

Effectiveness of Blended (Online + Offline) Physical Education Teaching in Enhancing Physical Competency of Chinese High School Students: Development and Validation of Instructional Guidelines

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ABSTRACT: This study aims to develop online physical education courses, explore the effectiveness of blended (online + offline) teaching in enhancing high school students' physical competency, and propose instructional guidelines. Methods: A quasi-experimental design was adopted, with 100 senior three students divided into an online-only group ($n=50$) and a blended group ($n=50$). The intervention lasted 4 weeks. Data were collected via physical fitness tests, questionnaires, and interviews, and analyzed using SPSS 26.0 (independent t -tests, paired t -tests, Cronbach's α). Results: The blended group showed significantly greater improvement in physical competency (average 35.27% vs. 18.56% in the online-only group), with significant differences in 50-meter running (44.28% vs. 9.82%), 1-minute sit-ups (64.02% vs. 33.39%), and other indicators ($p < 0.001$). Students and teachers had high recognition of the blended mode. Conclusion: Blended physical education teaching is more effective in enhancing high school students' physical competency than online-only teaching. The proposed instructional guidelines provide practical references for teaching practice.

Keywords: Online physical education course, Senior high school student, Physical competency

1. Introduction

With the development of Internet technology, online physical education has become an important supplement to traditional teaching, especially during the COVID-19 pandemic. However, traditional offline physical education faces limitations in time and space, while online-only teaching lacks interactivity and practical experience. Blended teaching, combining the advantages of both modes, has emerged as a promising solution.

Despite previous research on online physical education, few studies have empirically compared the effectiveness of online-only and blended modes in improving Chinese high school students' physical competency. Additionally, there is a lack of systematic instructional guidelines for blended physical education. This study addresses the following research questions: 1) How effective is the developed blended physical education teaching mode in enhancing students' physical competency? 2) What are the perceptions of students and teachers towards the blended teaching mode? 3) What instructional guidelines can be proposed for effective blended physical education teaching? Physical education of senior high school students plays a vital role in the process of students' growth. It is not only the cornerstone of improving students' physical fitness, but also can improve heart and lung function and strengthen

muscle strength, laying a healthy foundation for their studies and future life, and also plays an important role in cultivating sports skills. By participating in the study and training of sports, students can master professional skills and improve their competitive level, which is of positive significance to their future career development and social participation (Kang & Shao, 2020). At the same time, physical education can also guide high school students to form a healthy lifestyle, stimulate their interest in learning and enthusiasm for participation, and urge students to develop positive and healthy life attitudes and behavior habits. However, the traditional offline physical education curriculum has some limitations in time, space and resources, such as the limitation of venues and equipment, which leads to a single teaching content, the limited teaching staff, which makes the teaching effect uneven, and it is difficult for students to study independently after class due to the limitation of time and space (Huang, 2024).

Online sports video-assisted teaching is of great necessity in the current education system. It breaks the limitation of venues and equipment, broadens students' learning channels, enriches teaching content and effectively improves students' interest and enthusiasm in learning (Du & Wu, 2020). Through personalized teaching, students' individual differences can be fully considered, which can improve learning effect and self-confidence. At the same time, the real-time feedback and guidance function helps students to evaluate and reflect on themselves, cultivate their autonomous learning ability and time management ability, and then improve their sports skills and comprehensive quality (Miao, 2023). The empirical research shows that online sports video-assisted teaching has achieved remarkable results in improving high school students' sports performance, promoting students' autonomous learning ability, and improving their learning interest and enthusiasm. In order to promote the reform of physical education, we should make full use of its advantages, strengthen research and practical exploration, and at the same time strengthen teacher training and technical support.

Despite the widespread application of online physical education during the COVID-19 pandemic, existing studies lack empirical comparisons between online-only and blended teaching modes in improving Chinese high school students' physical competency. Additionally, few studies have integrated constructivism and humanistic learning theories to guide the development of instructional guidelines for blended physical education, creating a research gap that this study aims to address.

2. Research Objectives

1. To develop an online physical education course aimed at enhancing the physical competency of high school students.
2. To explore the promotion effect of online physical education teaching video course on physical education Physical competency for high school students.
3. To propose instructional guidelines for effective online physical education that promote physical competency in high school students.

3. Literature review

The development of online education in China has gone through four important stages. During this process, many scholars have conducted in-depth research on online teaching from multiple dimensions, providing theoretical support and practical guidance for the sustainable development of this field.

In the research on the construction and optimization of online teaching platform, Huang and Wu (2015) emphasized that online course design is at the core, and it is necessary to deeply integrate theoretical knowledge in many fields, such as teaching content and strategies, and put it into teaching practice to create an efficient online teaching course system. Zhang (2013) proposed that the key to the success of online teaching lies in the organic synergy between theory and technology. His "unit+activity" teaching structure skillfully uses the concepts of action learning and cooperative learning to realize the close combination of the two, which provides new ideas for the functional expansion of online teaching platform. Qu and Zhao (2015) restructured the network teaching based on the SPOT curriculum resources, accurately positioned the individual differences of students, practiced the principle of teaching students in accordance with their aptitude, and significantly improved the teaching effect. Looking forward to the future development of senior high school education, it has become an inevitable trend to develop and make full use of online teaching platform to promote the digital transformation of education.

Focusing on the implementation status of online teaching, there are still many problems to be solved urgently. The vast majority of high school teachers' awareness of online teaching is low, and their practical experience is lacking, which makes it difficult to achieve the expected goal. Chen and Cao (2020) conducted an investigation and study on network teaching during the epidemic period in high schools in Xiamen, and proposed that efforts should be made to improve the function of teaching platform, optimize teaching design, and focus on cultivating the subjective initiative of teachers and students to improve the teaching dilemma. Zhang et al. (2020) also pointed out that during the epidemic period, online teaching exposed a series of problems such as unreasonable design of live content, which needed to be optimized and adjusted in the follow-up teaching practice.

In the research field of network teaching system, scholars agree that it is very important to build a diversified evaluation system. Develop exclusive evaluation criteria for learners with different learning backgrounds and ability levels to ensure a high degree of unity among teaching, learning and evaluation. Zhang (2017) pointed out that sports network education needs to be deeply studied. With the help of computer technology, physical education curriculum teaching can not only significantly improve the teaching effect, but also facilitate the storage and management of teaching resources. Building an online teaching platform is helpful to fully stimulate students' subjective initiative. Li (2020) proposed that the network teaching mode is helpful to cultivate students' good study habits, and then improve the overall efficiency and quality of physical education teaching.

However, there is a big gap between the actual effect and the expectation of online physical education teaching due to the impact of epidemic situation. Lin (2012) clearly pointed out that it is urgent to explore effective means and methods to improve the effect of online teaching, and the current problems such as single teaching content seriously restrict the improvement of teaching quality. Zhang (2020) deeply discussed the network teaching mode of high school physical education and its coping strategies under the background of epidemic situation, and devoted himself to building a brand-new teaching mode and boosting the quality of courses. Wang et al. (2020) comprehensively analyzed the advantages and disadvantages of online teaching of physical education courses, and advocated tailoring personalized teaching programs for students and innovating teaching modes with the help of AI technology.

During the epidemic, the global education system was affected to varying degrees, and countries explored new teaching paths. The United States takes the lead in dividing quality evaluation standards in the field of online education, paying special attention to curriculum design. Roelle (2011) and others shared the practical experience of online teaching courses, and put forward that the segmented video teaching method is better in the process of online teaching implementation, and clarifying key concepts to students in advance is helpful to improve their learning ability. In the research field of online sports evaluation, scholars still have disputes about the form of online sports teaching. Cruickshank and Collins (2021) think that the mixed sports teaching mode has obvious advantages, while Van et al.(2022) emphasizes that grasping key factors plays a decisive role in improving the quality of online sports teaching.

Physical competency encompasses sports achievements and good health. Sports achievements refer to the comprehensive evaluation of students' skill level, physical fitness, and competitive ability in sports such as running, jumping, and ball games. Good health involves indicators including cardiopulmonary endurance, muscle strength, speed, flexibility, and coordination, which serve as the foundation for daily activities and physical exercise. Theoretical models related to physical competency emphasize the interaction between systematic training, personalized guidance, and autonomous practice. Previous studies have shown that targeted physical education interventions can significantly improve adolescents' physical competency, but few have focused on the comparative effectiveness of online and blended teaching modes (Hu., 2020).

To sum up, the research on online teaching has gained many achievements in stages, laying a solid foundation for further exploration. Looking back on the past research, there is still a broad space for development in the field of online sports teaching. Compared with other countries, its online distance education started earlier, and it has built a relatively perfect teaching model, and has taken the lead in the research of online sports teaching, focusing on improving students' enthusiasm for participating in courses and mastering sports skills. The research on online teaching in China started relatively late, mainly focusing on the construction of teaching platform, the integration of teaching resources, the analysis of teaching status and countermeasures, and the evaluation of teaching system. In view of the uniqueness of physical education, it faces many difficulties and challenges in the practice of online teaching, but it also breeds new opportunities. This study will focus on the bilateral interaction between "teaching" and "learning" and the feedback from parents. In view of the significant differences between traditional physical

education teaching and online physical education teaching, and the fact that online physical education teaching in China is still in its infancy, although online teaching research has become a hot topic, the related research in the field of sports is still weak, high-quality achievements are scarce, qualitative research is dominant and quantitative analysis is seriously insufficient. Especially in the special period of epidemic prevention and control, although the research on online sports teaching in senior high schools has emerged, it is mostly focused on the current situation investigation level, and there is a lack of high-quality achievements, which reflects that this field has not been paid enough attention. In view of this, this paper intends to investigate the implementation status of online physical education in senior high schools, accurately analyze the existing problems, and actively explore the optimization path in order to effectively improve the teaching effect.

