

Retraction

Retracted: The Teaching Effect of Two-Course Education Based on Online and Offline Integrated Teaching and In-Depth Learning Optimization

Wireless Communications and Mobile Computing

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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- [1] H. Li, H. Zhang, and J. Xu, "The Teaching Effect of Two-Course Education Based on Online and Offline Integrated Teaching and In-Depth Learning Optimization," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 4656361, 10 pages, 2022.

Research Article

The Teaching Effect of Two-Course Education Based on Online and Offline Integrated Teaching and In-Depth Learning Optimization

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Modern technology has been successfully applied in various fields. Starting from the educational environment, the teaching platform and offline traditional classroom are imperative. This method has the functional characteristics of informatization and interactivity and one of the courses to cultivate students' world outlook, values and other good conduct. In the construction of the course teaching mode, learning attitude towards the integration of teaching methods has changed differently. In the above situation, this paper studies the behavior changes and teaching effects of ideological and political students from the conditions and in-depth learning optimization. Firstly, the integrated teaching environment based on student behavior is designed and the mean student behavior data in different environments. After obtaining the behavior characteristics of the students, this paper analyzes the influence of the integrated teaching mode on the scores and other factors. Finally, the face recognition model is constructed by using the deep learning technology to capture and calculate the students' class and examination status. The improvement of students' learning quality has obvious effects in improving performance and classroom optimization.

1. Introduction

With the clear requirements of the education department for the development system of students in all grades, the training of students should be integrated towards the needs of lifelong learning and lifelong development [1]. The core requirements of two-course educations also show that knowledge is necessary to help students. The two courses refer to the courses of the Marxist theory and ideological and political education offered in ordinary colleges and universities in China at the present stage. Focus on guiding and helping students master Marxist positions, views, and methods, establish the common ideal of building socialism with Chinese characteristics, establish a correct world outlook, outlook on life, and values, and lay a solid theoretical foundation for adhering to the party's basic theory and basic line; in view of the new reality and new development, we should systematically carry out the education of the basic principles of Marxism, patriotism, collectivism, and socialism with Deng Xiaoping theory as the central content;

conscientiously implement the principles of integrating theory with practice, and "learning Marxism Leninism should be precise and effective," comprehensively reflect China's reality and the development of the times, and pay attention to improving the teaching effect; pay attention to the connection between the curriculum and the ideological and political education curriculum in middle schools, to achieve reasonable structure and complementary functions and reduce duplication. In the modern information society, various computer technologies are widely used in other fields [2], the reform and construction of college curriculum. The frequent application of online teaching mode has made new changes in teaching methods and diversified changes in students' learning modes. How to improve two-course educations needs to be studied from the aspects of teaching content and teaching mode [3]. Some schools have resumed the offline teaching mode and formed a new integrated teaching form by combining it with online courses. This online and offline integrated teaching has undergone new changes in the implementation process, monitoring process,

evaluation, and other links [4]. The collection and detection of students' behavior characteristic data is more convenient and fast, and the teaching quality and effect have also been significantly optimized and improved, the traditional link for students' learning and testing, but this efficiency is not high [5]. Therefore, online and offline integrated teaching is an optimized student-centered education model. At present, online courses are characterized by interactivity, digitalization, and networking, and the integration of the Internet and education is also constantly carried out under the upgrading of the mobile network [6]. However, the online teaching method cannot completely replace the offline traditional classroom. For example, in the teaching of mathematics, the traditional blackboard writing is needed to show the calculation formula and reasoning process. This further illustrates that traditional offline courses cannot be replaced [7].

According to the above analysis, online and offline teaching has its own advantages, showing a complementary and mutual aid relationship. The new integration mode is to improve the effect by combining the two characteristics [8]. We also need to understand its basic significance. From the perspective of feature analysis, the subjects involved in teaching are not only students but also platform assistants [9]. The teaching content presents diversified forms, and the selection of resources is expanded and integrated with after-school videos, in-class examinations, after-school communication forums, etc. The acquisition of teaching resources depends more on modern technology, and the final evaluation and quality evaluation of courses also need to be calculated by modern information technology [10]. The last point is interactivity and openness. Online teaching has changed the time, location, and space constraints in the traditional teaching mode, and the traditional classroom has further optimized the teaching details and face-to-face teaching methods. Therefore, the courses are highly open and interactive. Based on the above research status, how to apply online and offline integrated teaching to ideological and political classes and improve teaching quality and teaching effect is the main content of our research.

