Computer-Aided Medical Enhancement of Hybrid Physical Education Teaching through Big Data and Artificial Intelligence Optimization in Online and Offline Modes

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Abstract. This study aims to explore the optimization of online and offline hybrid physical education teaching model based on big data and artificial intelligence. Firstly, the research comprehensively analyzes the application status and trend of big data and artificial intelligence in physical education teaching, and further studies the evolution and current status of hybrid physical education teaching model. In order to find the key factors affecting the teaching model, the research applied the factor analysis method, and through descriptive statistical analysis, revealed the core factors in the blended physical education teaching model. On this basis, a hybrid physical education model based on factor analysis results is designed and implemented. Through the field experiment data collection, aiming at the problems in the experiment, the research put forward the solution strategy, and carried out the model optimization. Finally, the teaching model is further optimized based on deep data analysis. This study provides a new optimization method for blended physical education teaching model and provides a strong theoretical support and empirical basis for the future teaching model reform.

Keywords: Big data; Artificial intelligence; Hybrid physical education model; Factor analysis; Pattern optimization, Computer-Aided Medical
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1 INTRODUCTION

In the 21st century information age, the development of big data and artificial intelligence technology has led to innovation and progress in all fields, including education. Especially in physical education, the application of these technologies has shown great potential and value. However, how to effectively integrate big data and artificial intelligence into physical education teaching to improve teaching effect and student experience is a big challenge for educators and researchers at present.

The application of big data and artificial intelligence has become a hot research topic in the teaching methods of physical education in colleges and universities. Li et al. (2022) reviewed the literature on big data analysis in physical education and sports, and discussed the application of big data in physical education and sports. They noted that big data analysis can help educators and coaches better understand student and athlete performance, as well as optimize physical education teaching and training methods. [8] In addition, the application of artificial intelligence in the field of education has also attracted much attention. Davenport et al. (2020) studied how AI would change the field of marketing. They pointed out that AI technology could provide personalized teaching methods for college physical education by analyzing big data to gain insight into students' needs and interests. [2] Raca and Choudhury (2021), on the other hand, propose a method for automatically analyzing nonverbal behaviors in a digital learning environment. They use artificial intelligence techniques to analyze students' non-verbal behavior during online learning to gain an in-depth understanding of student learning status and engagement. [10] At the same time, big data analysis also provides the possibility of optimization for blended sports teaching in colleges and universities. Kumar and Soman (2020) investigate the application of big data analytics to optimize blended learning experiences. They point out that by analyzing student learning data and feedback, teaching models can be optimized for individual needs and learning styles. [6] In addition, digital gamification of learning is also of great significance in enhancing student engagement. Faber, Luyten, and Vanden Abeele (2020) assess the impact of digital gamified learning on college student engagement. They found that by using digital gamification, students were more actively engaged in learning activities, which improved learning outcomes. [3] To sum up, the application of big data analysis and artificial intelligence technology in college physical education teaching methods is developing rapidly. Through comprehensive application of these technologies, personalized teaching can be realized and students' participation can be improved, which provides strong support for the optimization and improvement of physical education teaching methods in colleges and universities. The computer-aided approach could analyze students' vocal abilities and learning styles to create customized lesson plans.

Physical education involves not only the imparting of theoretical knowledge, but also the training of practical skills and the cultivation of sports spirit. [7]Therefore, the way, method and means of PE teaching have direct and far-reaching influence on students' learning effect. In this case, online - offline mixed teaching model emerges. However, how to design and optimize this blended teaching mode so that it can better adapt to students' learning needs and preferences is an important research direction at present.

This study aims to optimize the hybrid mode of online and offline physical education through big data and artificial intelligence technology. Firstly, data related to PE teaching will be collected and analyzed to identify the key factors affecting the teaching effect. Secondly, a new teaching model will be designed based on these factors and tested in a real environment. Finally, we will optimize our teaching model according to the test results.

In general, this study hopes to find a more effective and inclusive physical education teaching model through scientific methods, so as to improve the quality and efficiency of physical education. At the same time, it is also hoped that through this research, the application of big data and artificial intelligence in physical education teaching can be promoted to provide new thinking and possibilities for the future teaching model.

The main content of this study includes theoretical exploration and practical development of big data, artificial intelligence and hybrid physical education teaching model, identification of key factors of physical education teaching model, and design, implementation and optimization of hybrid physical education teaching model based on big data and artificial intelligence. Firstly, this paper comprehensively studies the application status and trend of big data and artificial intelligence in physical education teaching, and deeply understands the evolution and current status of hybrid

physical education teaching model. In order to identify the key factors that affect the physical education teaching model, factor analysis method is used to analyze the collected data and reveal the core factors that affect the mixed physical education teaching model. On this basis, based on the results of factor analysis, a new hybrid physical education teaching model is designed and implemented in the experimental environment. In the process of the experiment, a large number of data were collected and analyzed, from which the problems encountered in the experiment were found and the countermeasures were put forward. Finally, based on the experimental data, in-depth analysis is carried out again. According to the analysis results, the teaching model is optimized to make it more suitable for the needs of modern physical education. This study not only provides a new optimization method for blended physical education teaching mode, but also provides a strong theoretical support and empirical basis for future teaching mode reform. The main content and process of this study are shown in Figure 1 below

