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Impact of Strengthening Rural Physical Education on the Promotion of Students' Physical Health in the Post-epidemic Era

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Abstract: *The healthy physical fitness of students is not only the hope for the future development of the country, but also an important foundation for national revitalization, among which the physical fitness of rural students cannot be ignored. With the evolution of the concept of improving physical fitness, urban and rural schools have also implemented strategies to varying degrees. This article conducts research and analysis on sports, and believes that sports are a good way to promote students' exercise, and schools are important places for students to use sports to improve their health. However, rural students have not received sufficient formal education in a short period of time. Due to limitations in class type, content, and location, rural schools face many inconveniences in physical education teaching. Moreover, with the changing forms of education, promoting the formal development of online sports has always been the top priority for urban and rural schools. However, rural areas face problems such as poor network conditions and insufficient equipment, making it difficult to carry out online sports. In order to better study the impact of strengthening physical education on promoting students' physical health in the post pandemic era, this article also used simulation algorithms to construct relevant physical education courses to further enhance the understanding of students' physical health in the post pandemic era, taking into account the actual situation of rural students. A survey was conducted on students after strengthening physical exercise, and according to relevant surveys and algorithm calculations, it was found that strengthening physical exercise can improve students' physical fitness by 14%. Rural students can also achieve significant physical fitness improvement from strengthening physical exercise.*

Keywords: *Strengthen Physical Training, Students' Physical Health, Sports Impact, Post-epidemic Era*

1. Introduction

In 2020, due to the 2019 global outbreak of coronavirus disease (COVID-19), sports around the world will be suspended, and sports activities in rural areas are no exception. The postponement of the Olympic Games and the cancellation of numerous international brand events clearly indicate that sports are closely linked to society and the economy, and the development of rural sports is also affected by it. The school actively develops science courses for student sports, creating an environment where families, schools, and communities work together to improve the health of young people, and rural schools are also striving to follow up. Although rural families have limited resources, their enthusiasm for improving their children's health remains undiminished. They cooperate with schools to help their children exercise. Rural communities, with their open spaces, organize students to engage in characteristic sports activities, improving the efficiency of sports activities. Physical exercise enhances students' immunity, and rural students also benefit from it. Integrating physical education with lifelong physical education for students and cultivating lifelong sports habits, rural areas can integrate their own labor characteristics into physical education. Since the outbreak of the epidemic, the connection between family, community, and campus sports has promoted the deep integration of sports resources, and rural areas are gradually achieving a healthy integration model.

Exercise would help to tone the organs and improve reaction speed. Exercise improves the control of the nervous system and the nervous system's ability to evaluate complex changes in human activities, so as to enable the body to respond in a timely, systematic, accurate, and rapid manner to adapt to changes. Du J audited it by using the identifier of the accelerometer and evaluated the different surveys [1]. Deng H believed that strengthening training was the most effective way to improve the sports level of athletes in sports competition [2]. W Gawroski found it necessary to introduce general physical

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training to strengthen the neck muscles before starting technical training [3]. Marc F recognized that psychological experience affected physiological homeostasis, including immune processes, through the autonomic nervous system, which biologically supported psychosomatic effects, and measured these effects through heart rate variability [4]. The polymorphic motion model proposed by Schneider S could be used for university and non-university teaching as well as specific learning and training planning [5]. Panhan A C used electromyography and dynamometer to test muscles and the resulting torque values were used for calculations. According to the results, Pilates exercise could improve muscle because of the increased torque and decreased electromyogram activity after the intervention [6]. In order to strengthen the health of the younger generation, Berezhnova Z Z considered the problem of improving the functional state of students and the process of physical education [7]. The interpretations of physical education in the above studies are relatively specific, but they are not related to the physical health of students.

