

## Research Article

# Construction and Practice of Multiple Mixed Teaching Mode Based on Big Data Analysis: A Case Study of “International Trade” Course

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With the progress of society, the quality requirements of international business enterprises for international business talents have been improved accordingly. So, it is urgent to conduct in-depth research on the teaching model and the improvement of students' practical ability. Taking international business as an example, this paper analyzes the contradiction between the supply and demand of international business technical talents by literature research. Furthermore, the convolution neural network model is used to improve the consistency between the talent cultivation of international business major and the talent demand of enterprises by interviewing teachers and questionnaire survey of students. By studying how to implement the professional training curriculum system construction and enterprise to talented person ability training requirements cohesion, this paper in view of the secondary vocational school of international business in today's society professional training curriculum system was modified and perfected. The ultimate purpose of this paper is to meet the demand of international business for characteristic talents and constantly promote the high-quality development of international business education.

## 1. Introduction

The 14th Five-Year Plan emphasizes once again: international multiple contradictions and challenges faced by China will deteriorate further, Chinese enterprises will inevitably will also be further about the international market competition and the pattern of economic and social development of a subject that cannot be ignored and strength; this means that we are used to that kind of low cost, high specification models also have to go, and the direct indirect market competition will be more obvious [1, 2]. In this context, for China's international business enterprises, this is both an opportunity and a challenge, which is the most critical period of development. At the macrolevel, the scientific implementation of the five national development concepts has further mobilized the endogenous force of the international business industry and become the driving force for

its sustainable development [3]. At the microlevel, there are still many deficiencies in vocational and technical education in China, which cannot keep pace with the national macropolicies [4]. Relevant surveys show that ,about 4% of graduates majoring in international business in secondary vocational schools must choose jobs corresponding to their major. However, when students enter the workplace, their lack of practical ability will be obviously manifested, and they cannot be competent for the job and meet the job needs. About 58% of the graduates choose positions related to international business major or enter other industries. More than 75% of the graduates of international business major of secondary vocational schools in 2016 choose to change jobs in the last three years, resulting in loss of most international business education resources [5].

On the one hand, now our country secondary vocational school's international business professional should also

actively explore the western orientation of CBE teaching model, effectively solve the current orientation training in international business management professionals in teaching patterns to cultivate ill-structured problems, in the international business training teaching mode in the dilemmas facing get breakthrough, and comprehensively improve the quality of international business personnel training, training practical, applied, innovative international trade personnel for the development of the international trade industry. On the other hand, from the analysis of the top-level design of national vocational education, practical training and teaching is an essential link to cultivate technical and skilled talents, and the key index to measure technical and skilled talents is also vocational ability [6, 7].

Generally speaking, now for the need of talents in our country under the changing circumstances, each secondary vocational school should update their education system in a timely manner and to timely find my own shortcomings and then improve it, so as to better adapt to the demand of the market and increase their school competitiveness in the society [8]. This paper aims to sort out the needs of international trade talents and put forward corresponding suggestions for the curriculum construction of ethnic trade specialty in secondary vocational colleges and finally achieve the purpose of adapting to social development. Teaching design ability is the core of teachers' teaching ability and also the key content of the construction of teachers' team in the future. This study tries to use the form of mixed teaching and learning mode to cultivate the ability and then, through practical research, to explore the specific effects of the training process. The specific significance of this paper is described as follows [9].

In reality, all kinds of problems are in front of us. Both learning and teaching there are serious path dependence, which means innovating teaching ideas and methods is not easy; at the same time, it also means that once the new teaching methods and means are discovered, it fully considered the student's own subjectivity, for the existence of secondary classroom teaching effectively solve the problems between the theory and practice. It builds a training system that combines quality and skill, enriches classroom teaching and practical teaching, greatly improves the teaching quality of the course, and effectively supplements the theoretical knowledge of education and teaching. Through the teaching design and the teaching implementation process of the teaching mode, it plays a guiding significance of theoretical guidance and practical demonstration to the later teaching activities and has a relatively positive role [10]. Finally, using the teaching mode in practice and feedback the study of the theory of the teaching mode, so as to provide theoretical guidance for further improve the teaching quality, it also makes that the human-oriented education concept is more and more thorough popular feeling [11].

