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Application of Intelligent Digital Educational Technology in English Ideological and Political Education

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Abstract: The extensive application of Intelligent Digital Educational Technology (IDET) in the age of network information provides new ideas for the ideological and political work (IPW) of college students. Therefore, the research and application of IDET in English ideological and political education (IPE) has become more and more important. First of all, this paper studied the concepts of big data and IPE through literature review, which was convenient for subsequent research. Secondly, for the structure of the article, the first part conducted an introduction analysis, first introduced the background of IDET, then analyzed IPE and IDET through the research of scholars, and finally made a summary. This paper constructed an algorithm model of IDET, and used various algorithms to improve the theoretical basis for the research and application of English IPE. The third part introduced the research and application elements of IDET in English IPE, and the elements of IDET. Finally, the simulation experiments were carried out, and the experiments were summarized and discussed in detail. The research results showed that the research and application of the IDET constructed in this paper in English IPE improved the effectiveness of IPE by 9.12%.

1. Introduction

In the context of the great development of network information technology, data events are transformed into measurable information elements. By re-examining the data, this paper believed that the advantages and broad application prospects of IDET in understanding real life provided new ideas for the current IPW in colleges and universities. Higher education institutions are the forefront of cultivating, developing and disseminating social ideas, values and cultures. They are the places where ideas are most active, knowledge is most intensive, and information technology applications are most networked. It can make full use of IDET in IPE, improve the accuracy and efficiency of IPE personnel training, better play the role of morality fortress, and educate people for colleges and universities.

Under the new situation, strengthening and improving the connotation of big data teaching is a problem existing in the current national IPW of college students. IDET in English IPE has become a major topic that all colleges and universities must face. Based on this, many scholars have carried

out research on IDET in English IPE. Wang Ying proposed that in practical teaching, attention should be paid to cultivating students' academic theory and practical ability, and to provide them with more personalized learning services according to their personal characteristics [1]. Dong Y believed that the IPE in English classrooms was more specific and distinct [2]. Meng L discussed the implementation of IPE in business English teaching, and explained the era value of morality and political construction of the curriculum [3]. Yang Guanghui proposed that in the course construction of English subjects in colleges and universities, people can reasonably grasp the moral culture elements, flexibly apply teaching methods such as case teaching, research teaching, and project teaching methods, and comprehensively integrate the issues that students need to know [4]. Liang H discussed the specific practices of IPE for English majors. He believed that IPE for English majors should be based on practical problems and specific cases, innovate teaching methods, strengthen students' moral culture quality, and integrate IPE into professional teaching [5]. Zhang Jingting believed that on the basis of professional-based curriculum moral culture practice activities, English professional education should strengthen the construction of "curriculum moral culture" based on mixed teaching while promoting the internationalization of Chinese culture and national development [6]. On the basis of analyzing the moral culture goals and advantages of the English comprehensive course, Li Meilan discussed the necessity of implementing the moral culture system of the English comprehensive course [7]. IDET has been hotly discussed in English IPE in life, and it has also attracted attention in the academic world.

Today, with the rapid economic development, the quality of English IPE is getting higher and higher. Scholars have put forward rich insights into the research and application of IDET in English IPE. Wang J believed that moral cultivation is the fundamental task of IPE in colleges and universities. To take root in the overall situation of IPE in the new era, colleges and universities must attach great importance to the role of big data in IPE [8]. By understanding the connotation and characteristics of moral culture educators such as college counselors and class teachers, Zhou Zhengxiu used IDET to open up a new way of IPE, and improve the accuracy and effectiveness of IPE in personnel training [9]. Wu Chuanzhong believed that strengthening the informatization construction of IPW in colleges and universities and the collection and arrangement of information resources can ensure the interconnection of information resources, thereby cultivating the ability and pace of the times for all-round development of educators [10]. Deng Guofeng believed that it was necessary to fully recognize the "change" teaching methods in the current teaching of moral culture theory courses in colleges and universities. It was necessary to carefully organize the application value of many aspects such as ensuring the quality of teaching and predicting the teaching situation to improve the quality of teaching [11]. Wang Qi believed that in recent years, China's informatization has progressed rapidly and has entered the era of informatization, and information technology has had a profound impact on people's lives and management styles [12]. Dou X discussed the related concepts and theoretical basis of red culture, and analyzed its current situation and existing problems [13]. Huang Y summarized the practical significance of IPE in college English courses, and analyzed its application in English teaching [14]. Based on IDET, this paper studied the research and application in English IPE.

In order to ensure the accuracy of the data, the collection and organization of the data must be considered, the moral culture teaching materials of each unit must be exchanged, and the structure of the teaching staff must be considered. Taking English IPE as the starting point, this paper discussed how to create a good educational environment for the country. This paper firstly constructed the IDET model and proposed the research on related algorithms, then analyzed the research and application elements of the Intelligent Digital Educational Technology IDET in English, provided methods and theories for the experimental part, and finally conducted a simulation experiment analysis on the research and application of English.