2. Brief Introduction to the Development in Various Countries

Ideological and political classes need to be reformed and innovated in combination with big data, Internet, and other technologies [11]. This mode of independent teaching and virtual space teaching uses the information platform to attract students' interest and expands learning materials. Integrate diversified classroom knowledge into teaching design and teaching content, and improve the teaching atmosphere of traditional classroom [12]. The online teaching mode includes Mu class platform and microclass. Although it is flexible in the dissemination of knowledge, students can also participate in teaching activities. However, the traditional classroom environment can better meet students' needs for professional knowledge. Teachers can analyze the learning effect according to students' facial expressions and behavioral states [13]. The advantages and

characteristics of the two realize the function of two-way interaction of teaching information with the support of Internet and other technologies [14]. Traditional classroom focuses on cultivating students' practical ability, while online classroom focuses on meeting students' individual needs and supplementing extracurricular knowledge [15]. There are many researches on the application of integrated teaching model in Japan. They create an interactive and immersive learning environment for students' cognitive skills and motivation. By stimulating students' psychology of acquiring knowledge, we can promote the improvement of teaching effect. Some researchers start from the characteristics that students like to surf the Internet, use the Internet platform to promote the dissemination, and integrate teaching evaluation, assignment, and other links into the online platform [16]. According to the back-end management function, teachers can obtain the degree and effect of students' participation in knowledge interaction. Finally, we use data analysis to judge the historical behavior trajectory of students and count the reasons that affect the teaching effect. Put forward targeted and effective suggestions according to the research results [17].

The United States is relatively advanced computer technology. They have widely used modern applications in various fields [18]. The combination of information technology equipment and subject functions has changed the traditional educational concept. Based on the students' interest tendency, adjust the way of knowledge transmission. Taking the ideological and political class as an example, the focus of the teaching content is combined with the key points of the current news to design an online course with personalization and interest [19]. Use the Internet platform to send it to students' smart devices. Students can use devices to watch courses online on the way after school and in other time activities. This fragmented learning method can change the space limitation of traditional teaching. Finally, the offline classroom is used for timely testing and practice to consolidate teaching knowledge and improve teaching effect [20]. Compared with the single online teaching or offline teaching, the integration mode can change the applicability of teaching at a deep level. And educators have a more accurate grasp of students' learning attitude, performance changes, and learning effects. Based on the above research status, we analyzed the students' behavior data from the perspective of in-depth learning and studied the changes of students' learning attitude and teaching effect.

3. Behavior Analysis and Teaching Effect Research of Ideological and Political Students Integrated Teaching and In-Depth Learning Optimization

3.1. Research on Classroom Behavior of Ideological and Political Students Based on Online and Offline Integrated Teaching. Carrying out online and offline integrated teaching activities mainly uses traditional model. Teachers can independently study modern ideological and political teaching ideas, integrate online teaching platform with offline

classroom environment, change traditional educational ideas, and improve teaching quality. The new mode after integration has expanded the traditional teaching space and added many interactive and information-based teaching activities. Teachers gradually change from traditional teaching to two-way communication. In view of the particularity of two-course educations, education should also meet the historical development background and reform needs. Dynamic teaching tools are added to the online and offline integration mode to innovate teaching methods along the process of modernization. At the same time, the integrated teaching mode also needs to be updated and optimized in time in combination with students' actual learning situation and ideological change dimensions, to ensure the efficiency and rationality of education. This paper analyzes and studies the classroom students' behavior habits and behavior states of online and offline integrated teaching. With the support of national policies, the prosperity and development of the Internet, the improvement of people's willingness to receive education, and the promotion of the epidemic in 2020, the demand for online education surged, and the scale of online education users increased rapidly. In 2020, the number of users in China's online education industry reached 342 million. First of all, make a statistical analysis on the cases of online platform teaching nationwide after 2021. Among them, the number of students reached 18 million, and 230 million students realized online learning. We randomly selected a university to conduct quantitative analysis on the data generated by online learning, including more than 800 teachers and more than 12000 students. There are 700 courses, and the relevant teaching resources occupy 7000 GB of storage. All public courses, professional courses, and other compulsory contents of the school adopt online courses, which are divided into two forms: online teaching platform live courses and offline basic classroom courses. We continue to make questionnaire statistics on the teachers and students of the school, as shown in Figure 1.