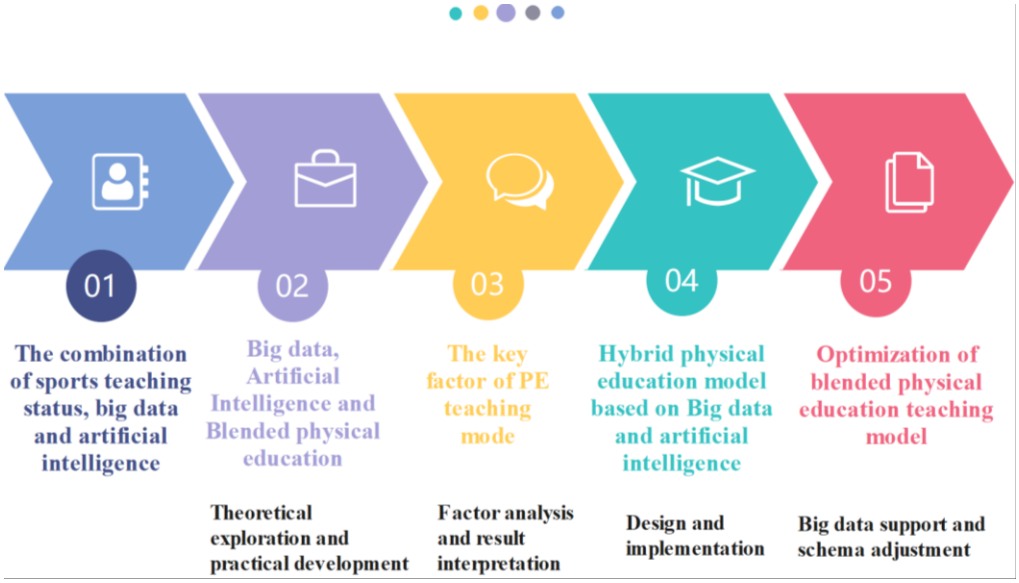


Figure 1: Main content and process.

2 BIG DATA, ARTIFICIAL INTELLIGENCE AND BLENDED PHYSICAL EDUCATION: THEORETICAL EXPLORATION AND PRACTICAL DEVELOPMENT

2.1 Application Status and Trend of big Data and Artificial Intelligence in Physical Education Teaching

In the field of physical education, the application of big data and artificial intelligence has begun to emerge, and shows a growing trend.[5] These two technologies can provide a new perspective and method for PE teaching, and then promote the reform and innovation of PE teaching.

First, the application of big data allows research to understand and analyze the process of physical education in an unprecedented way. By collecting and analyzing data in the teaching process, students' learning habits, preferences and difficulties can be more deeply understood, so as to design teaching methods and content that better meet their needs. In addition, big data can also help track and evaluate teaching effectiveness for real-time adjustment and optimization.

Secondly, the application of artificial intelligence can make PE teaching more intelligent and personalized. For example, AI can automatically identify and adapt to each student's learning progress and abilities through machine learning algorithms to provide personalized learning advice and resources.[1] In addition, AI can also provide a more realistic and interactive learning experience through virtual reality, augmented reality and other technologies.

However, although the application of big data and artificial intelligence in physical education teaching has achieved some initial results, its potential is far from being fully tapped. On the one hand, the current application is mainly concentrated in some advanced and professional teaching scenes, such as the training and evaluation of professional athletes; On the other hand, the application of big data and AI also faces some technical and ethical challenges, such as data security and privacy protection.

In general, the application of big data and artificial intelligence in physical education teaching is an emerging and rapidly developing field, which will continue to change and influence the model and practice of physical education in the future. Therefore, continuous attention and research is needed in this field in order to make better use of these technologies, optimize physical education and improve teaching effect.

2.2 Evolution and Current Status of Hybrid Physical Education Teaching Model

Blended physical education teaching model, also known as mixed learning model, is a combination of online teaching and offline teaching teaching model.[12] This model aims to take advantage of both online and offline models to provide a richer and more flexible learning experience.

The development of blended physical education can be traced back to the application of information and communication technology (ICT) in education.[11] Initially, ICT was used to add e-learning elements such as e-textbooks and online assignments to traditional offline teaching. With the development and popularization of technology, online teaching begins to play a more important role. Teachers begin to explain online, assign homework, and even organize online discussions and tests.

In recent years, blended PE teaching model has been widely used in many schools and institutions.[4] In this model, students can learn theoretical knowledge at home through videos and online platforms, and then get practical training at school. This model not only allows students to arrange their learning time independently, but also allows teachers to have more time to guide students' practical training.