4. Conceptual Framework

This study is a investigation and study, through the analysis of specific research object, explore the effective sports teaching mode, to improve the quality of physical education teaching, promote the development of high school students in sports, make contributions to cultivate all-round development of high-quality talents, but also provide valuable reference basis for the further development of online sports teaching.

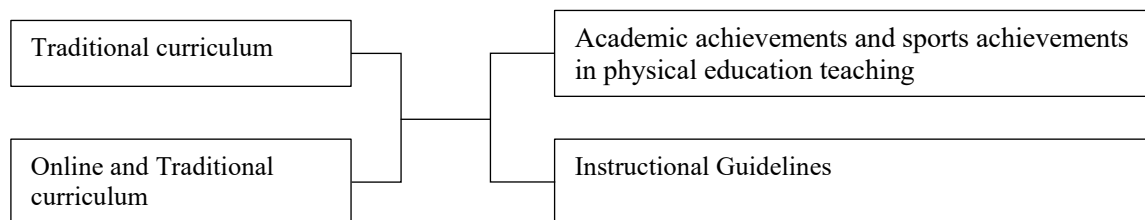


Figure 1. Example of figure

The independent variable is blended physical education teaching, including online course resources and offline practical guidance. Mediating variables include student motivation (autonomous learning willingness, sports interest) and teacher support (online feedback, offline technical guidance). The dependent variable is physical competency, measured by sports achievements and health indicators. The framework is guided by constructivism theory (emphasizing active knowledge construction) and humanistic learning theory (focusing on student-centered needs).

5. Methodology

This study was approved by the Ethics Committee of Srinakharinwirot University (Approval No.: SWU-20220918). Informed consent was obtained from all participants and their parents. Inclusion criteria: 3rd years high school students enrolled in Beijing No.4 Middle School (International Campus), no history of chronic diseases, and proficiency in using online learning platforms. Exclusion criteria: students with physical disabilities or unable to participate in physical exercise. A priori power analysis using G*Power 3.1 indicated that a sample size of 98 was required to detect a medium effect size ($d=0.5$) with $\alpha=0.05$ and power=0.90.

In this study, two classes of 3rd years high school in Beijing No.4 Middle School International Campus were selected as the research objects.

A total of 100 3rd years high school students from Beijing No.4 Middle School (International Campus) were selected as participants. Using simple random sampling, they were divided into two groups: the online-only group ($n=50$) and the blended (online + offline) group ($n=50$). The grouping process ensured no significant differences in baseline physical fitness ($p > 0.05$) between the two groups. Class-level clustering was considered in the experimental design, with each group consisting of two intact classes to avoid cross-group contamination.

According to the research on online education, these students are divided into two groups: one group only receives online physical education class, and the other group receives online and offline physical education. Before and after the experiment, the students accepted five physical fitness tests to evaluate their physical fitness: 50-meter running, 1-minute skipping, sitting forward, 1-minute sit-ups and 50-meter× 8 turn-back running. Investigate the physical

characteristics of two groups of students. After the experiment, students were investigated by online electronic questionnaire to understand their views on online teaching.

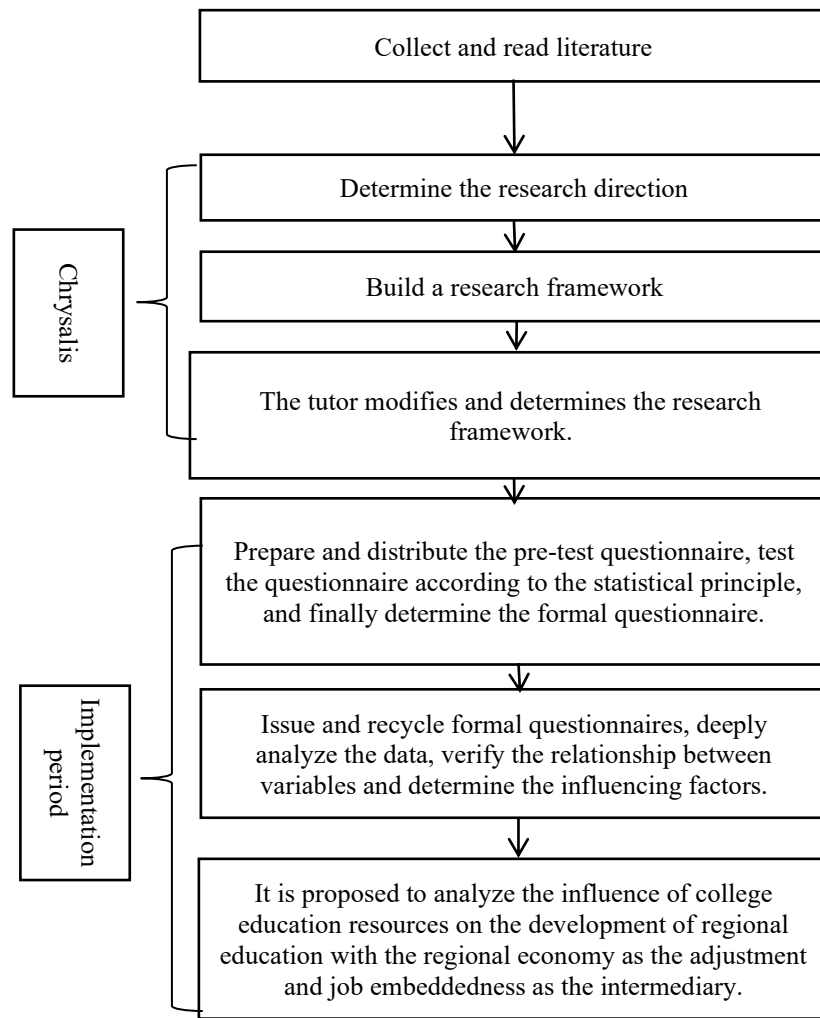


Figure 2. Example of figure

5.1 Develop online and offline integrated sports lesson plans

According to the physical education teaching needs of middle school students, video resources such as warm-up exercises and basic skills are published online with the help of the teaching platform, and supporting exercise manuals are provided for students to learn independently and record difficulties. In the offline class, the online learning results are displayed in groups, and the teacher demonstrates and explains the common problems. Then, the group confrontation drills are organized, and the students' action norms are analyzed by motion capture technology. After class, the online punching tasks are arranged, and the practice videos are required to be uploaded. Teachers comment and feedback through the platform, thus forming a closed-loop teaching mode of "online preview-offline practice-online consolidation".

5.2 Sports testing

Students' physical fitness was recorded with X-Scan Plusii body composition analyzer, polar heart rate meter, sitting forward bucksimeter, stopwatch, meter holder, touch height meter, German blood lactate analyzer, blood collection needle and other instruments. The PE scores of both groups were obtained by recording and analyzing the test data displayed by the instrument.

5.3 Questionnaire survey

Selected 100 senior 3rd years high school students from 4 classes of Beijing No.4 Middle School (International Campus), randomly divided into online and online + offline sports groups. After four weeks of implementation, the questionnaire was distributed and recovered through the questionnaire network within the specified time. Through the analysis of the survey content, the practical problems and deficiencies of the family online video teaching course are summarized. The questionnaire consists of three parts: the method and content of online video teaching course (questions 1-7), the evaluation of online video teaching course (questions 8-13), and the cognitive attitude of students and parents towards online video teaching course and family exercise (questions 14-20).

Shapiro-Wilk test confirmed the normality of data ($p > 0.05$), and Levene's test verified homogeneity of variance ($p > 0.05$). Effect sizes were reported using Cohen's d for between-group comparisons, with values ≥ 0.8 indicating large effects, 0.5-0.79 medium effects, and ≤ 0.49 small effects. The questionnaire had good internal consistency (Cronbach's $\alpha = 0.86$) and content validity (IOC values ≥ 0.5). For physical fitness tests, test-retest reliability was confirmed with intraclass correlation coefficients (ICC) ≥ 0.85 , and equipment was calibrated before data collection. Testers received standardized training to ensure consistency in measurement procedures.

Paired t-tests were used to compare pre-test and post-test scores within each group, and independent t-tests were used for between-group comparisons. Categorical variables were analyzed using chi-square tests. Confidence intervals (95%) and exact p-values were reported for all statistical tests.

5.4 In-depth interview

In order to deeply understand the physical education teachers' recognition of online video teaching courses, and to gain a more intuitive understanding and feeling, this article initially decided to design an interview outline. The questions in the interview outline will be designed as semi-structured questions to understand their views of the online video teaching course based on respondents' responses.

Construct teaching guidance. According to the development process, effective teaching guidance is put forward, that is, suggestions for applying research results.