It can be seen from Figure 1 that according to the survey results, most teachers and students have a positive attitude towards the integrated teaching mode. The average score given by teachers remains above 80. Students have a little fluctuation, the average score reached 78.6, with a minimum score of 68 and a maximum score of 89, but it does not affect the actual results. The scoring model also includes teachers' statistics on the attendance rate of online courses. The number of students participating in online courses can also reflect their attitude towards online teaching. But it cannot accurately detect students' learning situation and learning effect. Secondly, including students' satisfaction with the offline discussion, most students can accept this link and express their satisfaction. Teaching environment can improve learning efficiency, enhance interaction and communication with students, and facilitate knowledge exchange with teachers. In order to accurately improve the judgment teaching results of the combination of online and offline, this paper first analyzes the behavior patterns of students in different states. By analyzing and judging the model factors in different situations, the research uses data mining to analyze and simulate the students' state in different teaching

classes. The click times of online class in the two courses were compared, as shown in Figure 2.

A few students study for only a few minutes. From the number of clicks, students' acceptance of online courses is relatively high and the more clicks they have for a long time. According to the above research results, we analyze the learning behavior of the statistical data in combination with the individual learning duration and total amount. The relationship between the two variables is as follows:

$$T = \sum_{i=1}^{i=17} t_i, \quad (1)$$

$$A = \frac{T}{T'}. \quad (2)$$

The above formula reflects the repeated viewing times of each student on the online platform. We have arranged relevant offline assignments in the integration mode. Students can record the start time and end time by means of online timing. The formula is used to express the offline practice interval of each student as follows:

$$k = \left\{ \begin{array}{l} 3(\text{day1-day2}) \\ 2(\text{day3-day4}) \\ 1(\text{day5-day6}) \end{array} \right\}. \quad (3)$$

The distribution of exercise duration is as follows:

$$k = \sum_{i=1}^7 k_i. \quad (4)$$

The average of the total number and duration of students is as follows:

$$T = \frac{K}{7}. \quad (5)$$

According to the above formula, we can get the time distribution of students, online platform, and offline learning. At the same time, the teaching method system of multiple integration is proposed, as shown in Figure 3.

Online links and offline links are connected in the form of flipped classroom. Carry out multimodule interactive communication from teacher guidance to lecture, practice, summary, and innovation. Combined with the learning resources provided by the online platform, the course assessment is finally carried out, and the feedback information of students is summarized to optimize the fusion teaching mode. Then, we use the deep learning algorithm to evaluate the students' behavior and teaching effect.

3.2. Research on the Teaching Effect of Two-Course Education Based on Deep Learning Optimization. Two-course education is the main learning course moral development, because the two-course education itself is not very interesting. The classroom atmosphere is relatively lazy,

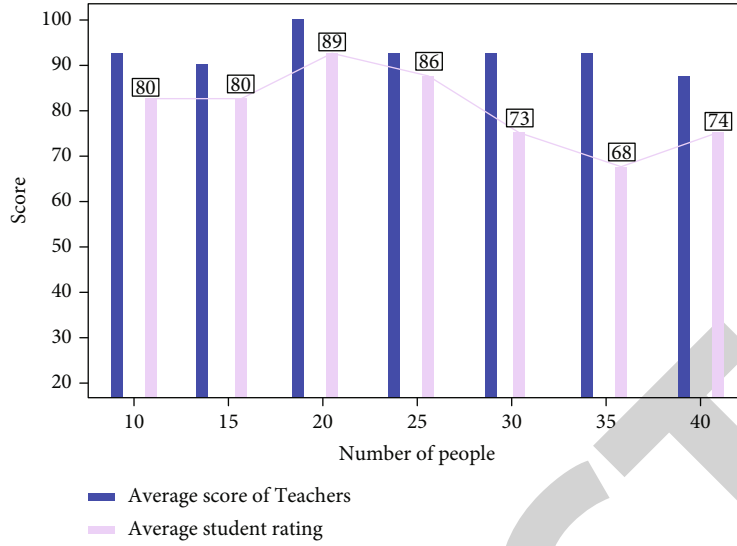


FIGURE 1: Evaluation attitude mode.

