concentrated in the operator information, WeChat Group and other ways. With this basis, artificial intelligence technologies can be added to promote the intelligent communication between schools and students. For example, visual communication methods, face recognition technology and other communication methods, are adopted to analyze various learning behaviors of students in school through big data [24].

(2) Carrying out personalized sports teaching with Big Data. It can been graphically analyzed with Big Data by cloud computing and other technologies, students' sports performance, exam results, interests and hobbies at school, so as to carry out personalized teaching for different students and different sports. Physical education teachers can also analyze such data simultaneously, deepen the cooperation between teachers and students, which provide an effective basis for promoting students' physical education development [25].

3.3. Sports game teaching method

Through big data analysis, artificial intelligence can not only meet the personalized sports needs of students, but also monitor the physical and psychological state of students in real time. Through visualization and intelligent display, students can participate in sports courses more scientifically and reasonably and enjoy sports fun by sports games.

(1) Construct a three-dimensional curriculum system. The teaching method of sports games must build a three-dimensional curriculum system and incorporate sports game activities into the curriculum system. Physical education is not only to improve students' physical quality and sports accomplishment, but also it can cultivate all students' sports culture, sports spirit and sports consciousness. Therefore, it is necessary to build a three-dimensional curriculum system of physical education and incorporate sports game activities into the curriculum system as a part of the

curriculum system. Students' demands for sports activities need to balance the relationship between traditional curriculum and sports games in the curriculum system and build a three-dimensional curriculum system [26]. With the original intention of integrating game activities into students' physical education, it also includes providing students with easier and more acceptable physical education, and then paying attention to students' individual needs, which is especially a part of the construction of three-dimensional curriculum system. At the same time, in the process of sports games, sports games can also guide students to form the spirit of hard work, courage, courage and solidarity.

(2) Prepare for the game session. Teachers of physical education need to prepare and design the links of sports game activities. In the early stage of sports game activities, they need to prepare important links related to the overall completion of the games. Therefore, teachers need to fully understand the progress of the games and reasonably prepare the required props. At the same time, whether it is outdoor sports activities or indoor games, venues should be carefully selected, games should be carefully prepared, and more dangerous areas or dangerous props should be avoided [27].

(3) Innovative teaching methods. Integrating games activities into students' physical education, which is itself an innovative teaching method and increases the flexibility of physical education. It is necessary to pay attention to the law of students' physical and mental development in the teaching design and the choice of sports games, and the individual needs of college students, and the requirements of the country for the development of physical education. In teaching design, sports games can be used to enrich classroom interaction. In this regard, innovative teaching methods and rich classroom interaction can extract the traditional culture contained in traditional sports games and interact with students. Traditional sports games often have richer traditional cultural connotations. Teachers can popularize traditional sports culture for students and lead students to understand sports activities in the process of traditional sports activities.

3.4. Principles of gamified physical education teaching

(1) Taking the educational goal as the fundamental requirement. Carrying out gamification teaching is an important way to achieve the goal of physical education teaching, which is based on the course goal and serves the course goal. Therefore, teachers should take the realization of educational goals as a foothold before carrying out gamified physical education teaching, and set various games links to achieve sports knowledge points, transmit basic sports skills, and achieve the purpose of improving students' basic physical education ability. Taking the realization of the physical education curriculum goal as a reference object, gamification teaching realizes games around this goal [28]. It can be said that gamified teaching seems to be a free activity time for students, but in fact, it is also a "constraint" on students' behavioral awareness within the target range, and serves for students to better carry out sports activities. Therefore, in the actual teaching, PE teachers should fully consider the actual teaching content, and take the improvement of students' basic ability, sports emotion and sports accomplishment as the starting point, and adopt a flexible form to carry out teaching.

(2) Training students as a prerequisite. Students are the masters of physical education and occupy the absolute subject position of physical education. In the daily sports games teaching, PE teachers must follow the teaching principle that takes training students as the prerequisite. Starting from the age characteristics, cognitive rules and interests of students, PE teachers use games to stimulate students' interest in sports, stimulate their autonomy and enthusiasm, and maximize students' learning interest and sports passion [29]. First of all, it must be realized that gamification teaching adheres to the development of students as the center, and carries out all participation in the game, combined with students' physical quality, interests and hobbies, and effectively reduces the difficulty of the games, improves the audience of the game content, so that all students have a

positive attitude to participate in the sports game activities, which can change the students' sports learning concept and awaken the students' learning passion. Secondly, students are given personalized guidance, and gamified teaching is used to achieve personalized growth of students. Sports is open to a certain extent, and it is more like a broad display platform, which can effectively promote students' personality ability. When organizing students to carry out sports games, PE teachers should combine students' personality characteristics and effectively set up some personalized game links, so that students have a space with personality ability to display their talents, so as to help their personality growth.

Compared with the results of previous related studies, the advanced nature of this study is mainly reflected: this paper integrates artificial intelligence and game-based methods into physical education teaching by exploring the mode of "sports + artificial intelligence + games", all of which reflect the results of this research to enhance the credibility of the proposed model and its superiority over traditional research.

4. Conclusion

This paper puts forward the mixed teaching method of "physical education + artificial intelligence + games" by entrusting the initiative and the right to speak in physical education to students and increasing students' interest in physical education. This hybrid teaching method does not only use game elements but also artificial intelligence, but also provides algorithm and data guarantee for realizing the goal of smart physical education. In the process of research, this paper studies the mixed teaching method of "physical education + artificial intelligence + game" from different perspectives of "games + sports" and "artificial intelligence + sports", and analyzes the practicability of this method through cases.

In order to study the hybrid teaching method of "physical education + artificial intelligence + games", this paper argues that:

(1) Compared with traditional physical education, the advantages are reflected with the education model of "Games + Physical Education": when organizing students to carry out sports games, PE teachers should emphasize the importance of knowledge theory, so that students can gradually discover the importance of knowledge theory in practice and realize the true meaning of applying what they have learned.

(2) The education model of "Artificial Intelligence + physical education "can simulate human learning behavior through computer technology and big data analysis - machine learning. This mode can realize deep learning and provide algorithm and data guarantee for realizing the goal of smart physical education. Therefore, this paper studies the hybrid teaching method of "physical education + artificial intelligence + games", which not only enables students to develop excellent qualities of unity and cooperation, love the collective and abide by the rules in the game, but also promotes the innovative development of physical education by using the intelligent physical education and health teaching model.

(3) The main direction of future research is how to achieve the objectivity, timeliness, process and diversity of sports and health learning evaluation by means of modern information technology, which is also the key to the intelligent sports teaching model.

Through practical validation and impact assessment, this study integrates AI and game-based approaches into physical education teaching to create a hybrid teaching model. The results of this study show that this hybrid teaching model is superior to traditional teaching methods, which not only cultivates students' physical ability, but also cultivates their sportsmanship and participation, and solves the key problems of current PE teaching efficiency and student motivation.

Future research directions will be based on this hybrid teaching model and continuously optimize this teaching method to cultivate not only students' physical ability, but also their sportsmanship and participation, and better solve the key issues such as current physical education teaching efficiency and student motivation.

5. Code - Data Availability

Data may be obtained from the authors upon reasonable request.

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