The training of skilled talents depends on the development of secondary vocational education. However, a summary of the current teaching shows that there are still

many problems in the teaching process, whether it is international business major or other applied majors. From the perspective of teaching mode, the imparting of knowledge is still a relatively single mode, mainly lectured by teachers and listened to by students [12]. From the perspective of teaching content, part of the course content is relatively backward, which does not meet the latest trends of international trade and the needs of the society and lacks attention to students' professional ability and accomplishment. From the perspective of students, most secondary school students' basic knowledge reserve is not enough, and students' cultural literacy is generally low, which is not suitable for simple theoretical knowledge learning. If theory is not combined with practice, it is difficult to ensure the teaching effect because theoretical knowledge must be tested in practice to motivate students to take the initiative to learn, and pure theoretical teaching is unlikely to bring such an incentive effect. At the same time, the combination of theory and practice is not random, but a new scientific teaching mode, which is closely combined with theory and practice and carefully studied according to students' cognitive characteristics under the consideration of students' subjectivity. This new teaching model, which includes practical elements and takes into account the cognitive characteristics of students, can motivate students to take the initiative to learn, so that students' learning efficiency is rapidly improved, and meanwhile, teachers' professional ability is further improved [13].

## 2. Related Work

*2.1. Research Status of Deep Learning under Big Data.* With the advent of the information age, the communication between people is getting closer and closer. It is in this context that big data has attracted the attention of all sectors of society. However, it is still unknown how to define the concept of big data [14, 15]. There is no unified opinion in the academic circle, which usually refers to the data set that cannot be captured, managed, and processed within a certain period of time by using conventional software tools. Big data generally has five characteristics, which refers to that the value and potential information of data depend on the size of data, which is given in Figure 1.

In-depth study is accompanied by biology of the cranial nerve system developed in the study of cognitive thinking process and was first put forward by Hinton et al, mainly according to the composition of the neurons, allowing the computer to simulate the structure and be able to study and analyze the cognitive process of human brain activity, in order to solve image, speech classification, and other tasks that require a lot of feature analysis [16, 17]. When the brain receives information from sensory organs, the information will be passed on to the layers of progressive neurons, and each layer represents the feature extraction of things, through the layers of transfer form to the cognition of things. Deep neural

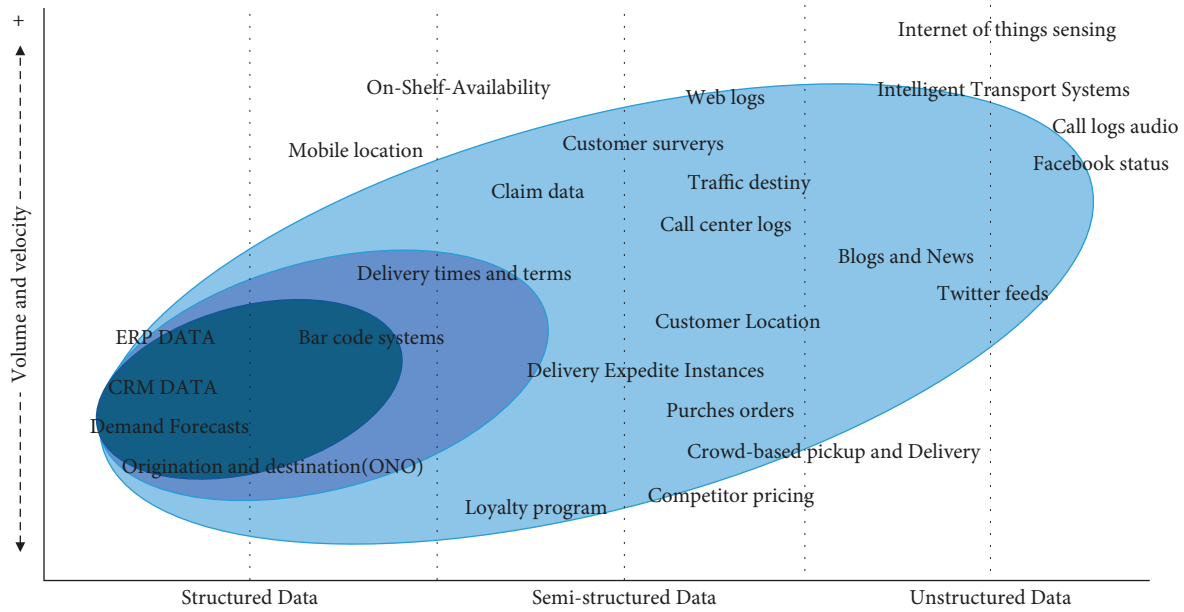


FIGURE 1: The development of big data sources and volumes.

networks are largely based on abstract information, with processors at each layer receiving processors at the upper and lower levels to extract deep data features [18].