6. Results

6.1 Develop online physical education courses

This online video course design scheme is aimed at high school students in China, focusing on sports online video courses. There are three principles in the course: first, it is student-centered, combined with the characteristics of high school students, to stimulate learning interest by telling stories to introduce sports history and clearly demonstrating technical movements; Second, it pays attention to systematicness and consistency, and the contents are sorted logically, from basics to skills to actual combat, and there are links between courses, such as the gradual design of football lessons; The third is to highlight interaction and feedback, enhance participation through questioning and online discussion, coach's online guidance, after-school questionnaire collection and suggestions to help students improve. The purpose of the course is to provide diverse, efficient and convenient sports learning channels and improve the sports literacy of senior high school students. Specifically, it includes letting students master the basic concepts and history of sports to cultivate their interests, teaching basic techniques and rules to improve their physical fitness, cultivating the sense of teamwork and competition, and helping students develop exercise habits. The course content is divided into 10 units. Basic quality physical education curriculum introduces related concepts, project methods and the relationship between health and training ability; Jumping and throwing courses cover a variety of skills and points; The running course explains posture skills, training methods and benefits; Football, basketball, volleyball, table tennis and badminton courses have their own emphases, involving basic knowledge, technology, rules, tactics and actual combat. The course of horizontal bars and parallel bars teaches basic skills and consolidates guidance; Aerobics course includes basic movements, combined movements and music collocation. After the course design is completed, it will be evaluated by a five-member expert group. The evaluation results show that the IOC scores of all courses are above 0.5, among which jumping and throwing courses and badminton courses get a full score of 1 point, which has good overall consistency, high degree of expert recognition and can be implemented.

6.2 Sports performance test results

In the exploration and research process of physical education teaching mode, in order to accurately analyze the effects of different modes on students' physical performance and physical quality, this study carefully set up the control group

and the experimental group, and conducted in-depth testing and detailed analysis on the physical ability of the two groups of students before and after the implementation of the curriculum. Before and after the experiment, the sports test items in the control group showed some dynamic changes. As far as the 50-meter $\times$ 8 turn-back run is concerned, the average value increases by 14, which is 21.81% when converted into an increase range; One-minute sit-ups also increased by 33.39%. However, a comprehensive survey of the indicators shows that the overall growth trend is relatively flat, and the promotion range is relatively limited. In-depth exploration of the root causes, it is not difficult to find that there are inherent disadvantages in relying solely on online physical education teaching mode, the most prominent of which is the lack of face-to-face interactive guidance, which greatly restricts the in-depth expansion of teaching effect and makes students' physical education ability improvement encounter bottlenecks. In sharp contrast, in the experimental group, after the introduction and implementation of online+offline physical education teaching mode, students' physical education achievements have achieved remarkable improvement. Among them, the growth rate of 50-meter running soared to 44.28%, and the growth rate of 1-minute sit-ups was as high as 64.02%. Such remarkable achievements have fully demonstrated the excellent effectiveness of online and offline physical education teaching mode in strengthening students' physical fitness. This model ingeniously integrates the advantages of rich and diverse online teaching resources, flexible and convenient learning arrangements, strong interaction of offline teaching, accurate and timely guidance, etc., and forms a synergistic force, which effectively stimulates students' strong interest in physical education courses, greatly mobilizes their enthusiasm for classroom participation, and comprehensively promotes the advancement of students' physical fitness and the cultivation of sports competence characteristics. Further comparing the test results before and after the control group and the experimental group, it is clear that the performance of the experimental group stands out in all tests, which is significantly better than that of the control group. This result strongly proves that the online+offline teaching mode is more effective in improving students' physical fitness than the simple online physical education class. The mechanism behind it may be that this model paves the way for students to obtain more abundant teaching resources, builds a more timely and effective feedback guidance platform, creates more diverse and active interactive communication scenes, fully stimulates students' subjective initiative, opens up a new path for the innovation and development of high school physical education, and provides valuable practical methods.

Table 1 Test Results of Physical Ability of Control Group

Assessment Content	Before the Experiment	After the Test	Mean Growth	Growth Margin	T Value	P Value
50 m $\times$ 8 Turn-Back Run	64.20 $\pm$ 16.321	78.20 $\pm$ 14.348	14	21.81%	4.555	<0.001
50-Meter Run	61.10 $\pm$ 11.651	67.10 $\pm$ 11.210	6	9.82%	2.624	0.010
1 Minute Skipping Rope	68.60 $\pm$ 13.440	80.20 $\pm$ 12.895	11.6	16.91%	4.404	<0.001
Sit And Reach	61.20 $\pm$ 11.508	66.40 $\pm$ 11.536	5.2	8.50%	2.257	0.026
1 Minute Sit-Ups	59.15 $\pm$ 14.545	78.90 $\pm$ 14.712	19.75	33.39%	6.750	<0.001

The control group showed modest improvements in all physical fitness indicators, with the largest increase in 1-minute sit-ups (33.39%), indicating that online-only teaching has limited effect on physical competency enhancement.

Table 2 Results of the Experimental Group's Physical Ability Test

Assessment Content	Before the Experiment	After the Test	Mean Growth	Growth Margin	T Value	P Value
50 m $\times$ 8 Turn-Back Run	63.80 $\pm$ 16.453	86.30 $\pm$ 11.962	22.5	35.27%	7.821	<0.001
50-Meter Run	61.20 $\pm$ 11.765	88.30 $\pm$ 10.490	27.1	44.28%	12.157	<0.001
1 Minute Skipping Rope	68.70 $\pm$ 13.197	94.00 $\pm$ 2.714	25.3	36.83%	13.278	<0.001
Sit And Reach	60.90 $\pm$ 11.518	89.50 $\pm$ 8.277	28.6	46.96%	14.258	<0.001
1 Minute Sit-Ups	58.65 $\pm$ 14.716	96.20 $\pm$ 3.942	37.55	64.02%	14.258	<0.001

The blended group achieved significant improvements in all indicators, with 1-minute sit-ups increasing by 64.02% and 50-meter running by 44.28%, demonstrating the effectiveness of blended teaching.

Table 3 Test outcomes for the experimental group and the control group before and after

Assessment Content	Control Group	Experimental Group	Mean Growth	Growth Margin	T Value	P Value
50 m× 8 Turn-Back Run	78.20±14.348	86.30±11.962	8.1	10.36%	3.066	<0.001
50-Meter Run	67.10±11.210	88.30±10.490	21.2	31.59%	9.764	<0.001
1 Minute Skipping Rope	80.20±12.895	94.00±2.714	13.8	17.21%	7.405	<0.001
Sit And Reach	66.40±11.536	89.50±8.277	23.1	34.79%	11.504	<0.001
1 Minute Sit-Ups	78.90±14.712	96.20±3.942	17.3	21.93%	11.504	<0.001

The blended group outperformed the control group in all physical fitness tests ($p < 0.001$), with an average growth margin 16.71% higher than the control group, confirming the superiority of the blended teaching mode.”

6.3 The questionnaire survey results

When exploring students' cognitive pattern of online teaching, the scientific and rigorous research methods are very important. This study carefully selected 100 students from four classes of Grade Three in Beijing No.4 Middle School (international campus) as the core research sample, aiming to deeply explore the internal cognitive logic of students' groups on online teaching. In the questionnaire design, we fully absorb the research essence of scholars in related fields and introduce the expert consultation method to optimize and polish it, so as to accurately touch the key dimensions of students' cognition of online teaching and ensure the effectiveness and pertinence of the questionnaire tool. The implementation process of the survey follows the anonymous and online one-to-one normative mode and is advanced in a fine way. On the eve of issuing the questionnaire, explain to the respondents in detail that there is no standard for judging whether the questionnaire is right or wrong, and solemnly promise that the collected information will be kept strictly confidential, completely dispel students' concerns and ensure the authenticity and objectivity of data collection. The data collection cycle began in January 2024 and ended successfully in February, during which a total of 100 electronic questionnaires were distributed and 98 were recovered, from which the recovery rate was as high as 98%. After strict quality screening and screening process, 96 valid questionnaires were finally determined, with an effective rate of 96%, which laid a solid foundation for further analysis. Questionnaire data processing relies on professional statistical software SPSS26.0 to carry out all-round analysis, covering descriptive statistical analysis, so as to visually present data characteristics; The Cronbach coefficient value is used to rigorously verify the internal consistency of the questionnaire to ensure the reliability of the measurement; KMO method is used to accurately test the validity and ensure the fit between the questionnaire design and the research objectives. The results of comprehensive data analysis show that students show a high degree of recognition in the presentation mode and content architecture dimension of online video teaching courses, and most of the feedback teaching contents are diversified and rich, and the teaching methods are easy to understand and easy to flexibly plan the learning process according to individual learning rhythm; Focusing on the overall evaluation of online physical education teaching courses, most students give high marks, and believe that it can effectively help expand the sports knowledge reserve and improve physical fitness; Further exploration of students' and parents' cooperative cognitive attitudes towards online video teaching courses and family exercise shows that most students are deeply aware of the key significance of family exercise, and parents actively support the practice of family exercise, and both sides highly agree with the unique advantages contained in the organic integration of online and offline physical education teaching models, which provides a strong practical basis for the innovation of educational models.

For the online-only group ($n=50$): 42% of students rated the course content as "very rich", 56% found teaching methods "easy to master", and 48% agreed with the online teaching mode.

For the blended group ($n=50$): 68% of students rated the course content as "very rich", 76% found teaching methods "easy to master", and 82% agreed with the blended teaching mode. Significant differences were found between the two groups in overall satisfaction ($\chi^2=8.36$, $p=0.004$).