The level of physical fitness has a significant impact on some health-related attitudes and concepts of students. It is imminent to improve the health and physique level of students, and the strengthening of health education is the only way to improve the physique of young people. Huang Y studied the student's physical health evaluation model based on the combination of family sports and school sports, and analyzed the research status of physical health evaluation in the world, and the support vector machine algorithm was applied to the physical health evaluation model [8]. Liu Liping provided a theoretical framework for studying policy from a psychological perspective. Through the experiments, it was found that there was a relationship among college students' cognition and satisfaction as well as behavior of policy. Sugimoto H believed that it was necessary to ask students to eat breakfast and to develop good living habits while ensuring good health. Yang Y believed that it was very important to improve the quality of physical education courses, but the original physical health evaluation method was difficult to achieve. Tazetdinov R F established a health evaluation model to conduct a comprehensive analysis of the students' physical health level. Zhang L believed that one of the major health problems in modern society was the general poor health status and the rising incidence of the overall disease, especially the incidence of cardiovascular system diseases. Yu D expounded the principles and goals of the college students' physical health test system, and analyzed the relevant modules of the system to better promote the improvement of college students' physical quality and provide more qualified talents for the country. These studies on students' physical health are relatively comprehensive, but they do not include physical education.

Students' physical health is a long-term and far-reaching issue, which is not only related to the healthy growth of individuals, but also to the health of the entire country. Students' correct understanding of exercise should be cultivated and the duration and frequency of exercise should be guaranteed to reduce the use of mobile phones and the Internet and ensure sufficient exercise intensity and types of exercise [9-10]. The improvements and changes in physical condition, fitness, and physical quality due to exercise should be tracked to achieve a stronger body and fully develop a healthy body and the motor skills [11-12].

2. Evaluation of Elements of Sports Status in the Post-epidemic Era

(1) The class lacks fun, and students fail to develop exercise habits

The traditional physical education class is more serious in spirit, lacks interest, and has a single teaching method. Teachers do not pay attention to students, and students cannot enjoy the happiness brought by physical education. The purpose of students participating in exercise is not clear enough and the sense of achievement is low, so they would not have interest in sports and would not have the desire to participate. In order to cope with the physical examinations faced by schools, schools often make surprise exercise and ignore the physical health of students, or deliberately cultivate and strengthen physical examination elements in examinations. Due to school pressures, English, math and English teachers often occupy extracurricular activities or physical education classes to teach their own classes, and students don't have a lot of time for exercise. The need for students to move forward faces the excessive protection of adults, and the awareness of self-exercise since childhood is obliterated. Schools reduce active physical activity for fear of taking responsibility, which results in a severe lack of physical activity and the poor condition of students' organs such as bones and muscles. During the post-epidemic period, online learning lacks the classroom guidance and supervision of previous offline learning, which is not conducive to the formation of students' exercise habits. This is also the main reason for students' lack of athletic ability and poor physical condition, as shown in Figure 1.

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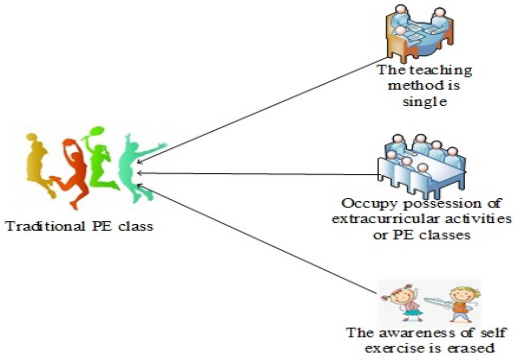

Figure 1. Lack of fun in class and students exercise failed to develop habits

(2) Insufficient informatization teaching and pertinence

During the post-epidemic period, students' learning styles shifted from offline to online, which had a significant impact on the physical education classrooms that focus on exercise. In fact, as early as a few years ago, MOOC were already a form of online education, and MOOC themselves are short for a large online platform that provides online education services in an open network. Although most people are not used to it, the use of e-learning methods to conduct physical education classes is also new during this pandemic, and a series of online courses have been launched. However, due to the limitation of conditions and the nature of physical education classes, the teaching and learning of physical education have not been fully prepared and implemented in the end, and the lack of high-quality educational resources is also one of the main problems restricting the development of online physical education.