A general structure consists of a visible layer that represents input information [19]. In the process of development from the encoder, because input noise makes the results are often not satisfactory, the researchers need to focus on the solution, the denoising encoder is designed, and the main working principle is in the training set artificially increase the noise data, in order to enhance the adaptability of the encoder [20].

Convolutional neural network (CNN) is a deep-seated neural network proposed by Japanese scholar Fukushima. Different from autoencoder, convolutional neural network is a supervised learning model. Because it changes the previous full-connection mode of neural network, partial connection mode is directly adopted in neurons [21]. Thus, the number of parameters to be learned in the network is reduced, the complexity of the training process is reduced, and the efficiency is improved. The structure of convolutional neural network can be artificially changed according to the actual needs. Among them, the convolution layer and the sampling layer are hidden layers, whose main task is feature mapping [22]. In the training process, the convolution layer performs operations such as convolution bias, and the sampling layer performs operations such as weighted sigmoid function. After repeated for many times, features with high abstraction are input to the full connection layer. In practice, each layer is improved according to the complexity of the problem to be solved. In addition to the above two types of deep

learning algorithms, there are also deep confidence networks, convolutional decomposition neural networks and so on, and the convolutional neural networks involved in this paper is the CNN [23].

Based on the above discussion, the contributions of this paper are given as follows:

- (1) Firstly, a new mixed teaching mode is proposed according to the actual needs
- (2) On this basis, the new mixed teaching model is applied to the teaching of international trade courses
- (3) Simulation results show the effectiveness and practicability of the proposed method

2.2. *Research Status of Teaching Mode for “International Trade” Course.* At present, the discussion about the mixed teaching mode is in full flow. However, due to the development time of the mixed teaching mode, we may have a misunderstanding, thinking that the mixed teaching mode is just another product of the old bottle of new wine under the development of information technology in recent years [24]. But in fact, the source of mixed teaching mode is deeply buried in the development of continuous integration of technology and teaching. Since its occurrence, hybrid teaching has rapidly become a hot spot in classroom teaching for its theoretical superiority and good effect in practice, and the hybrid teaching mode is grown in the soil of the perfect hybrid teaching, so the research on the hybrid teaching mode has to first clarify the development history of the hybrid teaching. The research of blended teaching is a

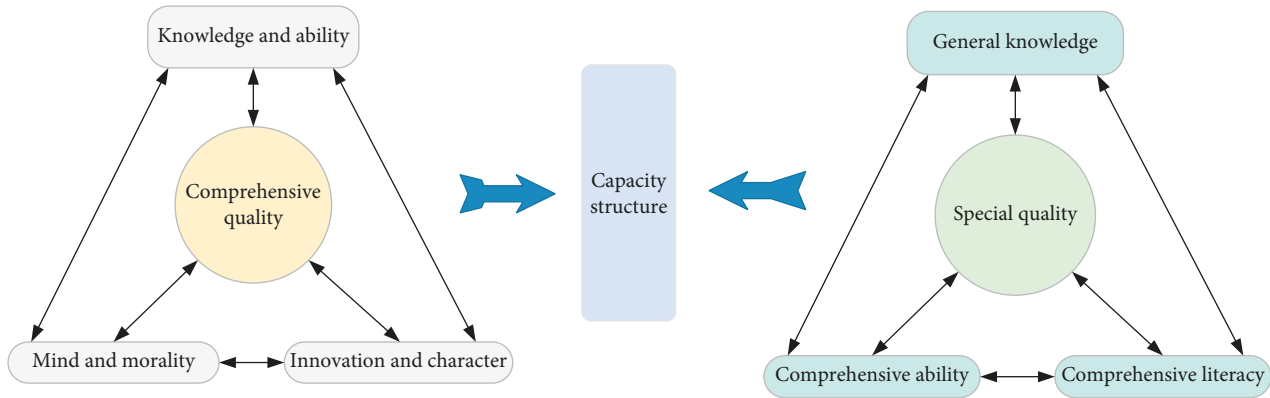


FIGURE 2: Ability of students majoring in international trade.

gradual process, from the germination to the mature stage, and it has gone through multiple stages of change. Sorting out the changes of its development stage and the existing research results will help us better grasp the development of blended teaching research. Therefore, we conduct a literature review in two aspects: one is the discussion on the connotation of hybrid teaching in Chinese and foreign educational circles; the other is a systematic review of the current research on hybrid teaching [25]. In addition, the main abilities are given in Figure 2.