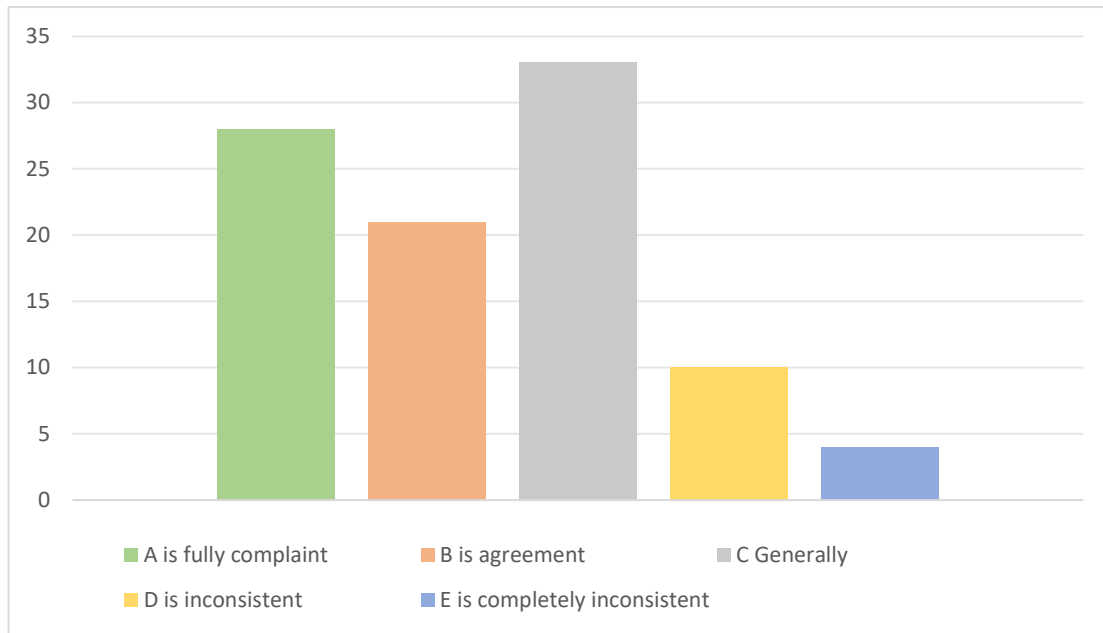


Figure 3 I think the teaching content of online video course is rich and varied

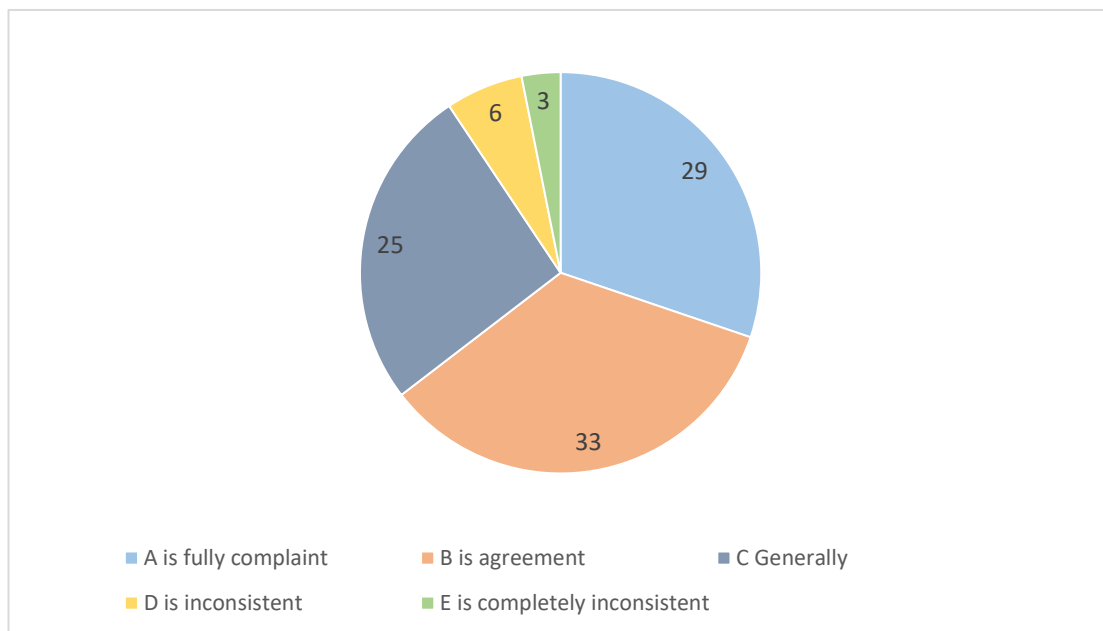


Figure 4 The teaching method of online video course is easy to understand and master

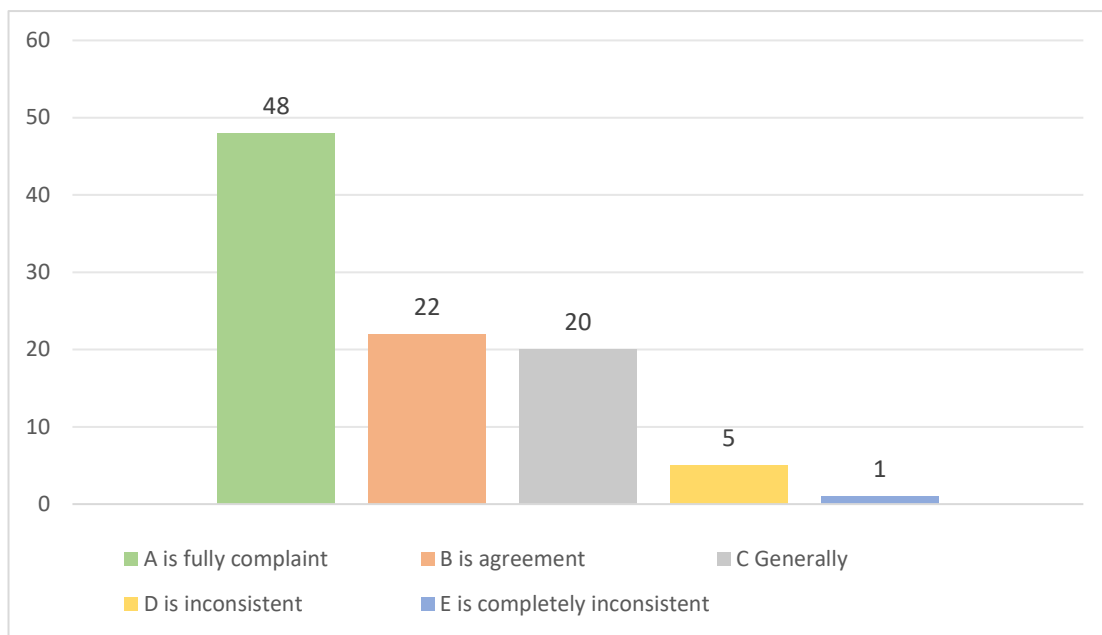


Figure 5 I can arrange the study of online video courses according to my own progress