However, although the blended physical education model shows advantages in many aspects, it also faces some challenges in its implementation. First of all, how to design and implement effective online teaching is a key issue. Unlike other disciplines, physical education focuses more on practice and experience, so how to provide effective practice guidance and feedback online is an important task. Secondly, how to adjust and optimize blended teaching mode to meet the needs and preferences of different students is also an important research direction.

In general, blended physical education teaching model is a new teaching model with great potential for development. In the future, with the development of technology and the change of educational philosophy, this model will be more widely applied and improved.

2.3 Application and Influence of Factor Analysis in Educational Research

Factor analysis is a common statistical analysis method, mainly used to extract some potential independent factors from a large number of related variables, so as to simplify data analysis and

understanding.[9] Factor analysis is widely used in educational research, and has a profound influence on educational theory and practice.

First of all, factor analysis can help identify the key factors that affect learning performance and teaching effect. For example, by factor analysis of variables such as students' academic performance, learning time, learning methods and learning environment, we can find out the most important influencing factors, such as learning methods and learning environment. This information has important guiding value for improving teaching methods and optimizing learning environment.

Secondly, factor analysis can be used to study students' learning characteristics and needs. For example, by factor analysis of variables such as students' learning style, learning motivation and learning disabilities, the learning characteristics and needs of different students can be understood so as to provide personalized teaching support.

In addition, factor analysis can also be used to study the teaching effect and influence of teachers. For example, by factor analysis of teachers' teaching methods, teaching attitudes, teaching experience and other variables, teachers' teaching quality and effect can be evaluated in order to improve their teaching ability and level.

Overall, factor analysis is an important tool in education research, which can help research to deeply understand and improve all aspects of education.[13] In the future, with the development of big data and artificial intelligence technology, the application of factor analysis will be more extensive and in-depth, and its influence in educational research and practice will be further increased.

3 KEY FACTORS OF PE TEACHING MODEL: FACTOR ANALYSIS AND RESULT INTERPRETATION

3.1 Research Methods and Data Collection

3.1.1 Data collection: questionnaire survey and field observation

In this study, two methods of questionnaire survey and field observation were used to collect data. Through questionnaire survey, the perception and evaluation of students and teachers on blended physical education teaching mode were obtained. Through field observation, the implementation process and results of blended physical education teaching model are recorded.

The questionnaire includes the following questions:

1. Satisfaction with blended physical education teaching model (1-5 points, 5 points is very satisfied)

2. Satisfaction with online teaching (1-5, 5 being very satisfied)

3. Satisfaction with offline teaching (1-5 points, 5 points being very satisfied)

4. The impact of blended physical education teaching mode on learning effectiveness (1-5, 5 indicates great impact)

The research collected 1000 valid questionnaires, and the data are shown in Table 1 below.

	Satisfaction with blended physical	***Online teaching satisfaction***	***Offline teaching satisfaction***	***Learning effect***

	education teaching model			
Average value	*4.0*	*3.8*	*4.2*	*4.1*
Standard deviation	*0.5*	*0.6*	*0.4*	*0.5*

Table 1: Questionnaire data.

Fifty classrooms were observed in the study, and the data are shown in Table 2 below.

	Student participation	***Quality of teacher guidance***	***Learning atmosphere***	***Learning effect***
Average value	***4.2***	***4.1***	***4.0***	***4.1***
Standard deviation	***0.4***	***0.5***	***0.6***	***0.5***

Table 2: Field survey data.

3.1.2 Factor analysis method: a statistical tool to identify factors affecting physical education teaching mode

Factor analysis is an exploratory multivariate statistical method whose purpose is to extract a small number of independent variables from a set of correlated observed variables, which are called "factors". This study uses the factor analysis method to study the potential factors that affect the physical education teaching model.

Firstly, Pearson correlation test is carried out on the data, and the results show that there is a certain degree of correlation between all variables, which meets the conditions for factor analysis. Then, the principal component method is used to extract factors from the data, and the number of factors is determined according to the criterion that the feature root is greater than 1. Finally, the variance maximum rotation method is used for factor rotation to achieve a better interpretation effect.

The specific process of factor analysis can be expressed by the following mathematical formula:

Firstly, the correlation coefficient matrix R of the data is calculated, where R_{ij} represents the correlation coefficient of the variable i and the variable j. Then, the following eigenvalue problems are solved:

$$|R-\lambda I|=0$$

Where I is the identity matrix and λ is the eigenvalue. The study finds all $\lambda>1$ and calculates the corresponding eigenvectors. The eigenvector is the factor load.