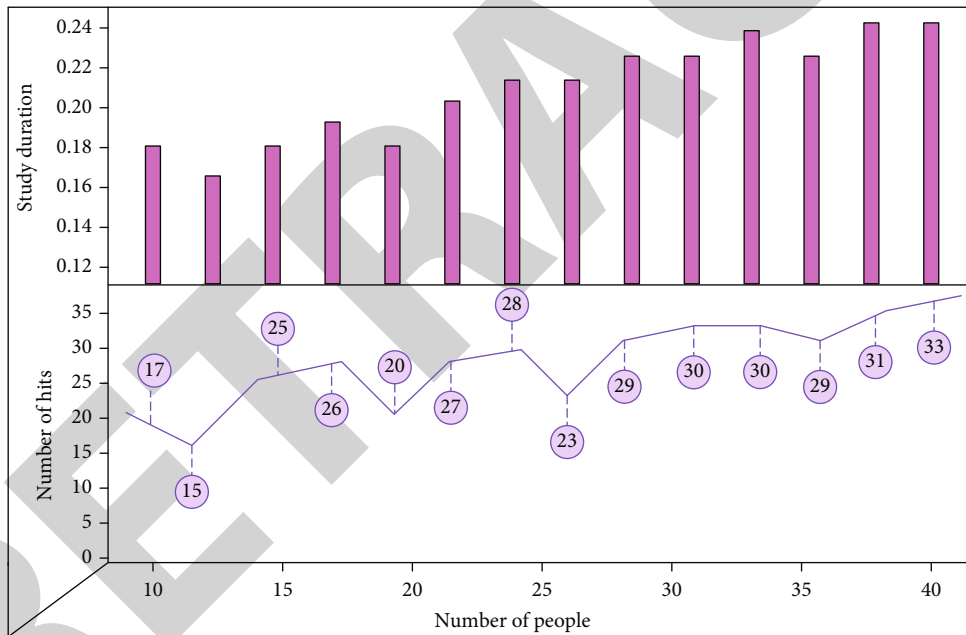


FIGURE 2: Comparison of students' average click times and learning duration.

and the learning effect is not ideal. When online courses are widely used in today's complex environment, the advantages and disadvantages of online teaching are gradually revealed. Teachers made a horizontal comparison and summary of online courses and found that students' practical application ability and consciousness were poor. This further shows that the traditional offline teaching mode cannot be replaced. In order to optimize teaching methods, we put forward the exploration integrated teaching mode under the concept of in-depth learning. In the macrodirection, integrate the network platform and physical teaching resources to increase

the universality and interest of the teaching content. Based on the information platform, expand traditional teaching methods and establish a teaching system of sharing and mutual assistance. Optimize the integrated teaching mode and process, and improve the number of activities. Change the traditional relationship to achieve organic integration. Based on this multifusion teaching structure, we designed a group of dynamic monitoring simulation teaching experiments. Firstly, the facial recognition algorithm is used to obtain the expression features of students in online and offline classes. The changes of facial features of students in the

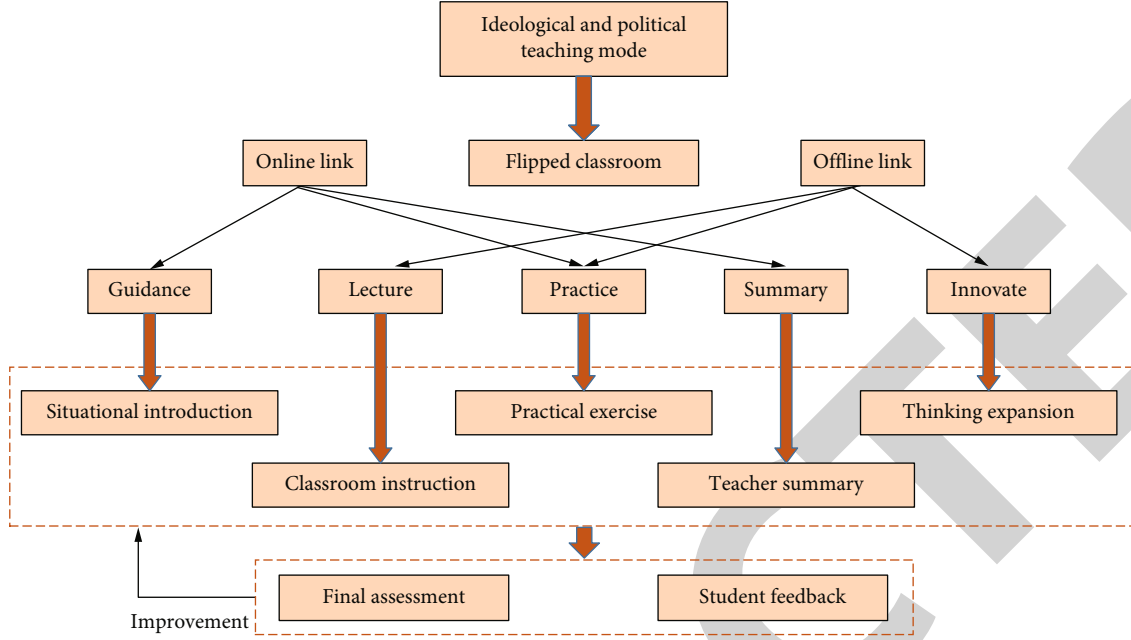


FIGURE 3: Online and offline integrated teaching method system process.