Blended learning first appeared in enterprise training, combining online teaching with offline teaching. In 2002, foreign scholars believed that blended learning is the mixture of network technology, teaching methods, teaching technology, and classroom training. It can also be defined as a mixture of teaching techniques and teachers' work. People pay special attention to the understanding of the connotation of blended teaching, which is conducive to in-depth grasp of its essence. With the development of educational technology, its connotation has undergone multiple stages of change. First, the technology application stage (from the end of 1990s to 2006) emphasizes the core role of technology in teaching and holds that blended teaching is a simple combination of teaching and technology. Chinese scholars put forward the concept of hybrid learning in the 7th Global Chinese Conference on Computer Applications, which triggered the discussion on this concept in China. Hybrid teaching can overcome the shortcomings of traditional classroom teaching through technology. This stage is mainly regarded as "the mixture of face-to-face teaching and online teaching," and it is considered as the transitional stage between pure face-to-face teaching and pure online teaching [26].

Second is the technology combination stage (2007–2013), which went beyond the technology combination level of the previous stage. With the development of practice and research, the definition of blended teaching gradually became clear, and the appropriate use of teaching elements was emphasized to achieve the optimal learning effect [27]. Clarifying the essence of its definition is of great support to the subsequent development of

theory and practice. In the third International Conference on Blended Teaching Methods (ICHL), researchers made a profound discussion on blended teaching, believing that blended teaching is not a transitional teaching method, but a flexible conversion and combination between electronic teaching and traditional teaching in order to support the needs of different learning methods of students, which is a natural teaching method. At present, the blended teaching model is considered to be more developed from the perspective of strategies and methods and mainly focuses on the change of learning environment and the frequency of interaction between teachers and students. Many scholars and experts are committed to model construction and apply it to educational technology, physics, medicine, economics, and other fields. There are abundant research achievements on the theory and practice of blended teaching [28].

Third, the Internet+ stage, from 2013 to now, during which the rapid development of Internet+ has broadened the connotation of hybrid teaching and the formal application of mobile technology, which is not only the combination of traditional and online teaching forms but also the combination of technical means, objectives, and other teaching elements, which is considered to be a teaching situation combining network and classroom with the support of technology. At this stage, people gradually began to stand in the perspective of students and pay attention to the learning experience brought by blended teaching. The learning environment is student-centered [29]. Attach importance to the development of students' autonomy and personalized learning needs. Meanwhile, the development of MOOC, SPOC, and other open online courses in China has promoted the application of blended teaching in course teaching. With the development of big data technology, multiple platforms have begun to support the application of hybrid teaching, and scholars have begun to carry out the practice of hybrid teaching in an all-round way and have achieved a large number of research results [30]. Up to now, blended teaching has a richer connotation, including not only the mixture of online and offline teaching but also the mixture of teaching media, teaching methods, evaluation methods, and other teaching elements. As the new normal of

future education, blended teaching has been receiving high attention at home and abroad. Foreign hybrid teaching originated from enterprise training. In order to improve the technical level and overall quality of employees in internal training of large companies such as Intel and Microsoft, the combination of online and offline training has achieved better results than the traditional training mode, thus enabling enterprises to obtain greater benefits [31].

### 3. Construction of Multiple Mixed Teaching Mode by CNN

*3.1. Principles of Mixed Teaching Mode.* When defining blended teaching, more attention should be paid to how to help students achieve the optimal learning effect [32]. Although the above definitions start from different perspectives, they all point to the student-centered teaching concept and advocate a mixture of various elements in teaching methods. Therefore, based on the above definition, the blended teaching in this study is defined as follows: Hybrid teaching is supported by information technology, under the guidance of advanced teaching theory, breaks through the limitation of time and space, and effectively integrates the advantages of traditional teaching and network teaching. On this basis, reasonable use of various teaching elements achieves the best teaching effect of teaching methods [33].