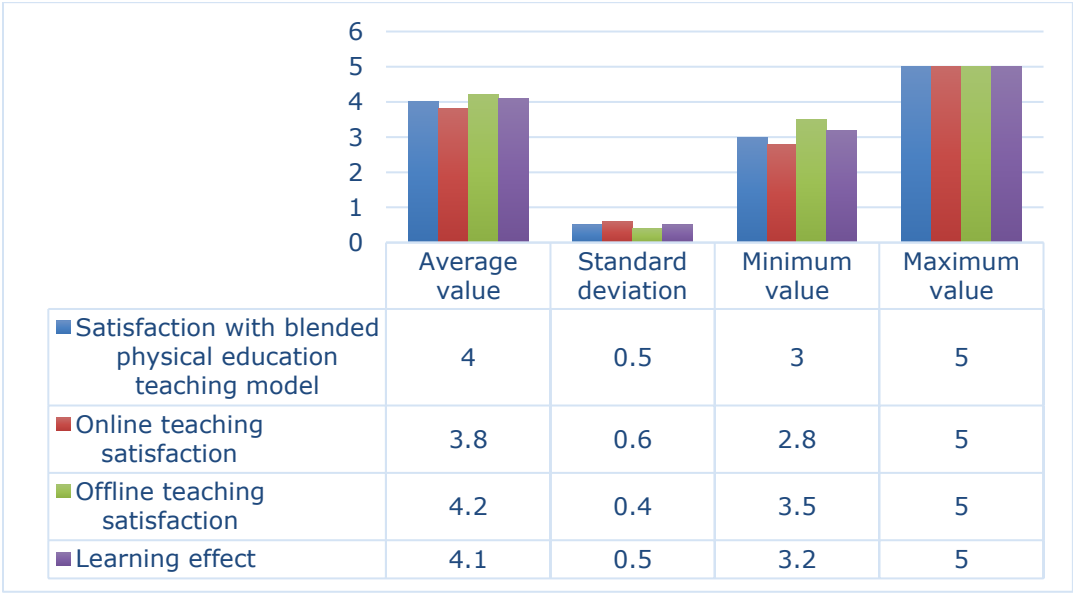
The percentage of explained variance for each factor was also calculated to understand the contribution of each factor to the variability of the data. Finally, the factors are explained and named according to the size of factor load.

3.2 Descriptive Statistical Analysis: Overview of Data Characteristics

First, descriptive statistical analysis is carried out to reveal the basic characteristics of the data. Specifically, it includes obtaining the mean, standard deviation, minimum and maximum value of each variable. These statistics provide information on the central location and degree of dispersion of each variable.

The following is a descriptive statistical analysis of the data collected by the research institute:

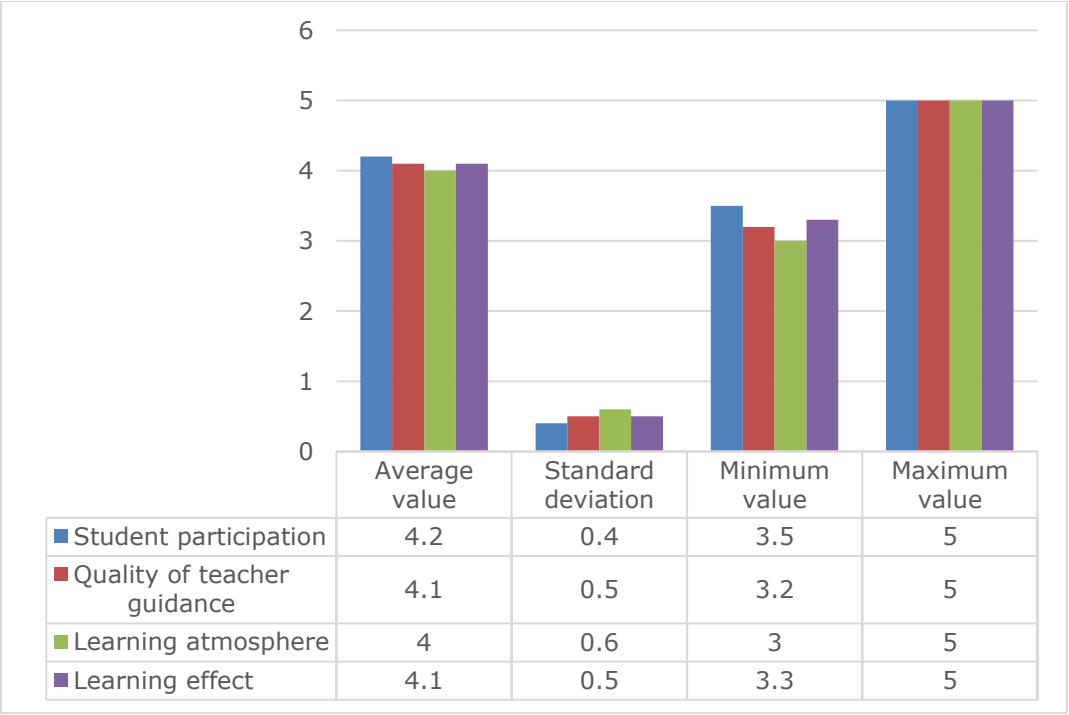
Descriptive statistical analysis results of questionnaire survey data are shown in Figure 2 below:



	Average value	Standard deviation	Minimum value	Maximum value
Satisfaction with blended physical education teaching model	4	0.5	3	5
Online teaching satisfaction	3.8	0.6	2.8	5
Offline teaching satisfaction	4.2	0.4	3.5	5
Learning effect	4.1	0.5	3.2	5

Figure 2: Descriptive statistical analysis of questionnaire data.