face of difficult problems were monitored by handing out in class tests with different degrees of difficulty. The camera is used to capture the expression feature data to extract the key points, and the deep learning algorithm is added to build the machine recognition model. The above process can not only analyze the overall state of students of two-course educations but also analyze the teaching effect of the new mode. It is convenient for teachers to change teaching methods and adjust teaching progress at any time.

Collect students' class status, starting from obtaining facial expressions. Therefore, the accuracy of identification is the main factor affecting the calculation results. The recognition process can select detection, feature extraction, expression management and classification, etc. However, the above methods are easily disturbed by external conditions such as environmental factors and body movements. We choose the deep learning algorithm to build the research model for the above defects. The deep learning algorithm starts from machine learning and achieves the goal of constructing the characteristics of things by training the learning times of the computer. Firstly, the contour features of facial expression are obtained, and the feature points are combined through hierarchical calculation to form a feature point set. We give priority to convolutional neural network in algorithm selection. Its internal structure is mainly composed of hierarchical convolution, computation pooling, and overall connection. The combination of convolution neural network operation flow and face acquisition flow is shown in Figure 4.

From Figure 4, the convolutional neural network structure is composed of multiple connection layers. Face recognition and neural network structure are combined to obtain feature data. There are multiple nodes scattered between each level, and the input facial expression pictures are extracted. The calculation formula is as follows:

$$x_j = f \left(\sum_{i \in M_j} x_i^{i-1} k_{ij} + b_j^i \right). \quad (6)$$

x_j represents the characteristic variables obtained at each level. The overall weight value can be calculated according to the number of feature points. In the subsequent calculation, it is necessary to compress the sample data to increase the system operation efficiency. The commonly used calculation formula is as follows:

$$y_j^{i+1} = \text{down} \left(y_j^i \right). \quad (7)$$

The formula includes sampling variables and output weight values. Next, the sorting of feature points is changed according to the original figure. Keep the effective feature data and delete the features that differ greatly from the original ones. In the data connection layer, the sorted feature data needs to be recombined, and each connection layer can reconstruct representative local features. The three corresponding formulas are as follows:

$$a_1 = W_{11} * X_1 + W_{12} * X_2 + W_{12} * X_3 + b_1, \quad (8)$$

$$a_2 = W_{21} * X_1 + W_{22} * X_2 + W_{23} * X_3 + b_2, \quad (9)$$

$$a_3 = W_{31} * X_1 + W_{32} * X_2 + W_{33} * X_3 + b_3. \quad (10)$$

According to the above formula, each variable can be connected with the corresponding feature function, and the feature can be used to extract the combined comprehensive information. Finally, the success probability of facial expression acquisition of different students is calculated by using the excitation variable function. In the evaluation teaching effect, the key characteristics of students are the main