(3) Insufficient online teaching ability of teachers hinders teaching development

Combined with the actual situation of physical education classes, various traditional teaching methods of physical education teachers were the common way for sports centers to explain, show, protect and help students face-to-face before the epidemic. Most teachers have little contact with network information technology and online learning methods of classroom teaching, and lack interest in the development and utilization of online physical education course resources. Therefore, in the context of the post-epidemic era, in-school teaching has put forward new requirements for physical education information, which enables teachers to use multimedia learning methods efficiently, as shown in Figure 2. However, with the exception of a few young teachers, some teachers have a weak knowledge base or are too old. They can't effectively raise their interest in physical exercise at all, so the impact of physical education on promoting students' physical health in the post-epidemic era can't be strengthened.

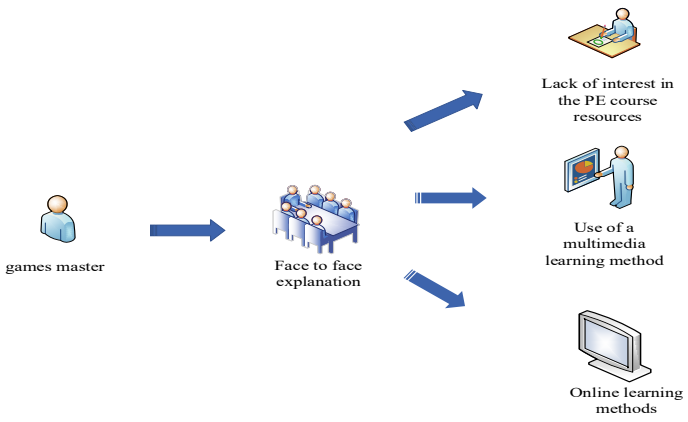

Figure 2. Teachers' lack of online teaching ability hinders teaching development

3. Elements of Ways to Improve Sports Status in the Post-epidemic Era

(1) Realization of quality education reform

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After experiencing a severe epidemic period, the school gradually abandoned the idea of only the enrollment rate, and began to focus on promoting quality education and creating a sports environment for students. In today's post-epidemic era, more schools gradually focus on the development of sports careers and the development of students' physical and mental as well as moral education to promote the development of students' physical fitness. Of course, in order to strengthen the impact of physical education on promoting students' physical health in the post-epidemic era, it is not only necessary to emphasize social education in schools and family education for parents and children, as well as the popularization of various Olympic sports and the development of sports competitions. The spirit of competition and teamwork is enhanced to jointly cultivate awareness of ability, and students are encouraged to actively participate in various sports to develop good independent sports habits and moral habits, so as to lay a solid material foundation for lifelong sports careers.

(2) Online and offline blended learning

When teaching new motor skills, students acquire motor skills through repetitive practice. Under the guidance of teachers, students try to experience the connection of each action repeatedly to train motor memory. Therefore, even if simple online teaching is combined with three-dimensional and multi-dimensional video playback, good learning effects cannot be achieved without physical participation. Online and offline learning methods should complement each other and combine video learning with offline motion simulation. Based on the videos and teacher feedback, students focus on specific fitness benefits and optimize motor skill acquisition to rapidly improve student fitness and learn motor skills online, as shown in Figure 3.

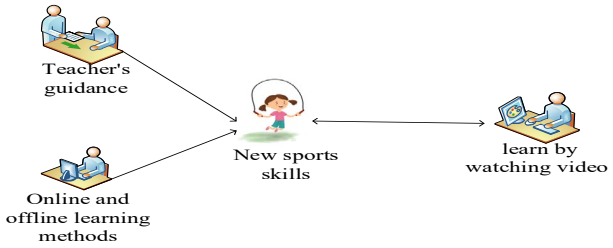

Figure 3. Mixed online and offline learning

(3) The strengthening of physical training of students

Physical fitness is an important part of physical training. For this reason, in the post-epidemic era, online sports should implement the guiding philosophy of focusing on physical fitness content and supplementing sports content. Physical exercise should be based on cardiovascular endurance training such as long jump and burpee. Moderate cardiorespiratory training can effectively train cardiorespiratory function and improve endurance, so as to prevent students' growth and development as well as diseases that may occur in the post-epidemic era. Physical activity-based dynamic cooperative exercise can be used as an adjunct to help the overall development of adolescents' bodies and reduce sports injuries, as shown in Figure 4. Therefore, schools should strengthen the physical fitness of students, especially in the context of the post-epidemic era. The training of weaker parts of the body should be strengthened to reduce sports injuries.