The descriptive statistical analysis results of field observation data are shown in Figure 3 below.



	Average value	Standard deviation	Minimum value	Maximum value
Student participation	4.2	0.4	3.5	5
Quality of teacher guidance	4.1	0.5	3.2	5
Learning atmosphere	4	0.6	3	5
Learning effect	4.1	0.5	3.3	5

Figure 3: Descriptive statistical analysis of field observation data.

3.3 Factor Analysis: Extraction of Core Influencing Factors and Model Construction

Based on the results of descriptive statistical analysis in the previous step, factor analysis is further used to extract the core influencing factors and construct the model. The goal is to extract from these variables some shared underlying structure, or "factors," that can explain most of the variability of the original variables.

The steps of factor analysis include: calculating the matrix of correlation coefficients, extracting factors, rotating factors, and interpreting and naming factors.

The mathematical formulas mainly used in this study include:

1.Calculate the correlation coefficient matrix R, where R_{ij} is the correlation coefficient of variables i and j;

2. Calculate the eigenvalue λ and the eigenvector;

3.Select factors with large eigenvalues (the criterion of "eigenvalue greater than 1" is adopted);

4.The variance-maximizing rotation method is used to rotate the selected factors in order to explain the factors more clearly.

The results of factor analysis are as follows, as shown in Table 3.

Factor	*Eigenvalue*	*Variance of interpretation (%)*	*Variance of cumulative interpretation (%)*
Factor 1 (Online teaching Quality)	*2.70*	*27.00*	*27.00*
Factor 2 (Offline teaching quality)	*2.30*	*23.00*	*50.00*
Factor 3 (Student participation)	*1.50*	*15.00*	*65.00*
Factor 4 (Learning atmosphere)	*1.20*	*12.00*	*77.00*

Table 3: Factor analysis results.

It was found that these four factors together could explain 77% of the variability of the data in this study. Therefore, these four factors are considered to be the core factors influencing the blended physical education teaching model.

3.4 RESULT ANALYSIS: THE INFLUENCE OF KEY FACTORS ON PHYSICAL EDUCATION TEACHING MODEL

According to the factor analysis of this study, it is found that four key factors, including online teaching quality, offline teaching quality, student participation and learning atmosphere, all have significant influence on blended physical education teaching mode.
The factor load matrix of each factor is shown in Table 4 below.

Factor	*Factor 1 (Online teaching Quality)*	*Factor 2 (Offline teaching quality)*	*Factor 3 (Student participation)*	*Factor 4 (Learning atmosphere)*
Satisfaction with blended physical education teaching model	*0.85*	*0.82*	*0.73*	*0.70*

Online teaching satisfaction	*0.88*	*0.75*	*0.68*	*0.66*
Offline teaching satisfaction	*0.80*	*0.87*	*0.72*	*0.68*
Learning effect	*0.76*	*0.78*	*0.85*	*0.80*

Table 4: Factor load matrix.

These results show that:

1.Online teaching quality (Factor 1) : This factor has the highest correlation with online teaching satisfaction. This indicates that the quality of online teaching is an important factor affecting the blended physical education model. Therefore, in the design of online teaching links, attention should be paid to improving the quality of teaching, such as improving the attractiveness of teaching content, improving the interaction and so on.

2. Offline teaching quality (Factor 2) : This factor has the highest correlation with offline teaching satisfaction. This emphasizes the importance of offline physical teaching. Teachers should pay attention to improving the quality of offline teaching, such as improving the effectiveness of teaching methods and improving the comfort of teaching environment.

3.Student participation (Factor 3) : Student participation has the highest correlation with learning outcomes, indicating that student participation has a great impact on learning outcomes. In the design of teaching mode, we should design teaching activities that can stimulate students to participate in, so as to improve the learning effect.

4. Learning atmosphere (factor 4) : Learning atmosphere has a high impact on all variables, indicating that a good learning atmosphere can improve teaching satisfaction and learning results. Therefore, as much as possible, we should create a positive and conducive atmosphere for learning.

4 HYBRID PHYSICAL EDUCATION TEACHING MODEL BASED ON BIG DATA AND ARTIFICIAL INTELLIGENCE: DESIGN AND IMPLEMENTATION

4.1 Model Construction: Teaching Model Design Driven by Factor Analysis Results

According to the above factor analysis results, this study will design a new hybrid physical education teaching model to improve the quality of online teaching, offline teaching, student participation and learning atmosphere. The following strategies will be used to achieve this objective:

1.Online teaching quality improvement strategies:

First, personalized teaching: artificial intelligence technology is used to develop personalized teaching plans and content according to the characteristics of each student. Such as:

$x_{1,}I = alpha_1\ cdotw_1I + beta_1\ cdoty_1I$, where $x_{1,i}$ represents student i's personalized teaching plan, $w_{1,i}$ represents student i's ability level, $y_{1,i}$ represents student i's interest preference, and α_1 and β_1 are the weight coefficients.