The teaching mode is a stable framework and system of teaching activities [34]. The mixed teaching mode is a system established on the basis of the mixed teaching. According to the previous definition of the mixed teaching, the mixed teaching mode is defined as follows: break through the limitation of time and space, effectively integrate the advantages of traditional teaching and network teaching, and achieve stable teaching procedures [35]. The definition emphasizes the following: first, the mixed teaching mode is to select and use teaching technology, teaching means, teaching evaluation, and other teaching elements appropriately according to teaching needs. The ultimate goal is to achieve the maximum benefit of teaching. Second, it emphasizes student-centered and advocates the use of teaching technology, teaching means, teaching evaluation, and other elements in order to realize students' active and creative learning [36, 37].

*3.2. The Proposed Recommendation Method.* Due to the shallow network layer and the use of linear activation units, the early artificial neural network models are often unable to solve complex problems. So, in recent years, the CNN model is often used to solve complex image recognition problems. On the basis of the traditional full-connection layer neural network, the convolutional neural network adds convolution layer and pooling layer.

The function of the convolution layer lies in the extraction of image features. The essence of the convolution kernel is a filter matrix, which can produce many different effects on the original image. The calculation process of convolution is shown as follows:

$$x_i = \text{act}(x_{i-1} \otimes k_i + b_i). \quad (1)$$

Then, the mathematical expression of sigmoid function is

$$f(x) = \frac{1}{1 + e^{-x}}. \quad (2)$$

The mathematical expression of tanh function is

$$f(x) = \frac{e^x - e^{-x}}{e^x + e^{-x}}. \quad (3)$$

The mathematical expression of ReLu function is

$$f(x) = \max(0, x). \quad (4)$$

The mathematical expression of LeakyReLu function is

$$f(x) = \begin{cases} x, & x \geq 0, \\ \alpha x, & x < 0. \end{cases} \quad (5)$$

Therefore, the efficiency of the entire network operation can be improved to a certain extent.

The output layer adopts Softmax function to normalize, and the probability value in the corresponding category is shown in the following formula:

$$h_{w,b}(x_i) = \begin{bmatrix} p(y_i = 1|x_i; w, b) \\ p(y_i = 2|x_i; w, b) \\ p(y_i = 3|x_i; w, b) \\ \dots \\ p(y_i = n|x_i; w, b) \end{bmatrix} = \frac{1}{\sum_{j=1}^n e^{w_j x_i + b_j}} \begin{bmatrix} e^{w_1 x_i + b_1} \\ e^{w_2 x_i + b_2} \\ e^{w_3 x_i + b_3} \\ \dots \\ e^{w_n x_i + b_n} \end{bmatrix}. \quad (6)$$

In classification tasks, it is a common method to use cross entropy loss function to evaluate the gap between predicted value and true value. The cross-entropy formula is as follows:

$$\text{loss} = -\frac{1}{m} \sum_{j=1}^m \sum_{i=1}^n y_{ji} \log(\hat{y}_{ji}). \quad (7)$$

The error calculated from the cross-entropy function needs to be calculated by back propagation, so as to realize the newer back propagation of model parameters. The original form of the gradient descent method is

$$\theta := \theta - \alpha \frac{\partial}{\partial \theta} J(\theta). \quad (8)$$

In the experiments in the following chapters, this paper also verifies that the use of Adam has faster convergence than SGD. The mathematical expression of a common Adam optimizer is as follows:

$$m_t = \beta_1 m_{t-1} + (1 - \beta_1) g_t, \quad (9)$$

$$v_t = \beta_2 v_{t-1} + (1 - \beta_2) g_t^2. \quad (10)$$

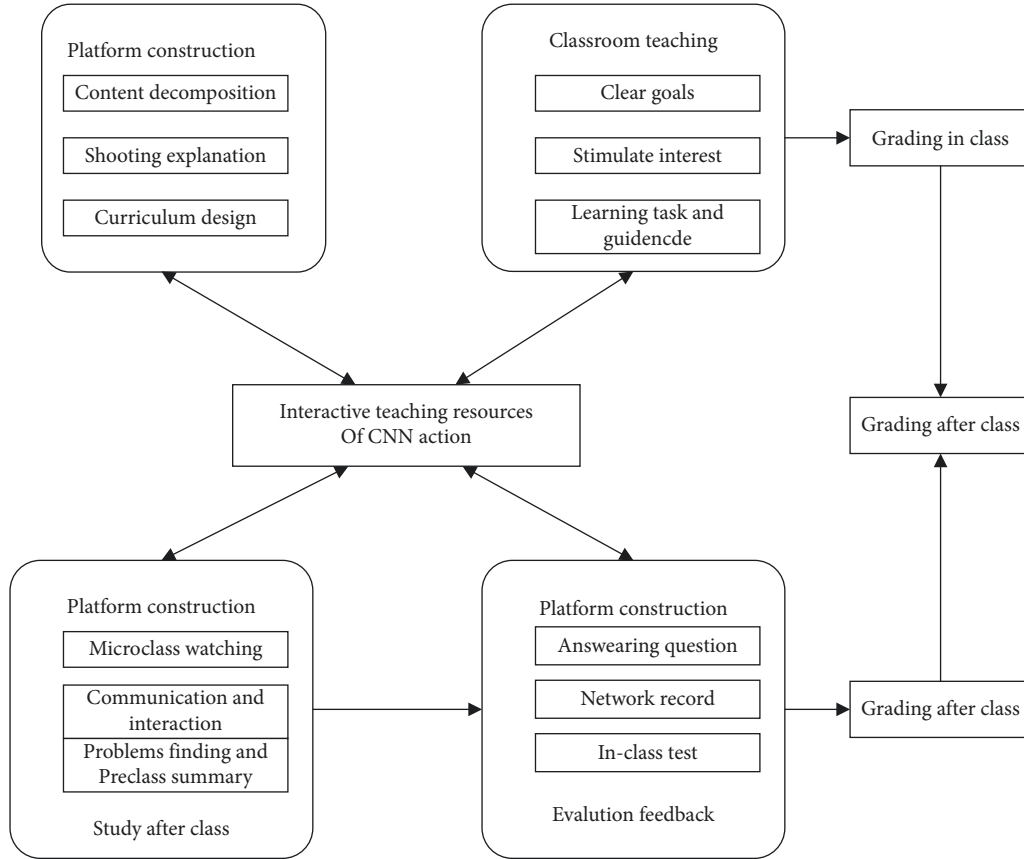


FIGURE 3: Schematic diagram of mixed teaching mode for international trade major students based on CNN.

Therefore, the updating rule of gradient descent is as follows:

$$\theta_{t+1} = \theta_t - \frac{\alpha}{\sqrt{v_t + \epsilon}} m_t. \quad (11)$$

Based on the equations (1)–(11), Figure 3 gives the schematic diagram of mixed teaching mode for international trade major students based on the CNN model proposed in this paper. It mainly contains platform construction, classroom teaching, and finally, the CNN based teaching pattern is designed.

## 4. Experimental Results and Analysis

**4.1. Experimental Data Collection and Introduction.** The independent variable of this study is the mixed teaching mode, and the dependent variable is the cultivation of students' teaching design ability. Due to the limitation of the practice process, the selection of subjects cannot be randomly assigned, and the unequal group design is adopted. In the study, besides the independent variable, many factors will affect the dependent variable. In the experiment, these factors include the irrelevant variables that we need to control, including the experiment time, which is controlled to the same length. In this study, 18 class hours were taken as the criterion, and the experiment duration was strictly controlled consistent. During the experiment, experiments were carried out in the same teaching place to avoid

experimental errors caused by changes in the experiment site. Therefore, the same number of teachers and assistants was used in this study to ensure the credibility of the experiment, so as to further verify the effectiveness of the proposed method. Students' existing subject knowledge, teaching knowledge, and practical knowledge will have an impact on ability training. Since the class of this study is from the natural class formed by students' independent course selection, the training situation of students with different majors, grades, and internship experiences needs to be compared and analyzed in the later analysis. The teaching data dynamic generation and processing method are shown in Figure 4.

**4.2. Experimental Results.** This paper uses the experimental data obtained in Section 4.1 to verify the satisfaction degree of users after using the proposed mixed teaching model. The specific experimental results are shown in Figure 5.

As can be seen from the figure, after the application of the hybrid teaching system proposed in this paper, users' satisfaction with the system reaches more than 98%. Therefore, the system is deeply loved by students and teachers and has obtained good application feedback.