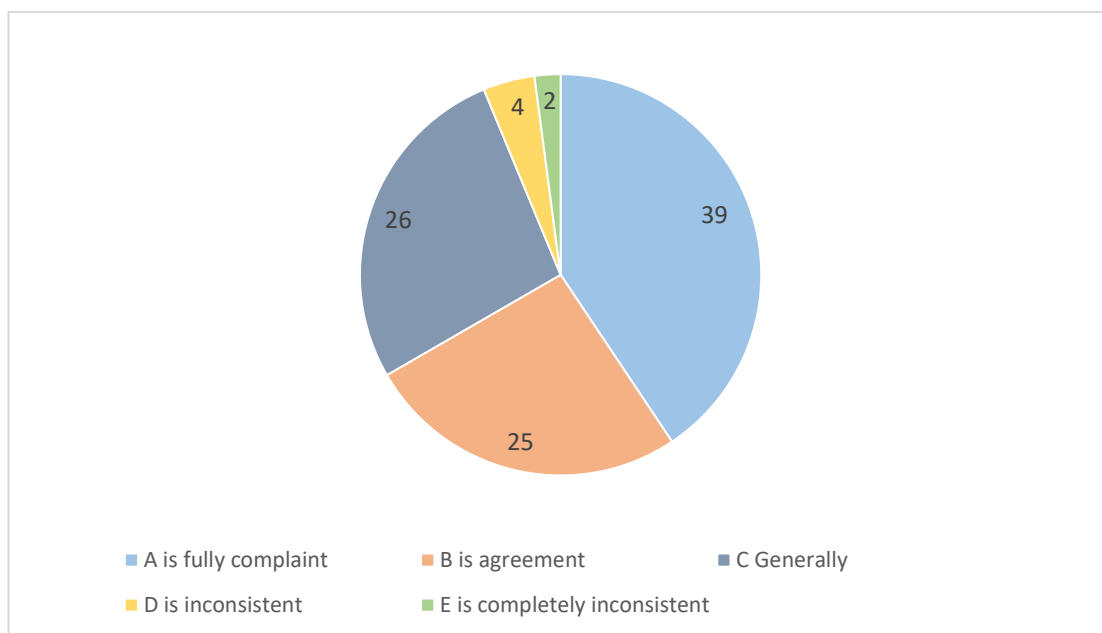


Figure 6 My overall satisfaction with online physical education courses is high

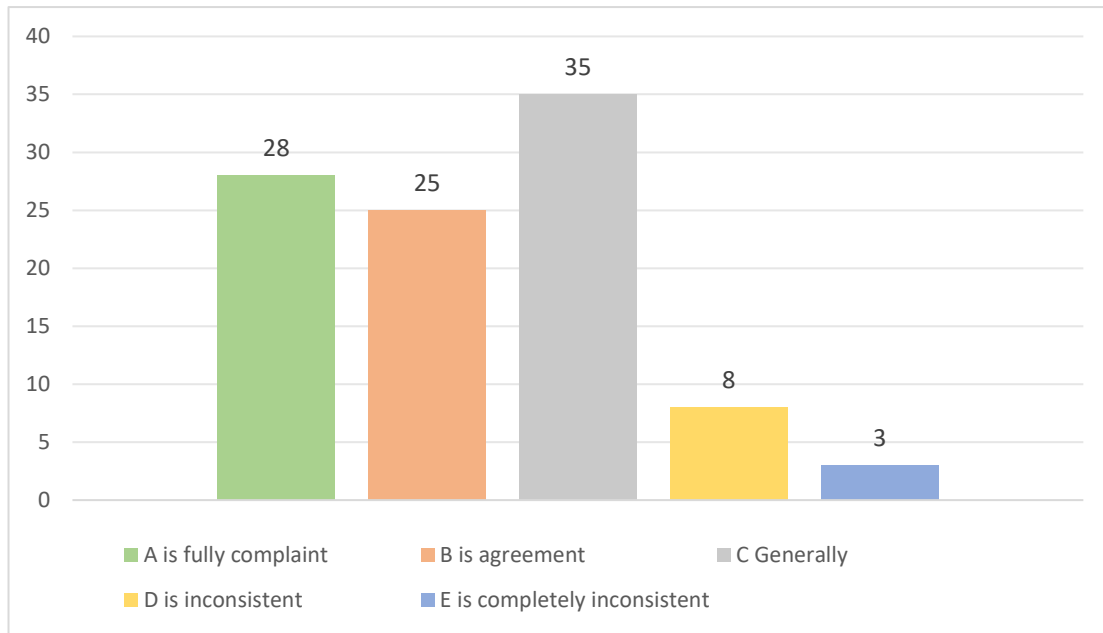


Figure 7 Online physical education courses have improved my physical education knowledge

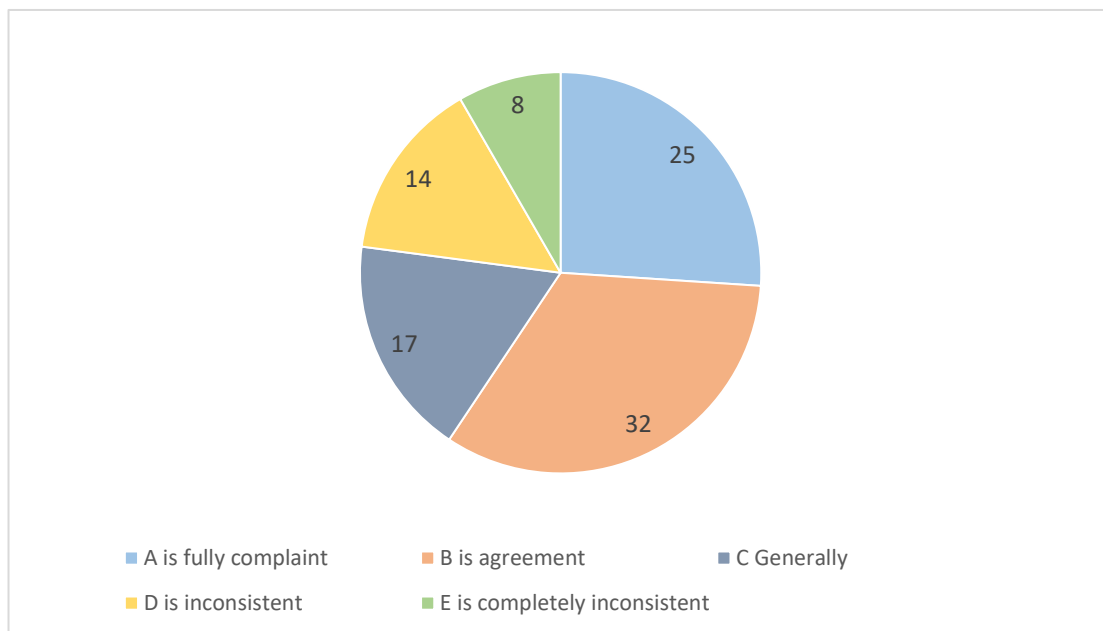


Figure 8 Online physical education class has enhanced my physical fitness

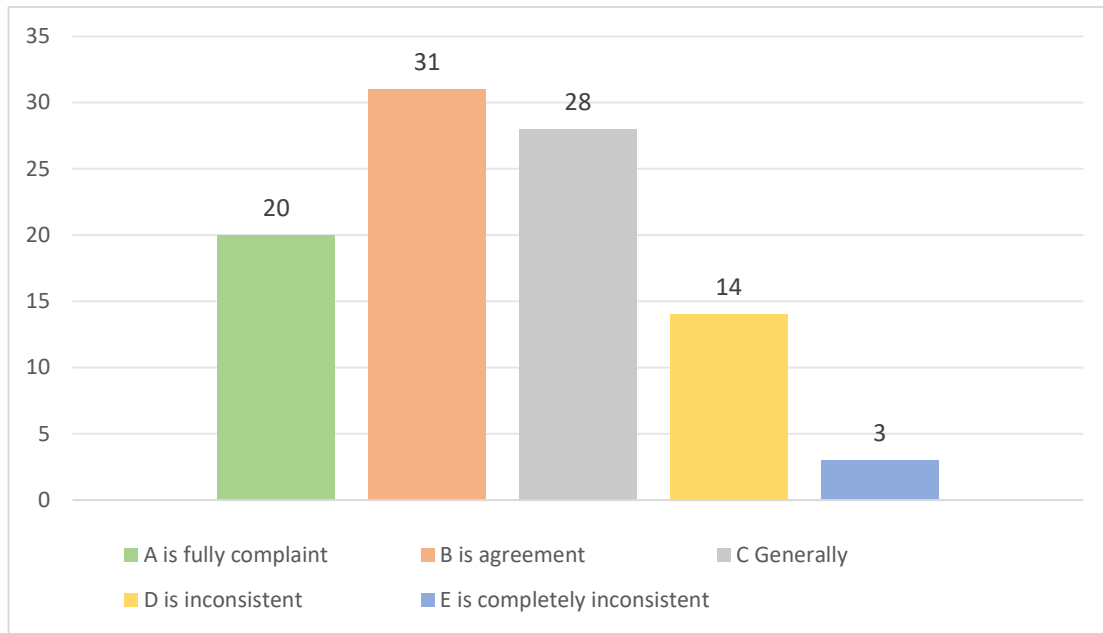


Figure 9 I think family exercise is very important for my health

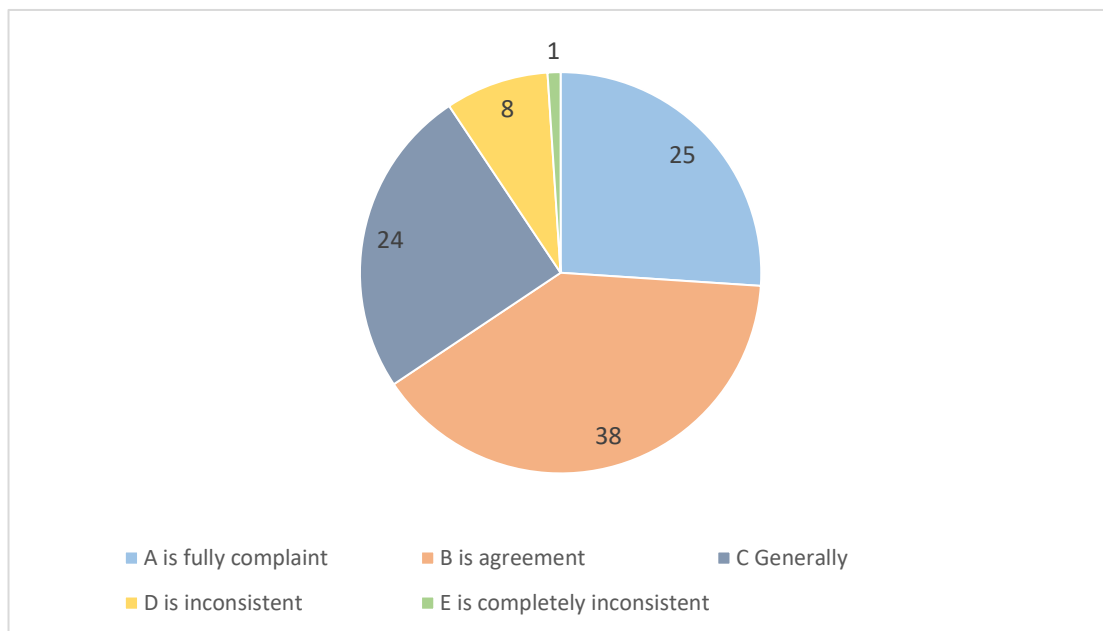


Figure 10 Parents support me to do family exercises

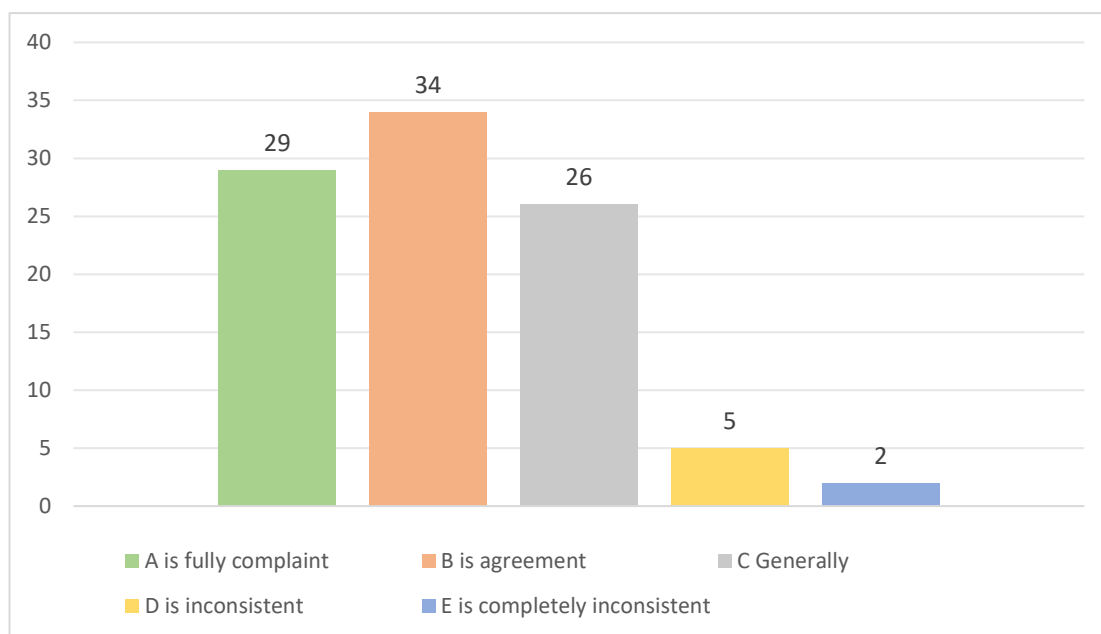


Figure 11 I agree with the advantages of online+offline physical education teaching mode