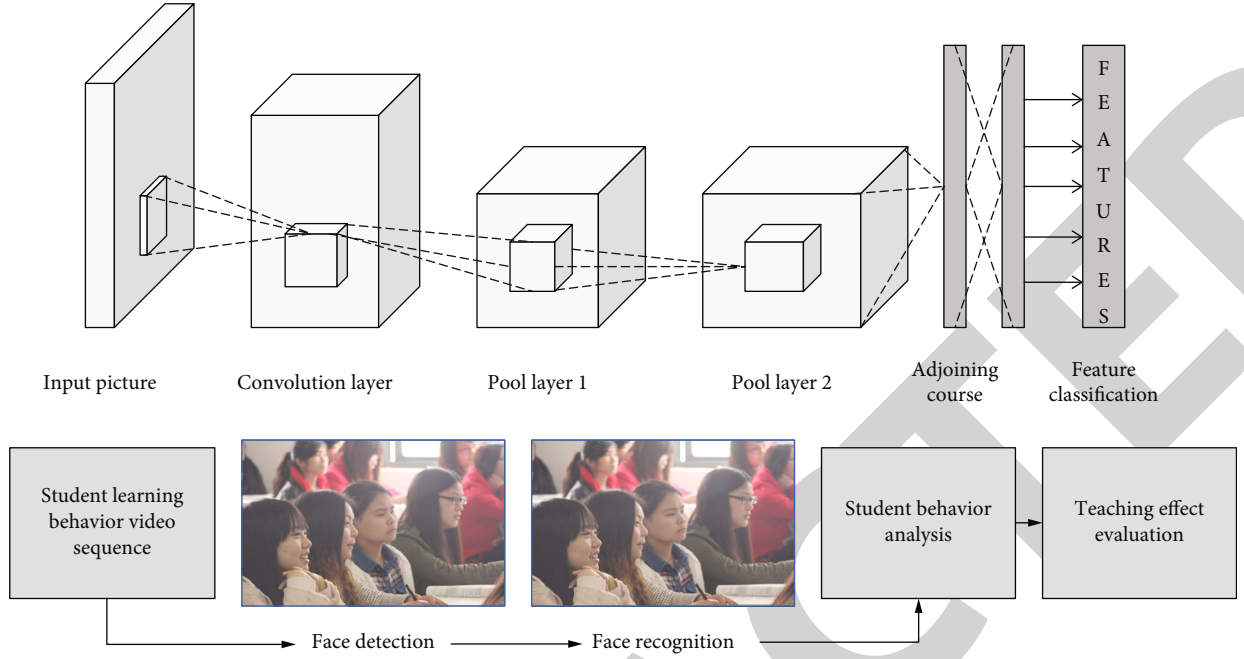


FIGURE 4: Convolution neural network operation flow and face acquisition flow.

influencing factors. Therefore, we will add the obtained data to form reasonable and effective feedback suggestions. Set up a simulation environment, first let students listen to ideological and political knowledge from the online teaching platform, and then, release offline classroom test papers to test students' learning effect. The experiment obtains the students' listening status and examination status from the two teaching environments, as shown in Figure 5.

It can be seen from Figure 5 that the online teaching adopts the method of camera face detection to extract the changes of students' facial expressions in the ideological and political class. The offline data adopts the method of class video to detect the examination status of students frame by frame. From the image data, it can be seen that most of the students are in good condition in class, and their scores in the in class examination are also at the upper middle level. This shows that the teaching mode of online and offline integration has certain applicability. We use the fuzzy evaluation method to test the actual teaching effect. The first step is to assign values to different indicators and corresponding influencing factors by means of weight set determination:

$$A_1 = (a_1, a_2), \sum_{i=1}^n a_i = 1, \quad a_i \geq 0. \quad (11)$$

Obtain the range of the second level value according to the weight set:

$$A_{2i} = (0.35, 0.16, 0.21, 0.13, 0.15)(i = 1, 2 \dots 5). \quad (12)$$

Step 2: select appropriate sample objects to establish teaching evaluation combination:

$$V_j = (v_1, v_2, \dots, v_m). \quad (13)$$

The range elements represent the evaluation indicators of different students, which are divided into three grades: excellent, general, and unqualified. We form the influence coefficients of indicators at all levels into a fuzzy evaluation set and set the influence matrix as follows:

$$R_1 = \begin{bmatrix} r_{11} & r_{12} & \dots & r_{1m} \\ r_{21} & r_{22} & \dots & r_{2m} \\ r_{31} & r_{32} & \dots & r_{3m} \end{bmatrix} = \begin{pmatrix} 0.50, 0.41, 0.01 \\ 0.21, 0.32, 0.03 \\ 0.31, 0.45, 0.02 \end{pmatrix}. \quad (14)$$

Finally, the comprehensive effect evaluation is processed in a unified format as a reference index result:

$$B = A_1 \bullet R = \left(\frac{b_1}{b}, \frac{b_2}{b}, \dots, \frac{b_m}{b} \right). \quad (15)$$

According to the calculation, we can know the prediction result indicators. By combining the calculation results with the changes of students' actual scores, we can summarize the influence tendency and quality optimization effect of the new model.

4. Analysis of Research Results Teaching Based on Online and Offline Integrated Teaching and In-Depth Learning Optimization

We take the teaching process of colleges and universities. Two-course educations as the research object use modern information technology means to integrate online teaching and offline teaching and analyze and study the effectiveness



FIGURE 5: Capture diagram of students' online class attendance status and offline examination status.