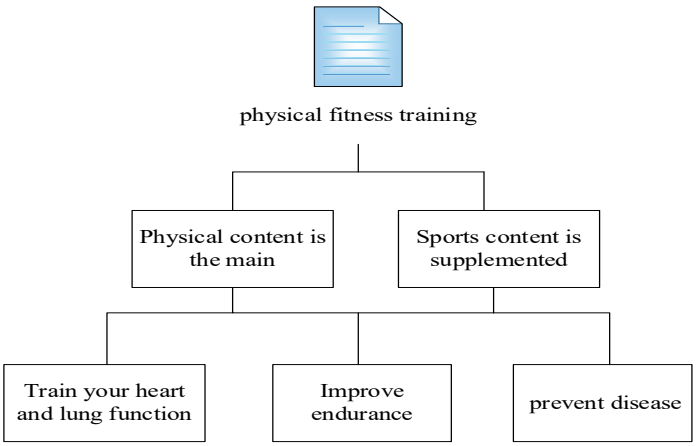

Figure 4. Strengthen students' physical training

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4. Role of Physical Education in Promoting Students' Physical Health in the Post-epidemic Era

(1) Physical education can promote the development of students' physical function

The respiratory system and cardiovascular system are the main subjects involved in the development of students' physical activity. An important indicator of the respiratory system is biological capacity, which is an important indicator for evaluating respiratory function. Scientific research shows that regular exercise can increase lung capacity and improve alveolar function and respiratory function. During exercise, the muscles must consume a lot of oxygen and nutrients to provide the required energy, and the carbon dioxide produced must also be excreted through the respiratory tract. In contrast, people who do not exercise tend to experience hypoxia symptoms such as difficulty breathing, dizziness, and fatigue. The stimulating effect of exercise on the cardiovascular system is mainly reflected in the promotion of blood circulation during exercise, so that the heart muscle gets more nutrition and the myocardial fibers become thicker. The heart wall becomes stronger and the blood flow of the heart and the body becomes better, and the heart is tighter. People who exercise regularly have their resting heart rate slow to 50-60 beats per minute due to increased cardiovascular activity. The average human heart rate is 70-80 beats per minute and blood pressure changes during mild exercise, which makes students less fatigued in daily activities and quick recovery from illness. During vigorous exercise, the improvements in cardiovascular function allow the body to maintain a higher level of exercise demand and physical activity.

(2) Physical education can promote the improvement of students' physical quality

Physical fitness is closely related to genetic factors, but it is important for acquired development. Physical fitness is the basic functional ability expressed as the function of various organ systems of the human body through muscle activity, and people who exercise regularly can improve various parts of the body in a balanced manner. Extensive exercise can improve upper body strength and lower back and abdominal development as well as the ability to coordinate explosive power, speed, endurance, and discipline with lower body training, as shown in Figure 5. In addition, different exercise plans, exercise methods, exercise intensity and duration have different effects on physical development. Therefore, scientific and reasonable physical exercise is of great significance for the comprehensive development of students' physical fitness.

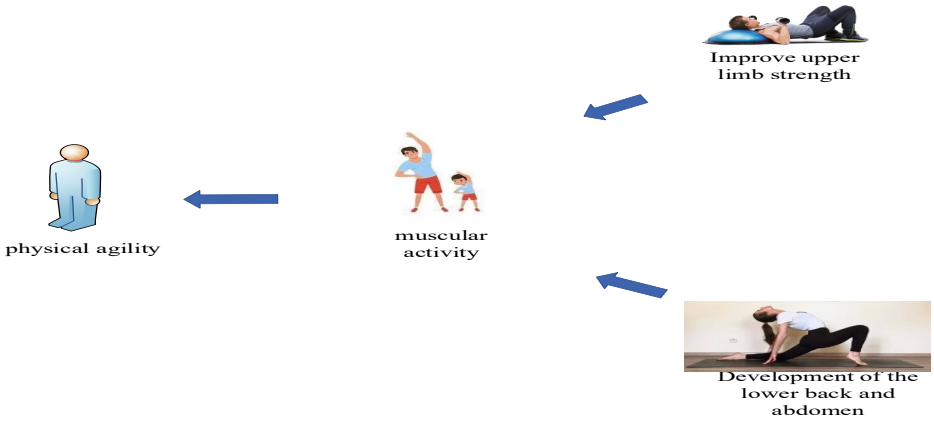

Figure 5. Physical exercise promotes the improvement of students' physical quality