6.4 Results of the in-depth interviews

As a flexible research method, interview survey plays a key role in exploring physical education teachers' cognition of online video teaching courses. Its methods include face-to-face interview and online interview. By controlling the interview duration reasonably, the communication depth is enough to dig out objective and detailed information and teachers' subjective feelings. This study focuses on the understanding of PE teachers' recognition of online video teaching courses. After rigorous screening, PE teachers in Grade Three of Beijing No.4 Middle School (international campus) are selected as the interviewees, and the interview process is carried out in an orderly manner around five carefully designed core issues. In the interview preparation stage, the interview time and place are accurately determined one week in advance, and the interview is started under the guidance of the interview outline with the full consent of the teachers. In the process, the questioning strategy is flexibly adjusted according to the actual situation, and the progressive questioning method is adopted. At the same time, the whole process is recorded and accurately converted into written materials, providing complete materials for subsequent analysis. The interview results of two senior three PE teachers show that they highly recognize the online video teaching aid and agree that it shows many positive effects in PE teaching practice. On the one hand, online video teaching can present students with intuitive learning resources, help students to deeply understand complex motor skills, create convenient conditions for students to study and review independently, and strongly stimulate students' interest in learning. Furthermore, online video teaching resources play a unique role in many fields, such as expanding the knowledge introduction of uncommon sports events, accurately adapting to the individual needs of students at different levels, and improving teaching efficiency as a powerful auxiliary tool. However, teachers are also keenly aware of the inherent disadvantages of online teaching, especially the problem that students' self-discipline is difficult to guarantee. To this end, they put forward practical solutions such as strengthening communication and cooperation with parents, forming study groups and adding online interactive links. In view of the shortcoming that online teaching lacks actual sports experience, teachers clearly point out that offline teaching can make up for it effectively, and offline teaching can give students a real sports experience and strengthen the interaction between teachers and students. On the whole, the two teachers firmly believe that the combination of online and offline teaching mode can give full play to the complementary advantages of the two teaching methods and effectively improve the teaching quality and effect. It can be seen that although there are some problems in online video teaching assistance, it occupies an important position in physical education teaching, and the combination of online and offline has become the mainstream development direction of physical education teaching in the future, so it should fully tap its advantages and present better physical education teaching services for students.

6.5 Construct a teaching guide

The design of teaching guide includes three parts: teaching implementation suggestions, teaching resources and teaching effect measurement methods. Suggestions on teaching implementation. When other teachers use the online and offline integrated physical education teaching scheme, they need to learn 10 units systematically and master the closed-loop logic of "online preview+offline practice". Be familiar with the video before online teaching, design guiding questions for different sports, and urge students to record the problems; Give priority to solving common problems after class, correct actions through group exercises, combine students' physical foundation with layered teaching, correct practice videos online after class, and share "online error correction highlights" every week. Teaching resources. There are 10 teaching videos online, an online teaching platform supporting multiple functions, and an electronic questionnaire tool. There are basic physical fitness testing instruments, all kinds of sports equipment, auxiliary tools for motion capture, portable equipment for data recording, as well as teacher interview outlines and student questionnaires, and it is necessary to ensure that the sports venues meet the teaching needs. Measurement method of teaching effect. From three aspects: physical quality, cognition and teaching recognition. Physical fitness was measured by five indexes before and after the experiment and the data difference was analyzed. Cognition is based on online electronic questionnaire statistics; Teaching accreditation uses semi-structured interviews to extract key points, and finally integrates three types of data to evaluate the effectiveness of the program

7. Discussion

7.1 Discussion on the achievements of curriculum development

Through empirical analysis, this study expounds the promotion of online sports teaching video course to the improvement of high school students' physical quality. This is in line with constructivism theory, which emphasizes that learners actively construct knowledge and realize meaning construction through context and cooperation, that is, students preview independently through online videos and interact with offline practice. From a personalized understanding of sports skills (Vygotsky's "zone of proximal development" theory supports this process). At the same time, students' positive cognition of online courses is consistent with the idea of taking students as the center and paying attention to individual needs in humanistic learning theory and echoes the view that physical education teaching should pay attention to skill training and healthy lifestyle formation in the second chapter. This verifies the all-round development of students by the online and offline integration model. Moreover, it is consistent with Kim's (1994) view that physical education teaching should combine teachers' guidance with students' autonomous learning, which shows that the results of this study correspond to the existing literature in theory.

7.2 Discussion on statistical results

The integration of online and offline teaching has significantly improved students' sports performance. The progress of the experimental group in 50-meter running, one-minute sit-ups and other items far exceeds that of the control group, with an average progress rate of over 35%. This is consistent with the positive effect of computer-aided instruction (CAI) on academic progress pointed out, which confirms the effective supplement of network resources to traditional teaching. Students are very satisfied with online courses. Among them, 64% of people recognize the richness of the course content, and 70% of people think that they can arrange their own learning progress. This is consistent with Zhuang (2024)'s view that technology should help students learn actively. At the same time, most students recognize the advantages of online and offline integration mode, which not only solves the time and space constraints of traditional teaching, but also makes up for the shortcomings of online practice through offline interaction. This is consistent with the discussion in the second chapter that online physical education teaching should be combined with offline practice, which shows the effectiveness of this model in meeting students' individual needs and improving learning effect.

7.3 Discussion on the design result of teaching guide

Teachers generally recognize the value of online video course in technology demonstration and resource supplement and think that it can help students learn action details repeatedly. This is consistent with the viewpoint that the physical education teaching mode needs the support of multiple resources. In view of the lack of self-discipline and practical experience in online teaching, the countermeasures put forward by teachers, such as parental supervision and offline spot checks, are consistent with the conclusion pointed out in the second chapter, and online teaching needs to be strengthened during the epidemic. The teaching guide based on research design emphasizes the closed-loop logic of "online preview+offline error correction" and clarifies the methods of resource integration and effect measurement. This is consistent with Cao and Liu. (2020), Li Liangliang. (2020)'s suggestion that college sports massive open online course should pay attention to online and offline coordination, which provides an operable practical framework for

high school physical education teaching Liu. (2023). The feasibility and scientificity of the integration model are further verified.

7.4 Comparison with Previous Studies

This study's findings are consistent with Zhuang (2024), who emphasized that technology-assisted active learning improves physical education outcomes. However, the larger effect size in this study may be due to the integration of constructivism-based interactive design and offline personalized guidance, which addresses the limitations of previous online-only interventions. Internationally, Cruickshank et al. (2021) also confirmed the advantages of blended physical education, but their study reported a smaller effect size (average 25% improvement). The difference may be due to cultural differences in student compliance and teaching structure, as Chinese students receive more structured guidance in the blended mode. This study enriches global literature by providing evidence from the Chinese context, supporting the generalizability of blended physical education effectiveness.

7.5 Cultural and Behavioral Explanations

In the Chinese educational context, students are accustomed to structured teaching and teacher guidance. The blended mode combines online flexibility with offline supervision, aligning with students' learning habits and enhancing compliance, which contributes to better outcomes.

7.6 Limitations and Future Research

This study is limited to one school, with a relatively small sample size. Future research should expand to multiple regions and adopt a longitudinal design to explore long-term effects. Additionally, future studies can investigate the impact of different online resource types on physical competency.

8. Recommendation

8.1 Optimize online teaching resources

1. Enrich the diversity of course content

Enriching online physical education courses can be started from three aspects. First, increase the multi-sports teaching video, covering competitive sports such as swimming, track and field, ball games such as volleyball and football, and fitness exercises such as yoga and Tai Chi. Video needs to be detailed and professional, from basic movements to advanced skills. For example, basketball video includes basic contents such as dribbling and passing and advanced knowledge such as tactical coordination to meet the interest needs of different students.

The second is to introduce sports culture content and make videos introducing sports history, celebrity stories and sportsmanship. For example, it talks about the development of the Olympic Games, the struggles of stars such as Jordan and Yao Ming, and explains the sportsmanship such as struggle, unity and fair competition, so as to enhance students' love and respect for sports and enhance their humanistic quality and values.