2. IDET Model

(1) ACO-PAM Clustering Algorithm Integrating Ant Colony Optimization

In the ACO-PAM (Ant Colony Optimization-Professions Allied to Medicine) algorithm, the solution space is constructed as a graphical model of a "target-cluster" node matrix, and it is solved. Figure 1 provides a matrix where k is the number of clusters, or cluster centers, and n is the number of data instances. The graph is layered according to the number of clusters, starting with the first data instance, the nodes visited by the ants indicate which cluster the current data instance is assigned to. For each data instance, ants can only visit one of the k nodes, and then go to the node corresponding to the next data instance. In Figure 1, the ants would collect pheromone on the visiting node. The stronger the pheromone on the node, the more times the ants would be attracted to visit. The ACO-PAM algorithm uses a pheromone matrix to store pheromone values.

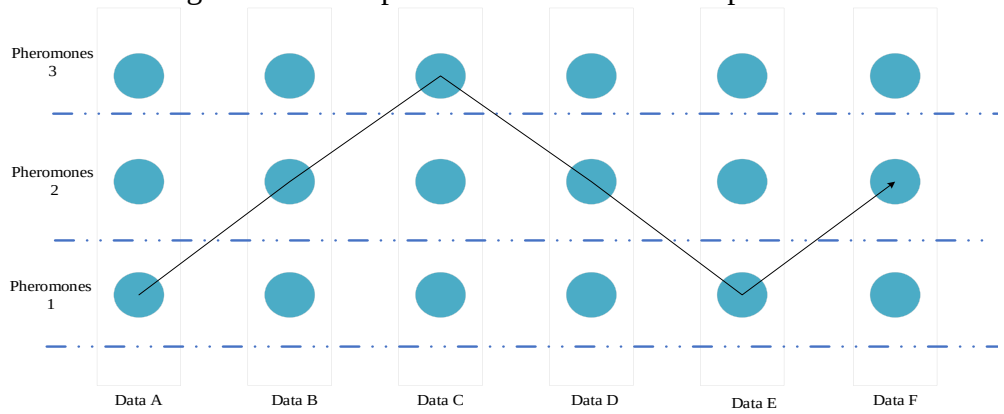

Figure 1 Model diagram of the ACO-PAM algorithm

The ACO-PAM algorithm relies on a certain number of ants to search for the best path in the construction graph. Each ant has the following characteristics:

1) Randomly selected initial center point set M^h;

2) Weight matrix

$$w_{nm}^h = \begin{cases} 1, \\ 0, \end{cases} \tag{1}$$

$$\sum_{m=1}^{k} w_{nm}^h = 1, n = 1,..., N \tag{2}$$

$$\sum_{m=1}^{k} w_{nm}^h \geq 1, m = 1,..., M \tag{3}$$

h is the corresponding ant number, constraint formula (2) states that each data instance can only be assigned to one cluster, and constraint (3) states that all clusters are not empty.

Ants have two search strategies, one is development and the other is exploration. Development strategies allow the ants to voraciously acquire pheromones and the most revealing information:

$$L^k = \begin{cases} \arg, \min_{\mu \in N_i \{[\tau(n,m)][\eta^h(n,m)]^\beta\}} if, q \leq q_0 \\ S, if, q > q_0 \end{cases} \tag{4}$$

In formula (4), the ants select the search direction according to the predefined probability q_0 and random probability q, and N is the survey method based on the ant colony algorithm.

The exploration strategy assigns a probability to each candidate node, and then lets the ants randomly visit one of the nodes according to formula (5), the more promising the node is, the more likely it is to be selected.

$$Z = P(n,m) = \frac{[\tau(n,m)[\eta^{(h)}(n,m)]^{\beta}}{\sum_{l=1}^{k}[\tau(n,m)][\eta^{(h)}(n,m)]\alpha} \tag{5}$$

Finally, each ant can find an optimal solution, compare it with the optimal solution, and update the pheromone for some ants with better results. The update rule is as follows:

$$\tau_{n,m}(t+1) = (1-\rho)\tau_{nm}(t) + \sum_{h=1}^{r} w_{nm}^{h}\Delta\tau_{nm}^{h} \tag{6}$$

$\Delta\tau_{nm}^{h} = \frac{1}{\delta^{h}}$ is the quality of the ant h solution, the higher the value, the better the solution.

(2) Similarity measure of cluster analysis

In cluster analysis, similarity measurement is a very important link. Different probability measures are often used for different data objects and clustering algorithms. Distance is used to measure the similarity between objects, so similarity measure can be thought of as distance measure.