5. Application of Simulation Algorithm in Strengthening Physical Education to Promote Students' Physical Health

In physical education, a probability-based simulation algorithm is used to judge the advantages of the evaluation objects by calculating the superiority between the evaluation objects. The evaluation link is added in the form of components to convert the evaluation data, and its validity is checked by the verification method.

It is assumed that there are n students exercising and w indicators to form exercise goals. There are multi-index goals composed of $x_{nm} = x_n(x_m)$ and $i = 1,2,3,....n$ as well as $j = 1,2,3,...m$, and the data matrix (decision matrix) can be expressed as:

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$$K = \left(x_{1m}\right)_{1 \cdot m} = x_{11}, x_{12}, ...x_{1m} \tag{1}$$

$$K = \left(x_{2m}\right)_{2 \cdot m} = x_{21}, x_{22}, ...x_{2m} \tag{2}$$

$$K = \left(x_{nm}\right)_{n \cdot m} = x_{n1}, x_{n2}, ...x_{nm} \tag{3}$$

Among them, K is the target data, and the goals of sports to promote students' physical health are generally transformed into:

$$\partial_i = \sum_{i=1}^{j} \sum_{j=1}^{i} p\left(k_n p \middle| \left(i_1 j_n\right), p\right) \tag{4}$$

$$\partial_i = \frac{\sum_{n=1} \left(k_{mn} - p_n\right)}{\sqrt{\sum_{i=1} \left(p_{nm} - k_n\right)^2}} \tag{5}$$

$$\partial_i = \frac{\sum_{i \in 1} p_{mn} k_m}{\sum_{i \in 1} p_{mn}} \tag{6}$$

$$\partial_i = \sum_{i \in j} k_{mn} \tag{7}$$

Among them, ∂_i is the observation value of the evaluated object about k indicators.

It is assumed that α_{ij} and β_{ij} are the formulas of the target δ_{i} object on the indicator x_{ij}, and the following formulas can be obtained

$$\alpha_{ij} = \frac{1}{n-1} \sum_{i=1} x_{ij} - x_{kj} \tag{8}$$

$$\alpha_{ij} = \frac{1}{m-1} \sum_{i=1} x_{ij} - x_{kp} \tag{9}$$

$$\beta_{ij} = \frac{1}{nm} \sum_{i=1} p^2 \tag{10}$$

Any two target objects are calculated with specific values, and the superiority between δ_i and ε_i is:

$$\delta_i\left(x_{ij}^{'} \geq x_{ij}^{''}\right) = \varepsilon_i\left(x_{ij}^{'} \geq x_{ij}^{''}\right) \tag{11}$$

The aggregate functions represent the target probability:

$$\delta_i = \sum_{j=1} x_{ij} (p,k)^2 \tag{12}$$

$$\delta_i = \sum_{i=1} x_{ij}^{'} (n,m)^2 \tag{13}$$

$$\varepsilon_i = \sum_{j=1} x_{ij} (p,k)^2 \tag{14}$$

$$\varepsilon_i = \sum_{i=1} x_{ij}^{'} (n,m)^2 \tag{15}$$

6. Combining Algorithm and Practical Application Result Evaluation

In order to further study the impact of physical education in the post-epidemic era on students' physical health, the survey is conducted in four high schools and colleges to investigate the satisfaction

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evaluation of students studying physical education courses in school. Schools are divided into: A, B, C, D, and the form of questionnaire is adopted. The content of the survey is mainly summarized into four points, and the students' satisfaction with these four points is investigated respectively: interest, exercise awareness, physical quality, and teaching mode. From these four points, the direction of improvement of physical education courses in the post-epidemic period is investigated. The sample size is 400 people, and the survey results are shown in Table 1.