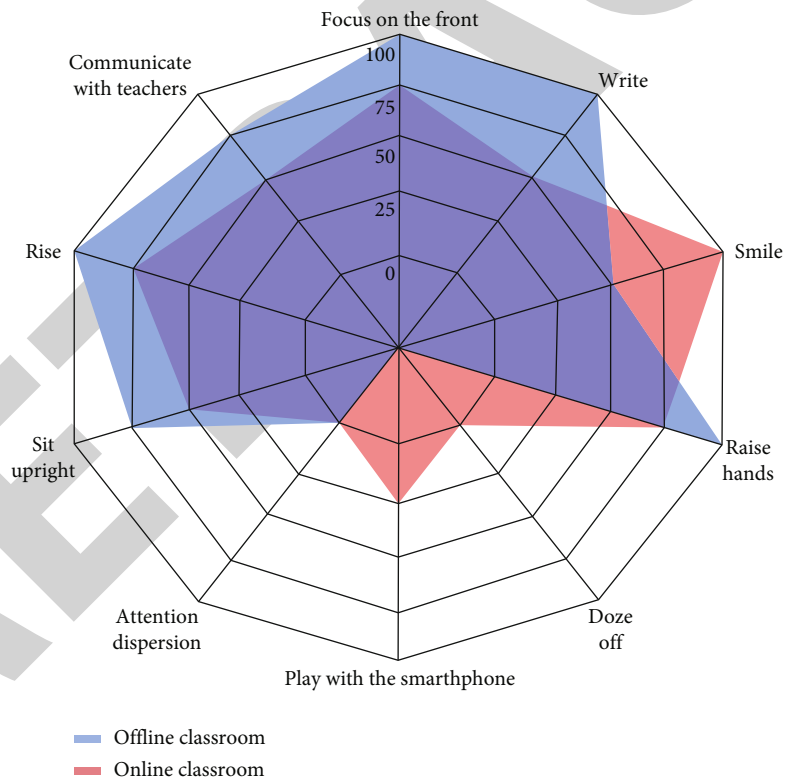


FIGURE 6: Radar chart of students' classroom state.

of integrated teaching. Firstly, the students of the same grade in a university are randomly selected as the research objectives. Starting from the teaching content, the learning activities in the three stages of preclass, middle school, and postclass are analyzed, through the collection of students' behavior and facial expression changes in class, as the research data of teaching evaluation. When simulating the

online environment, teachers need to prepare videos and teaching resources related to the course in advance. Release the key points and difficulties of learning, and set up random pop-up in class detection. The purpose of the in-class test is to test whether the students have carefully watched the whole course and fully mastered some of the knowledge they have learned. Online links use video recording to record

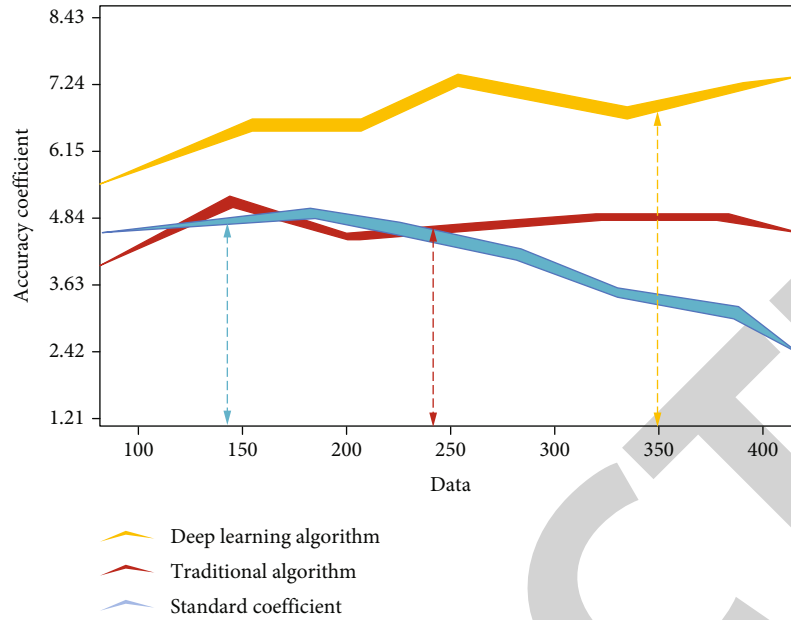


FIGURE 7: Comparison of accuracy between traditional algorithm and deep learning algorithm in teaching effect evaluation.

students' behaviors and obtain behavior data through the machine model built by the deep learning algorithm. Finally, the radar chart of students' classroom status is composed as follows.