The third is to supplement sports health knowledge and make teaching videos involving sports nutrition, injury prevention and reasonable exercise plan formulation. For example, it explains that running needs to supplement carbohydrates, strength training needs to increase protein intake and explains how to warm up before exercise and correct posture to prevent injury and how to deal with it after injury, so as to help students make exercise plans according to their own conditions.

At the same time, the school can organize professional physical education teachers and experts to participate in video creation, ensure the accuracy and practicality of the content, and invite students to evaluate and feedback for continuous improvement. In addition, the establishment of an exclusive online physical education teaching platform is convenient for management and students' learning, thus providing more comprehensive and high-quality physical education.

2. Improve the quality of teaching videos.

In order to ensure the stability and clarity of video, the choice of shooting equipment is very important. We should choose a high-resolution professional camera and equip it with a stabilizer to reduce jitter. The shooting environment needs sufficient light and simple background, avoiding shadows and interference factors. In post-production, the color and noise of the picture can be adjusted by professional video editing software, and the fluency and stability can be

enhanced by increasing the bit rate and frame rate, such as setting the bit rate to a higher level to prevent playback congestion and increasing the frame rate to 60 frames per second or more to make the picture more natural. Improving the interpretation process is the key to improving students' learning achievement, which can be promoted from three aspects. First, it adopts diversified forms of explanation, in addition to traditional oral explanation, combined with pictures, charts, animations and other AIDS, such as demonstrating the essentials of sports movements with animation, so that students can understand more intuitively. Second, vivid language and figurative metaphor are used to avoid obscure professional terms, and complex sports movements and concepts are transformed into contents that students can understand, such as comparing basketball dribbling to a "wand in the hand", which is convenient for students to remember and master. The third is to increase interactive links, set discussion parts and questions in the video to stimulate students' enthusiasm and teachers' timely feedback and evaluation. In addition, teachers should choose video materials and explanation methods according to the curriculum and students' reality. The video production team is responsible for technical work to ensure quality. The school regularly evaluates and improves teaching videos, collects students' feedback and conducts teacher training to enhance teachers' related skills and help improve the quality of teaching videos.

3. Strengthen the interaction and feedback mechanism

Creating interactive links and establishing timely feedback mechanism are of great significance to improving students' learning effect.

Creating interactive links can effectively encourage students to participate and communicate. Online teaching platform can allow students to ask questions to teachers and classmates at any time during their study, which can stimulate students' thinking and exploration spirit and promote exchanges and mutual assistance between students. For example, when explaining sports skills, students can ask exercise questions, other students share their experiences and answers, and teachers can supplement their guidance in time. At the same time, setting up a discussion area for students to discuss specific sports topics, such as wonderful events, new training methods, successful experiences of sports stars, etc., can expand students' sports knowledge, let them understand different viewpoints, and improve their expression ability and critical thinking. To ensure smooth discussion and questioning, rules can be formulated, such as requiring students to clarify the focus and background of the question; Arrange teachers or student managers to monitor and guide the dialogue and choose topics to help students communicate.

Establishing timely feedback mechanism is the key to improving learning effect. Teachers' timely reply and evaluation of students' problems and homework can make students feel concerned and supported and help them find out their shortcomings in time and adjust and improve. For students' questions, teachers can reply in text or record video answers on the platform; For homework, you can make detailed comments and scores, point out the advantages and disadvantages and make suggestions for improvement, such as evaluating the physical training plan submitted by students and giving specific suggestions on its rationality, feasibility and target method. To ensure timely and effective feedback, perfect processes and systems can be established, such as requiring teachers to respond to evaluation within a specific time; At the same time, students' feedback channels are established to let students evaluate teachers' feedback and help educators improve teaching methods.

8.2 Strengthen offline teaching guidance

1. Personalized training plan

A comprehensive physical fitness test is the basis of making a personalized training plan, which covers endurance, strength, speed, flexibility and other aspects. Students' physical fitness can be comprehensively mastered through 50-meter running, 1-minute skipping, leaning forward, 1-minute sit-ups, 50-meter× 8 turn-back running and other projects. Teachers need to comprehensively consider individual test results and students' performance in various tasks, so as to clarify students' strengths and weaknesses. For example, some students have good endurance but weak strength, while others have fast speed but poor flexibility, which are important basis for making personalized plans.

According to the test results, a training plan should be tailored for each student. For students with good endurance but insufficient strength, it is necessary to increase the proportion of strength training, arrange weightlifting, push-ups and other events and gradually increase the intensity, while appropriately reducing the frequency of endurance training but improving the quality, such as increasing the difficulty of interval training; For students with fast speed but poor flexibility, we should focus on strengthening flexibility training such as yoga and stretching, and at the same time pay attention to the technical improvement in speed training to enhance the stability and durability of speed. The training objectives, themes, skills and timetable should be clearly defined in the plan, such as strength training three times a

week, each time containing three different weightlifting movements and a fixed number of repetitions, and flexibility training twice a week for a specific time.

In the implementation of the plan, teachers should provide targeted help and guidance, correct students' irregular movements in time, avoid injuries and let students understand the action principle. At the same time, they should pay close attention to the training progress and adjust the plan according to the actual situation. If the progress is fast, it will increase the difficulty. If it is difficult, it will analyze the reasons and adjust the method or intensity. In addition, teachers can establish students' training files, record the results of physical fitness test, training plan and progress, and encourage students to monitor themselves and record their training feelings by comparing and evaluating the results, so as to better understand students' needs. Through these measures, we can provide students with practical personalized training plans, effectively improve their sports ability and help high school students develop their physical fitness in sports.

2. increase interaction and interest

Organizing group activities and sports competitions can effectively increase students' interaction and cooperation. Diversified group activities can be designed according to different sports and teaching contents, such as group tactical drills and competitions in basketball teaching, passing relay competitions in football teaching, etc. In these activities, students can not only improve their sports skills, but also learn to cooperate, communicate and coordinate. The school regularly holds basketball games, football games, track and field competitions and other events. Students participate on behalf of the class or the school, and work hard for the common goal, which can promote the contact between teachers and students and schools, and enhance the sense of collective honor and belonging. In order to ensure fairness and justice, detailed rules and referee systems need to be formulated, and professional physical education teachers or coaches can be invited as referees.

Adding gamification components to offline teaching can enhance the attraction and stimulate students' enthusiasm for participation. For example, running training designs "chasing games" and skipping teaching develops "jumping rope to catch dragons" games, so that students can exercise in a relaxed atmosphere and enhance their coordination and reaction ability. At the same time, modern technology can make teaching more attractive, such as using VR technology to let students experience virtual stadiums, monitoring and analyzing sports performance in real time through motion sensors and data analysis software, and providing personalized suggestions.

Teachers should reasonably design the contents and rules of activities and competitions according to students' age, gender and sports level, to ensure that they are both challenging and allow most students to participate. Prepare necessary sporting goods in advance to remind students to pay attention to safety to prevent accidents. After activities and competitions, teachers organize students to sum up and reflect, share gains and experiences, evaluate students' performance, praise outstanding individuals and groups, and encourage other students to learn. Through evaluation and feedback, students help improve their sports level and overall quality, and recognize their own advantages and disadvantages.

3. Strengthen technical guidance

Teachers should make full preparations before on-site teaching, study the technical points and common mistakes of various sports in depth, and make detailed teaching plans. In view of different sports such as running, jumping, throwing and ball games, the key technical actions and problems-prone links are clarified, such as the essentials of dribbling, passing and shooting in basketball teaching, the possible mistakes of students in walking and dribbling with both hands, and the key technologies and common problems in long jump teaching. Only by being familiar with these can teachers effectively help and correct students in teaching.

In on-site teaching, teachers should provide clear demonstrations, pay attention to the standardization, accuracy and consistency of actions, and let students observe from all angles through multi-angle display. For example, when teaching volleyball to serve, we can demonstrate it from the front, side and back, and we can also slow down and highlight the key links so that students can understand and imitate it.

When students practice, teachers should closely observe and find and correct mistakes in time. Focus on typical problems and give examples and give one-on-one guidance to individual problems. For example, if the students' starting posture in sprint is not correct, the teacher should demonstrate and emphasize the main points in person until the students master it. At the same time, arranging competitions, group and individual exercises and other forms can

increase students' practical opportunities and enthusiasm, and constantly give comments and encouragement in practice to enhance students' confidence. For example, in soccer shooting practice, group competitions and targeted feedback can not only improve motivation but also improve technical proficiency.

In addition, teachers should attach importance to cultivating students' self-correction ability, encourage them to observe their own and others' behaviors in their studies, and find and try to solve problems. For example, organize group discussion, let students point out the advantages and disadvantages of actions and make suggestions for improvement, help students learn to reflect on themselves and correct mistakes, and improve the learning effect. Through these measures, teachers can effectively strengthen technical guidance in on-site teaching, help students master correct movements, and improve sports effect and safety.

8.3 Promote online and offline integration

1. Establish a unified teaching platform

The development of comprehensive physical education teaching platform needs to pay attention to the combination of online and offline teaching resources. On the online resources, the platform can include a wealth of sports teaching videos, covering the basic action explanation, advanced skill demonstration and actual competition analysis of various sports, and can also set up an online course module, which is convenient for teachers to upload course videos and students to watch and learn at any time, and at the same time provide expanded resources such as sports articles and sports health tips. In terms of offline resources, the platform relates to the school sports facilities management system, which is convenient for students to inquire about the opening hours of venues and make reservations, and also supports teachers to publish information about offline teaching activities, such as the time and place of physical education class and the details of sports associations.