Table 1. The satisfaction evaluation of students on learning physical education courses in school

	A	B	C	D
interesting	43%	42%	47%	51%
Exercise consciousness	31%	44%	33%	36%
physical quality	46%	36%	44%	45%
Teaching mode	51%	53%	49%	52%

It can be seen from Table 1 that students are less satisfied with the fun, exercise awareness, physical quality, and teaching mode in physical education courses. Especially in the cultivation of exercise awareness, the highest school B has only 44% satisfaction.

In order to enhance the physical fitness of students in physical education courses, simulation algorithms are introduced into physical education courses. In order to simulate the impact of physical education courses on students' physical fitness in the survey algorithm, this paper investigates four high schools that have introduced new physical education courses for evaluation and testing and conducts student surveys. The sample size is 400 people, and the students' satisfaction with the new physical education course is investigated. The evaluation results are divided into four levels: satisfied, good, average, and dissatisfied. The specific effect is shown in Figure 6.

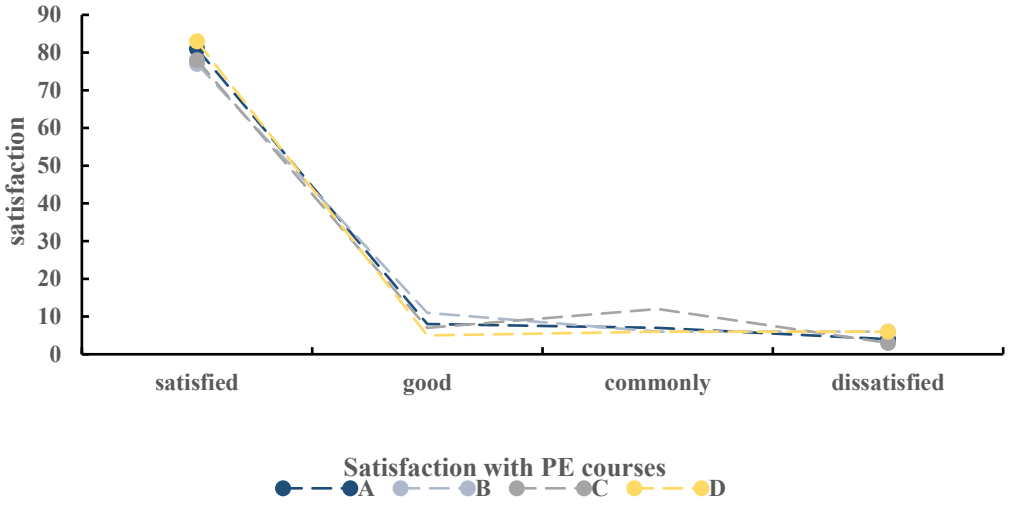

Figure 6. Student satisfaction with the new physical education program

According to Figure 6, among the new physical education courses, students' satisfaction is higher. In contrast, there are still many problems in traditional physical education courses. The traditional physical education teaching method is more traditional and the teaching system is old-fashioned, which makes it difficult for students to improve their enthusiasm for participation. Among the 400 students surveyed in Figure 6, most of them express their welcome and satisfaction with the new teaching mode, which shows that the new teaching mode greatly improve students' interest and lay a foundation for cultivating students' good physique.

There is a process in everything going on, and this paper re-investigates students in schools A, B, C, and D when a new type of physical education is introduced into the school curriculum. Students' satisfaction with these four points is surveyed, namely: fun, exercise awareness, physical quality, and teaching mode. The survey results are shown in Figure 7.

As shown in Figure 7, students' recognition of the new physical education curriculum is greatly improved. Among them, the awareness of exercise is greatly improved compared with the traditional teaching mode, and the fun, physical quality and teaching mode are also improved to varying degrees.

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The new physical education teaching mode has the characteristics of situational interaction and teamwork. According to relevant surveys and algorithm calculations, the strengthening of physical training can improve the physique of students by 14%.