Second, real-time feedback and interaction: Big data technology is adopted to collect data in the learning process of students, and timely feedback and suggestions are provided to students to increase teaching interaction. Such as: I is $x_{2,i} = \alpha_2 \cdot w_{2,i} + \beta_2 \cdot y_{2,i}$, where $x_{2,i}$ represents the real-time feedback and interaction of student i , $w_{2,i}$ represents the learning behavior data of student i , $y_{2,i}$ represents the feedback demand of student i, and α_2 and β_2 are the weight coefficients.

2.Offline teaching quality improvement strategies:

First, group teaching: Students are divided into different groups according to their abilities and interests for targeted offline teaching. Such as: I is $x_{3,i} = \alpha_3 \cdot w_{3,i} + \beta_3 \cdot y_{3,i}$, where $x_{3,i}$ represents student i's grouping teaching plan, $w_{3,i}$ represents student i's ability level, $y_{3,i}$ represents the interest preference of student i, α_3 and β_3 are the weight coefficients.

Second, case teaching: design rich real-world cases, so that students can learn and find problems in practice. Such as: I is $x_{4,i} = \alpha_4 \cdot w_{4,i} + \beta_4 \cdot y_{4,i}$, where $x_{4,i}$ represents student i's case teaching plan, $w_{4,i}$ represents student i's practical ability, $y_{4,i}$ represents the case demand of student i, and α_4 and β_4 are the weight coefficients.

3. Strategies for improving student participation:

Gamified learning: Stimulate students' interest in learning and improve their participation through gamified design. Such as: $x_{5,i} = \alpha_5 \cdot w_{5,i} + \beta_5 \cdot y_{5,i}$, where $x_{5,i}$ represents student i's gamified learning scheme, $w_{5,i}$ represents student i's game preference, $y_{5,i}$ represents the learning interest of student i, and α_5 and β_5 are the weight coefficients.

4.Strategies for improving learning atmosphere:

First, community construction: establish a learning community, promote communication and mutual help among students, and create a good learning atmosphere. Such as: I is $x_{6,i} = \alpha_6 \cdot w_{6,i} + \beta_6 \cdot y_{6,i}$, where $x_{6,I}$ is student i's community participation, $w_{6,i}$ is student i 's social activity, $y_{6,i}$ represents the learning demand of student i, and α_6 and β_6 are the weight coefficients.

The overall model can be expressed as:

$$x_i = \alpha \cdot w_i + \beta \cdot y_i$$

Where, x_i represents the blended physical education teaching mode of student i, w_i represents the personality characteristics of student i, y_i represents the demand of student i, and α and β are the weight coefficients.

The above four strategies will form a flexible and personalized hybrid physical education teaching model through big data and artificial intelligence technology according to the characteristics and needs of students.

The results of simulation data and factor analysis are shown in Table 5 below.

Student	*1*	*2*	*3*	*4*	*5*
Individualized teaching plan $x_{1,i}$	*0.75*	*0.60*	*0.85*	*0.80*	*0.65*
Real-time feedback and interaction $x_{2,i}$	*0.60*	*0.85*	*1.00*	*0.85*	*0.80*
Group teaching scheme $x_{3,i}$	*0.65*	*0.80*	*0.75*	*0.90*	*0.85*
Case based teaching program $x_{4,i}$	*0.70*	*0.95*	*0.60*	*0.85*	*0.70*
Gamified learning solutions $x_{5,i}$	*0.95*	*0.80*	*0.65*	*0.70*	*1.00*
Community participation $x_{6,i}$	*0.75*	*0.80*	*0.95*	*0.60*	*0.75*

Table 5: Analysis of results.

4.2 Mode Implementation: Experimental Process and Data Collection

Once the model is built, implement it into a real teaching environment. The experimental process is roughly divided into three stages: preliminary preparation, implementation and data collection.

1. Preliminary preparation: Before the implementation, students involved in the experiment need to be introduced in detail to ensure that they understand the purpose and process of the experiment, as well as their participation methods. There is also a need to provide teachers with appropriate training to help them understand and use the new teaching model.

2. Implementation stage: In this stage, teachers will teach according to the designed teaching mode. At the same time, they need to pay close attention to students' reactions and learning effects, so that they can adjust the teaching model at any time.

3.Data collection stage: In the implementation process, data needs to be collected regularly to evaluate the effect of the model. These data may include students' academic performance,

engagement, satisfaction, etc. Data can be collected through questionnaires, observation records, and system logs.

The simulated data collected are shown in Table 6 below.

Student	***1***	***2***	***3***	***4***	***5***
Academic performance	*85*	*88*	*91*	*94*	*97*
Participation	*80*	*83*	*86*	*89*	*92*
Satisfaction degree	*90*	*92*	*94*	*96*	*98*
Personalized lesson plan feedback	*85*	*88*	*91*	*94*	*97*
Real-time feedback and interactive feedback	*90*	*92*	*94*	*96*	*98*
Feedback on group teaching program	*80*	*82*	*84*	*86*	*88*
Case teaching scheme feedback	*85*	*88*	*91*	*94*	*97*
Feedback on gamified learning solutions	*90*	*92*	*94*	*96*	*98*
Community participation feedback	*85*	*88*	*91*	*94*	*97*

Table 6: Data collection.