Besides, the quantitative evaluation indicators results are shown in Figure 6. In the actual experiment process, we divided the students into three types, the first group is the traditional teaching mode, the second group is the

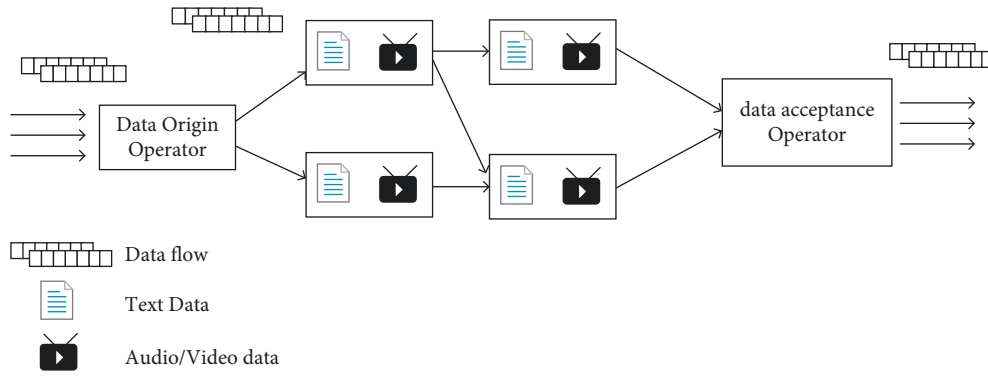


FIGURE 4: Teaching data dynamic generation and processing method.

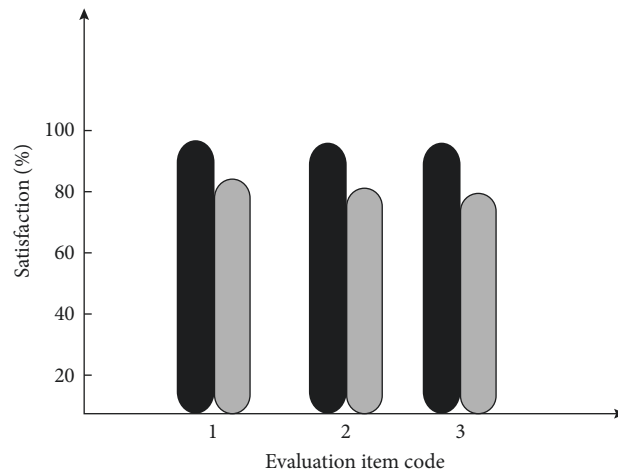


FIGURE 5: Satisfaction degree after using the proposed teaching model.

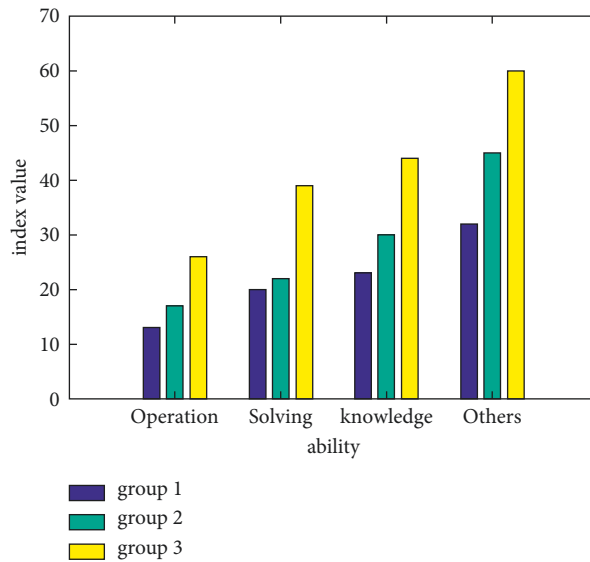


FIGURE 6: Results based on quantitative evaluation indicators.

simulation experiment situation, but only the basic experiment. In the third group, we conducted experiments using the proposed mixed teaching model.