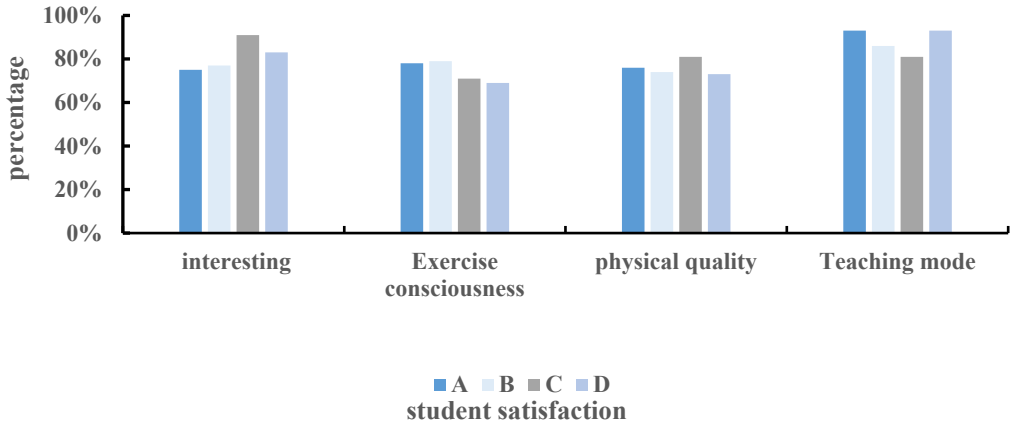

Figure 7. Student satisfaction after the introduction of the new physical education curriculum into the school curriculum

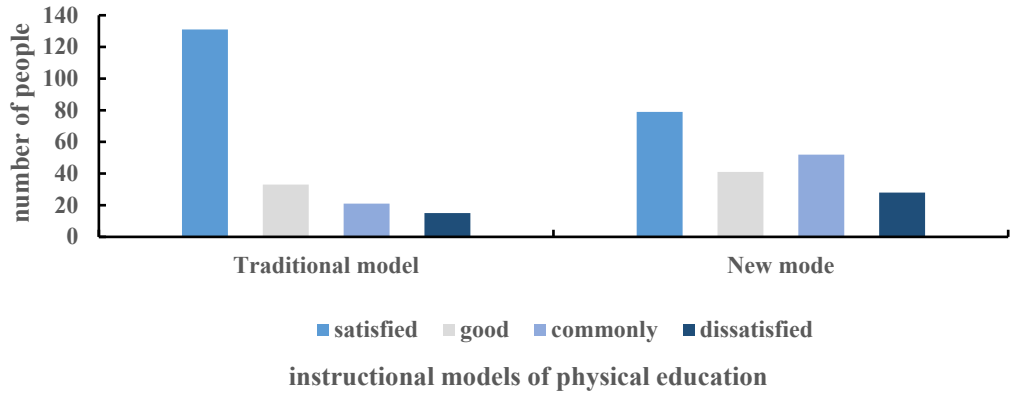

Figure 8. Student satisfaction in each of the two physical education models

In order to detect how the new physical education teaching mode in the post-epidemic era differs from the traditional physical education teaching mode, the satisfaction of a high school student under the two physical education teaching modes is investigated. A total of 200 students are surveyed, and the survey results are four levels of satisfaction, good, average, and dissatisfaction, as shown in Figure 8.

From the bar chart in Figure 8, it can be seen that compared with the two physical education teaching modes, the traditional physical education teaching method is more old-fashioned. Students' recognition of the traditional physical education teaching model is relatively low, and it fluctuates greatly. Although there are fluctuations in the new physical education teaching model, the fluctuations are not large and the recognition of students is higher.

7. Conclusions

The Corona Virus Disease 2019 (COVID-19) is a major health concern for everyone, and the current development of school sports needs to be seriously considered. The epidemic would eventually pass. Looking back at the revelation to school sports during the epidemic, the value of school sports would be given special significance for the times on the original basis under different social backgrounds. The combination of physical education and health education is an effective way to improve people's overall health level, and it is the need of modern human development. This is also an inevitable requirement of social development and an important aspect of quality education. The combination of sports and health makes the content of physical education more lively and interesting, which can not only improve physical fitness, but also allow students to acquire health knowledge and

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develop healthy behavior habits and lifestyles. The importance of school sports should be taken seriously to develop school sports to a new level.

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