It can be seen from Figure 6 that the radar chart judges the value according to the size of the area. The larger the area, the higher the frequency of this behavior. Most students can keep paying attention to the learning content and cooperate with the teachers to raise their hands in class activities. A small number of students play with mobile phones and lose concentration. Then, the online teaching effect is integrated by means of flipped classroom, and the online platform is combined with offline teaching. After students acquire knowledge by themselves through online videos, teachers will explain the difficult problems in the knowledge points in offline classes to consolidate the key and difficult knowledge. In the experiment, a deep learning algorithm is used to build an online and offline fusion teaching effect evaluation model. Due to the small amount of data participating in model training, we need to compare the accuracy coefficient of traditional algorithm and deep learning algorithm in teaching effect evaluation, as shown in Figure 7.

It can be seen from Figure 7 that the accuracy of the training model changes with the amount of data involved in the calculation. Under the big data environment, the accuracy of traditional algorithms for more and more feature points decreases gradually from the standard value. The deep learning algorithm can keep the accuracy above the standard range in the detection and analysis of a large number of feature point data. This paper chooses the deep learning algorithm to analyze the teaching effect, which has a certain credibility. After establishing an effective evaluation model, in order to ensure the integrity of the teaching effect, we add the personality characteristics of each student to the calculation data. Ensure that the experimental data conform

to the actual teaching effect. The students of different ages and learning abilities are tagged, and the complex factors affecting the teaching effect are extracted and the detection mode. Finally, judge the accuracy and effective performance of the model, and summarize the advantages of integrated teaching in combination with students' achievements. The evaluation model constructed is helpful to students' learning styles and teachers' teaching methods.

5. Conclusion

- (1) This paper evaluates and analyzes the teaching effect of the two courses under the new mode. First, the average clustering algorithm is used to obtain and analyze the students' behavior data under the two teaching modes, mining the key points of student groups, and using face recognition algorithm to capture students' classroom state and expression characteristics. Judge the main factors affecting students' learning effect in integration and offline activities. Adding student behavior data to the model calculation and analyzing the applicability of fusion teaching can supplement the shortcomings of traditional teaching and improve students' enthusiasm in class. It effectively improves the quality of teaching and strengthens students' main activities, so it has been applied in the teaching of two courses
- (2) Two-course education is the main learning process of moral education development, because the two-course education itself is not very interesting. The classroom atmosphere is relatively lazy, and the learning effect is not ideal. Teachers made a horizontal comparison and summary of online courses and found that online education students' practical

application ability and consciousness are poor, and the traditional offline teaching mode is irreplaceable. This paper puts forward the inquiry integrated teaching mode under the concept of deep learning. Use modern information technology to integrate online teaching and offline teaching, and analyze and study the effectiveness of integrated teaching. First, students of the same grade in the university are randomly selected as the research objects. Starting from the teaching content, this paper analyzes the learning activities in three stages: preclass, middle school, and postclass, through the collection of students' behavior and facial expression changes in class, as the research data of teaching evaluation. When simulating the online environment, teachers need to prepare videos and teaching resources related to the course in advance. Online link uses video recording to record students' behavior and obtains behavior data through the machine model built by deep learning algorithm

- (3) The radar map is judged according to the size of the area. Most students can continue to pay attention to the learning content and raise their hands in cooperation with teachers in classroom activities. A few students play with mobile phones, and their attention is not focused. Then, the online teaching effect is integrated through flipped classroom, and the online platform is combined with offline teaching. After students acquire knowledge independently through online videos, teachers will explain the difficult problems in the knowledge points in offline classes to consolidate the key and difficult knowledge. In the experiment, the online and offline fusion teaching effect evaluation model is constructed by using the deep learning algorithm
- (4) Due to the small amount of data involved in model training, we need to compare the accuracy coefficient of traditional algorithm and deep learning algorithm in teaching effect evaluation. The accuracy of the training model changes with the amount of data involved in the calculation. In the big data environment, the accuracy of traditional algorithms for more and more feature points gradually decreases from the standard value. The deep learning algorithm can maintain the accuracy higher than the standard range when detecting and analyzing a large number of feature point data. This paper chooses the deep learning algorithm to analyze the teaching effect, which has a certain credibility. After establishing an effective evaluation model, in order to ensure the integrity of teaching effect, we add the personality characteristics of each student to the calculation data. Ensure that the experimental data conform to the actual teaching effect. The results show that the evaluation model is helpful to cultivate students' learning style and teachers' teaching methods

Data Availability

The figures used to support the findings of this study are included in the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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