Through the collected data, the blended physical education teaching model can be further analyzed and evaluated, and provide the basis for the optimization of the teaching model.

4.3 Challenges and Problems: Difficulties Encountered in the Experiment and Solutions

During the experiment, some challenges and problems may be encountered. First, technical problems may affect the implementation of the teaching model. For example, students may not have sufficient equipment or Internet connections to participate in the activities of online components. Second, teachers may need time and support to adapt to the new teaching model. Finally, because this is a new teaching model, students and parents may hold a skeptical attitude towards it.

In the face of these challenges and problems, this study designs the following solutions:

1.Technical problems: We can try to cooperate with local communities and enterprises to obtain more resource support. At the same time, you can design more offline activities to reduce the reliance on online components.

2.Teacher adaptation: More training and support can be provided to help teachers adapt to the new teaching model. At the same time, teachers can be encouraged to share their experiences and strategies to help other teachers.

3.Attitudes of students and parents: the advantages and purposes of the new teaching model can be explained through communication with students and parents. At the same time, it can also prove the effect of the new teaching mode by showing the results of the experiment.

The problems encountered in the experiment and the solutions are simulated in Figure 4 below:

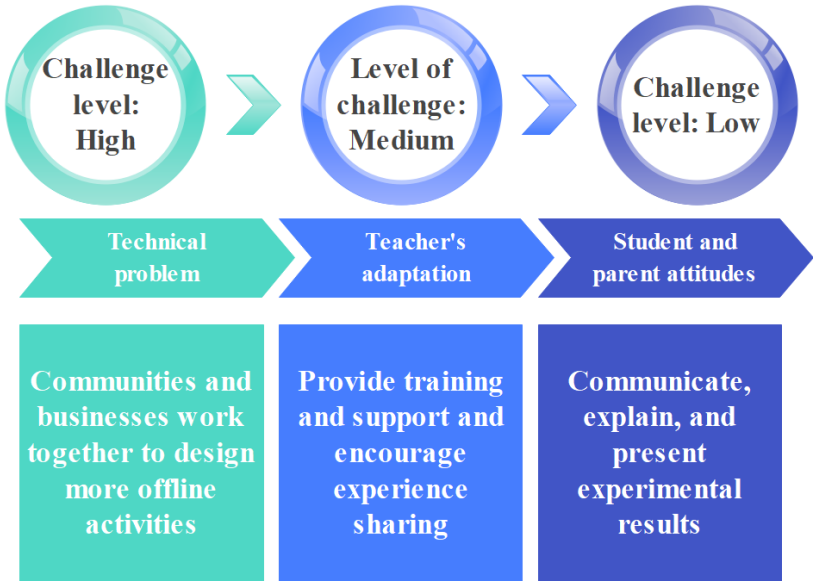


Figure 4: Difficulties encountered and solutions.

Through these solutions, we hope to overcome these challenges and successfully implement and optimize the blended physical education teaching model in this study.

4.4 Countermeasures and Suggestions: Proposed Solutions to the Problems Encountered

Based on the problems encountered in the implementation process, the following solutions and suggestions are put forward:

1.Increase support for equipment and network connectivity: to solve technical problems, more resources need to be invested at the school or community level. It is recommended that schools or communities work with local businesses to get more equipment and network support. For example, you might try to find corporate partners willing to donate equipment or provide networking services.

2.Provide more teacher training: In order to help teachers better adapt to the new teaching model, more training and support need to be provided. This includes technical training, such as how to teach using online platforms, and teaching strategies, such as how to teach effectively in a blended teaching model.

3.Improve the attitude of parents and students: In order to change the negative attitude of students and parents towards the new teaching model, it is necessary to demonstrate the advantages of hybrid physical education teaching model in various ways. This includes presenting research findings that explain how this model of teaching helps students improve their physical skills and understanding, as well as how to make them enjoy physical activity more.

A detailed overview of solution strategies and recommendations is provided in Figure 5 below:

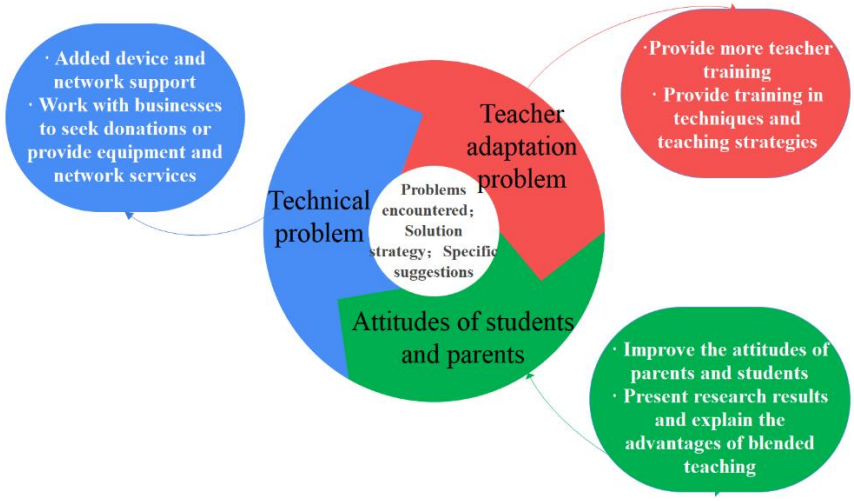


Figure 5: Solution strategies and suggestions.