This paper analyzes the test results of learning behavior of 5 students and takes attention and correct rate as quantitative indicators to demonstrate the effectiveness of

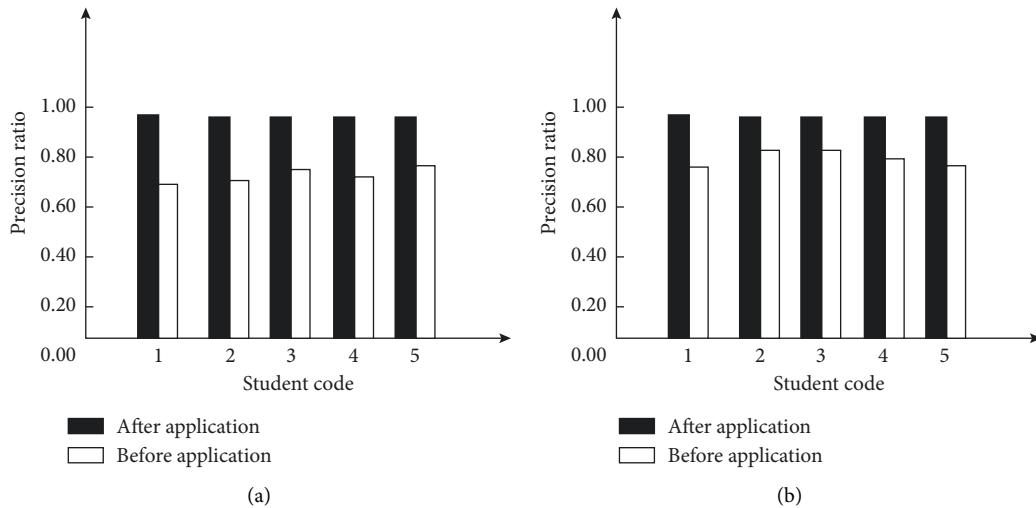


FIGURE 7: Teaching accurate results. (a) Attention. (b) The accuracy of the problem.

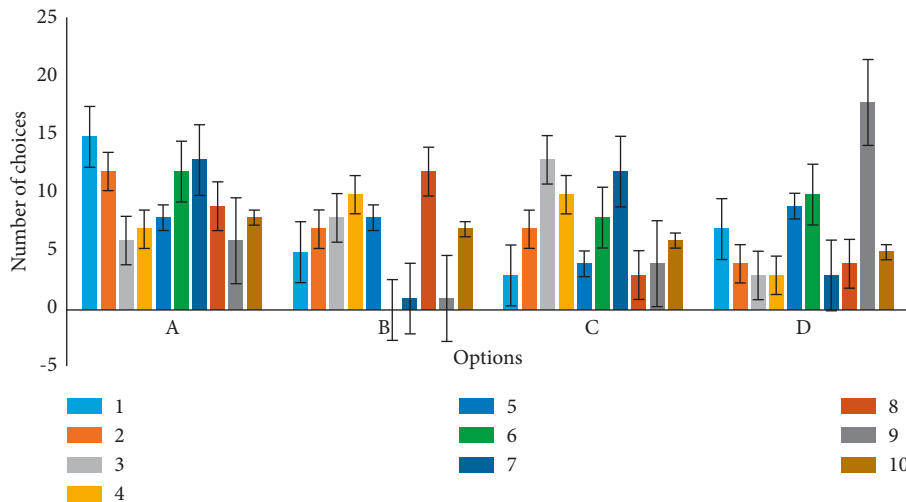


FIGURE 8: Visual results of students answering questions.

the proposed teaching method. The specific results are shown in Figure 7, from which it can be seen that all the proposed methods have achieved good teaching effects, and the maximum precision rate is 0.98, which also provides theoretical guidance and method reference for subsequent teaching task setting.

Figure 8 shows the comparison of the results of students taking multiple choice questions. It can be seen from the figure that the distribution of 10 students in the proposed system is relatively uniform and is consistent with the real selection results, thus proving the reliability and practicality of the proposed mixed teaching system again. Here, 10 samples were selected to conduct simulation experiments.

### 5. Conclusions

It is very important to cultivate talents suitable for the current social and economic development. In order to

cultivate talents suitable for international trade employers, we should mainly start from the following steps: set occupation, knowledge, vocational skills, and vocational quality of the trinity of three-dimensional training vocational personnel curriculum construction, providing the design of training activities, which has a very important significance.

This paper is based on the big data processing technology: CNN model. It is of great significance to explore the applicability of mixed teaching mode in the teaching ability direction of normal university students. This paper combines theoretical research with practical research to explore the effectiveness of training. In the practical research, through text analysis and questionnaire survey, it is found that the mixed teaching mode has certain effect on the cultivation of this ability. Targeted to promote the development of students, through teaching practice to cultivate students' ability and literacy, the training process has a certain effect.



## Data Availability

The dataset can be accessed upon request.

## Conflicts of Interest

The author declares no conflicts of interest.

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