The platform should have the function of facilitating teachers' teaching management. Teachers can arrange homework and exams online, and the system automatically corrects objective questions and counts the results to reduce the workload. It can also track students' learning progress, know how long they watch teaching videos and the completion of homework, so as to give personalized guidance in time. At the same time, it can manage students' information and classes, upload its own teaching materials or select content from the platform resource library to integrate into personalized teaching plans.

For students, the platform should provide a convenient learning experience, support the formulation of learning plans, the selection of online courses and resources, set up a learning reminder function to help arrange time reasonably, and also allow students to interact with teachers and students in the discussion forum, establish a personal learning file to record the learning process and changes in grades, and intuitively see their own progress.

The platform should pay attention to the integration of online and offline to realize the smooth connection of teaching. For example, after watching online videos, students can make an appointment for offline practice courses to receive on-site guidance, and teachers can also adjust the focus and difficulty of offline teaching according to students' online learning. The evaluation integrates online learning and offline practice performance, and comprehensively and objectively evaluates students. Technically, it is necessary to ensure the stability and security of the platform, adopt complex server technology and data encryption technology, make the interface design simple and easy to use, and continuously improve the function and experience through the user feedback mechanism.

2. Synchronize the teaching progress

Teachers need to do a good job in many aspects to promote online and offline teaching. At the beginning of the semester, it is necessary to make a comprehensive curriculum plan, clarify the objectives, themes and online and offline teaching arrangements at all levels, and ensure the steady progress of teaching. Taking basketball teaching as an example, it can be divided into three stages: basic theoretical knowledge learning, basic technical training and tactical cooperation drills. Theoretical learning arranges online teaching, and students can understand basketball-related knowledge through video explanation and online discussion. Technical training and tactical drills are arranged offline for students to practice in the actual venue. In this way, teachers can clearly grasp the progress and ensure the interconnection of online and offline teaching materials.

It is also crucial to establish an effective communication mechanism. Teachers can use the feedback function of online teaching platform and class group chat to collect students' learning problems and suggestions, and plan frequent offline learning exchange activities to let students share the success or failure of online learning. Through these channels,

teachers can adjust teaching strategies and progress in time to meet the needs of students. For example, when most students have difficulty understanding a concept online, they can focus on explaining it or arrange extra online tutoring in offline teaching.

When arranging teaching content, we should pay attention to coherence and complementarity. Network teaching focuses on theoretical teaching, video demonstration and autonomous learning task arrangement. Teachers can make teaching videos explaining the essentials of sports techniques, ask questions to guide students to reflect on the dialogue, and students can evaluate the learning effect through online tests and homework after watching them. Offline teaching focuses on practical training, group cooperation activities, and on-site guidance. For example, in football teaching, students are organized to compete in groups, so that they can use the tactical skills they have learned, and teachers give immediate feedback and guidance to help students correct their deficiencies.

In addition, teachers can use the online teaching platform to integrate and share teaching resources, upload courseware, video materials and exercises for students to review and consolidate at any time, and use the statistical function of the platform to understand students' learning progress and grasp the situation, so as to optimize teaching methods, and also encourage students to exchange and share learning experiences on the platform and create a positive learning environment.

3. Interaction and complementarity

In teaching, online and offline interaction needs multi-dimensional promotion. Network teaching can pay attention to students' interaction through various measures, such as setting up a special online discussion area, launching discussion content for different sports or teaching topics, such as basketball teaching unit proposing "how to improve shooting percentage", students sharing practice methods, experiences and lessons, etc., and teachers regularly participate in guidance to stimulate thinking collision. You can also use group work mode to assign students sports-related tasks in groups, such as analyzing basketball game tactics and making physical exercise plans. Members can collaborate through online tools to cultivate teamwork and communication skills.

Offline teaching should strengthen face-to-face interaction between teachers and students, and teachers should establish more interactive contacts in class physical education. For example, after explaining new sports moves, students are invited to demonstrate, other students observe and comment, and then teachers sum up and correct them, which can not only find students' problems, but also enhance their sense of participation. For students' questions, teachers should answer them patiently in time and can reserve class time or respond between activities. In addition, organize small-scale sports competitions or activities to enhance the feelings of teachers and students in interaction and improve students' learning enthusiasm.

The results of online and offline interaction need to be transformed into each other. The common problems discussed online can be used as the key explanation and guidance content offline, and the innovative exercise methods put forward by students can be tried in the classroom. In offline teaching, students' performance, problems and solutions are sorted into cases and shared on the online platform. At the same time, students are urged to use what they have learned offline for online group projects.

Schools should establish and improve the evaluation mechanism to comprehensively evaluate students' online and offline interactive performance, including discussion enthusiasm, group task completion, offline classroom interaction, etc., so as to encourage students to actively participate, and teachers can also optimize teaching strategies and quality according to evaluation feedback.

4. Evaluation system integration

The establishment of the evaluation system of physical education teaching needs to clarify the evaluation contents and standards. Besides paying attention to the proficiency of students' physical education knowledge and skills, it should also include learning attitude, participation and teamwork ability. In the online teaching part, the students' watching time of teaching videos (for example, no less than a certain time per week is required), their enthusiasm for participating in online chat (according to the number and quality of speeches) and the completion of online homework (grading in detail) are evaluated. In the offline teaching part, students' physical education class performance, enthusiasm for participating in sports activities and actual mastery of sports skills are evaluated, including observing their performance in class, observing discipline and performance in sports competitions, and testing and scoring sports skills.

Adopt diversified evaluation methods, combining teacher evaluation, student self-evaluation and mutual evaluation to ensure comprehensive justice. Teachers evaluate students' classroom performance and homework completion; Students' self-evaluation can reflect on their learning attitude, efforts and progress; Students' mutual evaluation can promote communication and learning and clarify their own advantages and disadvantages. For example, in the sports skill test, self-evaluation, group mutual evaluation and teachers' comprehensive evaluation can help students master the learning results and cultivate self-management and teamwork skills.

The use of information technology can improve efficiency and accuracy of evaluation. With the help of special physical education teaching evaluation tools, students' online and offline learning data can be integrated and analyzed, and learning time, homework completion, test scores and so on can be automatically counted and detailed reports can be generated. Based on this, teachers can keep abreast of students' situation, find problems and adjust teaching methods; Students can also check the evaluation results and make clear the advantages and disadvantages of modifying the study plan. At the same time, support the training of teachers, make them master the relevant evaluation technology, information technology and evaluation system content standards, establish a supervision system, and set up a special evaluation steering group to supervise and inspect, to ensure the fairness of evaluation.

According to the evaluation results, it can provide a basis for teaching improvement. Teachers can analyze the problems and deficiencies in students' learning and adjust the teaching contents and methods. If students have common problems in a certain sport technology, follow-up teaching should strengthen the training of the sport; Students' learning attitude is not positive, so we can carry out incentive activities and strengthen ideological education to improve their enthusiasm.

9. Practical Implications

1. Physical education teachers should integrate online video demonstrations with offline technical correction to enhance teaching effectiveness.
2. Educational policymakers should strengthen ICT infrastructure and provide training for teachers to support blended physical education implementation.
3. Schools should develop personalized blended physical education programs based on students' physical fitness levels and interests.

10. Prospects

Online physical education provides a broad space for enhancing the physical quality of senior high school students in China. In terms of teaching strategies, we can explore new ways of online and offline integration, develop intelligent platforms to customize personalized programs, and use virtual reality and other technologies to enhance learning experience and participation.

In terms of resource optimization, it is necessary to enrich interactive resources such as sports games and online competitions, increase learning fun, cultivate competitive awareness and team spirit, and improve resource quality control. The evaluation system should be improved, and indicators such as cardiopulmonary function and muscle endurance should be added, and students' health data should be analyzed in combination with big data to provide scientific evaluation and lesson preparation basis. We should also strengthen the information technology training of physical education teachers, improve their literacy through training courses and seminars, help the implementation of online and offline integrated teaching, and promote the development of online physical education teaching.

11. Conclusion

This study focuses on the online physical education instruction scheme to improve the physical quality of senior high school students in China. Literature review, questionnaire survey and interview were used. Combined with the data collected by questionnaire survey Star and analyzed by SPSS, this paper discusses the promoting effect of online sports teaching video course on high school students' physical fitness, students' cognition and teachers' cognition. From relevant teaching guidance suggestions.

1. This study developed a set of online physical education courses consisting of 10 units, covering basic physical exercises, running and jumping, ball games and other projects. It adheres to the principles of student-centered, systematic and interactive. After expert evaluation, the curriculum design has good consistency, and the IOC values all exceed 0.5, which is feasible to implement. It provides structured online learning resources for improving the physical quality of senior high school students. Meet the learning needs of students with different sports interests and skill levels.

2. Through experiments and questionnaires, this study found that online and offline integrated teaching has a significant effect on improving the physical fitness of senior high school students. The experimental group has made greater progress, and the progress in physical fitness tests such as 50-meter running and one-minute skipping is higher than that in the control group which only accepts offline teaching. Students have a high recognition of the richness of online courses and the ease of teaching methods, and most of them agree with the advantages of online and offline integration mode. Parents are also very supportive of family exercise, which confirms the positive role of online video-assisted teaching in improving sports performance.

3. This study puts forward an effective online physical education teaching guidance scheme, including systematically grasping curriculum logic, designing guidance questions, strengthening offline action correction and other teaching implementation suggestions, and defines the online and offline resources and teaching effect measurement methods from the aspects of physical fitness, cognition and teaching cognition, so as to provide practical reference for the innovation and optimization of high school physical education teaching mode. It is helpful to improve teaching quality and students' physical quality.

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