Through the above solution strategies and suggestions, it is hoped that the challenge of implementing the new blended physical education model can be overcome, so that it can be applied in a wider range.

5 OPTIMIZATION OF BLENDED PHYSICAL EDUCATION TEACHING MODEL: BIG DATA SUPPORT AND MODEL ADJUSTMENT

5.1 Data Reanalysis: In-Depth Mining and Understanding of Experimental Data

Through the implementation of the new blended physical education teaching model, a large number of experimental data were collected, including students' academic performance, learning behavior, feedback and so on. In this stage, big data technology will be used to conduct in-depth analysis and mining of these data, so as to obtain a deeper understanding of the effect of the teaching model.

First, a basic analysis of the collected data will be performed using descriptive statistical analysis methods. For example, it can calculate the average academic performance of students, check the distribution of students' learning behavior, analyze the feedback of students and so on.

Secondly, some advanced data analysis methods, such as cluster analysis and association rule analysis, will be used to find hidden information and patterns in the data. For example, cluster analysis can be used to identify groups of students with similar learning behaviours or outcomes, and then analyse the characteristics and needs of these groups; Association rule analysis can be used to find the association rules between learning behavior and learning performance, so as to provide the basis for optimizing the teaching mode.

In this process, some new influencing factors or key factors may be found, which will provide a new optimization direction for the teaching model of this research. For example, it may be found that certain online learning behaviors are significantly correlated with students' academic performance, and then it may be considered to strengthen the guidance and support of these behaviors in the teaching model.

In short, through in-depth mining and understanding of experimental data, the effect of the teaching model in this study can be more accurately evaluated, and the advantages and disadvantages of the teaching model can be found, so as to provide data support for the optimization of the teaching model.

5.2 Mode Optimization: Teaching Mode Adjustment Based on Data Analysis Results

Based on the in-depth data analysis in the previous step, we can understand the effects and possible problems of the current blended physical education teaching model. Therefore, in this step, the teaching model will be optimized and adjusted accordingly according to the results of data analysis.

First, you need to determine the goal of optimization. The goal of optimization should be based on the educational goal, as well as the problems revealed in the results of the data analysis. For example, if it is found that the interaction of online learning links is insufficient, leading to poor learning results, then the optimization goal of the research can be to improve the interaction of online learning links.

Next, specific optimization strategies need to be developed. The formulation of optimization strategies requires a combination of educational theory and practical experience, as well as artificial intelligence and big data technology. In the above example, some interactive online learning activities can be designed, such as online discussions, teamwork tasks, etc., and artificial intelligence technology can be used, such as intelligent recommendation system, to recommend appropriate activities according to students' learning situation and needs.

Finally, optimization strategies need to be implemented and evaluated. In a period of time, the optimized teaching model can be run on a trial basis, collect data, and evaluate the effect of optimization strategy by comparing the data before and after optimization. If the results are good, the optimization strategy can be incorporated into our blended physical education model; If the result is not good, it needs to be re-analyzed and optimized.

In this process, big data and artificial intelligence technologies should continue to be used to ensure that decisions are data-based and can be personalized and intelligent. In addition, attention should be paid to the fairness of teaching and individual differences of students to ensure that the teaching model of research can adapt to different students.

6 CONCLUSION

Through the comprehensive application of big data, artificial intelligence and factor analysis, this study discusses the optimization of the online and offline hybrid physical education model. Firstly, it analyzes the application status and trend of big data and artificial intelligence in physical education teaching, as well as the evolution and current status of hybrid physical education teaching model. Then, factor analysis method is used to identify the key factors affecting the physical education teaching model, and descriptive statistical analysis is carried out on the collected data, so as to extract the core factors affecting the mixed physical education teaching model.

On this basis, a hybrid physical education model based on big data and artificial intelligence is designed and implemented. In the process of the experiment, a large number of experimental data were collected, through the analysis of these data, to understand the problems in the process of the experiment and possible solutions. In order to solve these problems, this study puts forward the corresponding countermeasures and optimizes the teaching model according to the in-depth mining and understanding of the experimental data.

In conclusion, this study provides an effective methodological framework to scientifically solve the optimization problem of online and offline hybrid physical education teaching mode. In the future, we hope to further expand this framework and continuously optimize and improve the quality of physical education by further combining big data and artificial intelligence technology.

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