1) Euclidean distance: referred to as Euclidean distance, it is used to describe the geometric distance between two points in a multi-dimensional space. The calculation formula is:

$$d(n.m) = \sqrt{(x_{n1}-x_{m1})^2 + (x_{n2}-x_{m2})^2 + ... + (x_{nN}-x_{mM})^2} \tag{7}$$

$x_n = (x_{n1}, x_{n2}, ..., x_{nN}), x_m = (x_{m1}, x_{m2}, ..., x_{mM})$ represent two n-dimensional data objects. If the weight of each dimension in the object is different, one can add the weight to the attributes of each dimension to get the obtained Euclidean distance. The calculation formula is:

$$d(n.m) = \sqrt{W_1(x_{n1}-x_{m1})^2 + W_2(x_{n2}-x_{m2})^2 + ... + W_n(x_{nN}-x_{mM})^2} \tag{8}$$

W_1, W_2, W_n are the weight of each dimension attribute.

2) Manhattan distance, also known as city block distance, it is used to describe the average difference between objects of each dimension in a multidimensional space. The calculation formula is:

$$d(n,m) = |x_{n1}-x_{m1}|^{\rho} + |x_{n2}-x_{m2}| + ... + |x_{nN}-x_{mM}| \tag{9}$$

3) Minkowski is short for Min's distance, which is the definition of a set of distances. The calculation formula is:

$$d(n,m) = \left(|x_{n1}-x_{m1}|^{\rho} + |x_{n2}-x_{m2}| + ... + |x_{nN}-x_{mM}|\right)^{\frac{1}{\rho}} \tag{10}$$

It can be seen from the above formula that when the parameter ρ is 1, the Min's distance is converted to Manhattan distance, and when ρ is 2, it is converted to Euclidean distance.

(3) Overview of logistic regression method

Logistic regression is a machine learning algorithm commonly used to solve binary classification problems. As a general linear model, logistic regression extends the concept of multiple linear regression to measure the relationship between classification results and dependent variables. For a given class, LR (Logistic Regression) can provide the corresponding class distribution estimate. In

statistics, LR is a probabilistic statistical classification model that fits a log-likelihood with a linear function. For binary classification problems, the values of class label y are 0 and 1. LR calculates the deviation of the data prediction result from the actual value by constructing the prediction function and the cost function. The smaller the bias, the more accurate the prediction function. The specific process of the LR principle is as follows:

1) Construct the prediction function

Assuming the input variable X and the mapping parameter θ, the constructed prediction function h(x) in LR is shown in formula (11):

$$h_\theta(x) = g(\theta^T x) = \frac{1}{1+e^{-\theta Tx}} \tag{11}$$

The value of the constructor of formula (11) represents the probability value that the classification result of the input variable X is category 1. Therefore, the probability that the classification result of X is class 1 and class 0 respectively is shown in formula (12):

$$p(y \mid x;\theta) = h_\theta(x)^y (1-h_\theta(x))^{1-y} \tag{12}$$

Among them, logistic regression uses the logistic function mapping relationship to normalize the input variable X. Its logistic function formula is shown in formula (13):

$$g(z) = \frac{1}{1+e^{-z}} \tag{13}$$

The logistic function graph is shown in Figure 2.

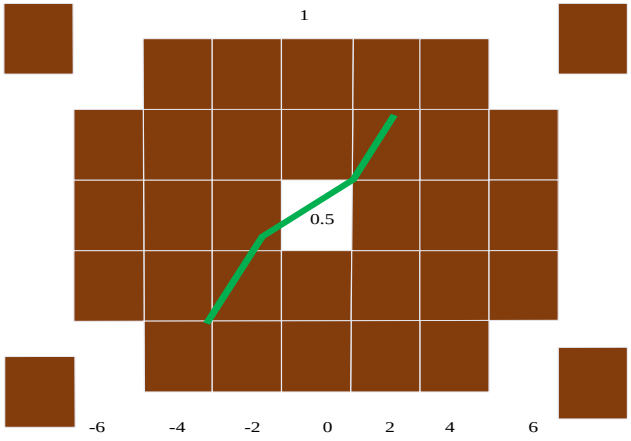

Figure 2 The Logistic function drawing

2) Construct the cost function

The cost function of LR is derived according to the maximum likelihood estimation, and its formula is shown in formula (14):

$$J(\theta) - \frac{1}{m}\left[\sum_{i=1}^{n} y_i \log h_\theta(x_i) + (1-y_i)\log(1-h_\theta(x_i))\right] \tag{14}$$

Take the likelihood function for formula (14) as:

$$L(\theta) = \prod_{i=1}^{m} P(y_i \mid x_i;\theta) = \prod_{i=1}^{m} (h_\theta(x_i))^{y_i} (1-h_\theta(x_i))^{1-y_i} \tag{15}$$

The maximum likelihood estimation is to find θ when the maximum value is obtained. Here, the gradient function method is used to solve it, and it is multiplied by the negative factor -1/m. The J(θ)

obtained at the minimum value is the required optimal parameter.

3. Application Elements of IDET in English IPE

(1) Elements of IDET

Big data mainly refers to those data that cannot be processed by ordinary data processing software. Big data has four characteristics: massive, diverse, fast, and variable. With the help of big data, new information processing methods can be generated, thereby improving the efficiency of information. The existence of big data is not only to collect comprehensive information, but also to make better use of big data for professional processing and analysis, turn information into data, and extract useful information from it, as shown in Figure 3:

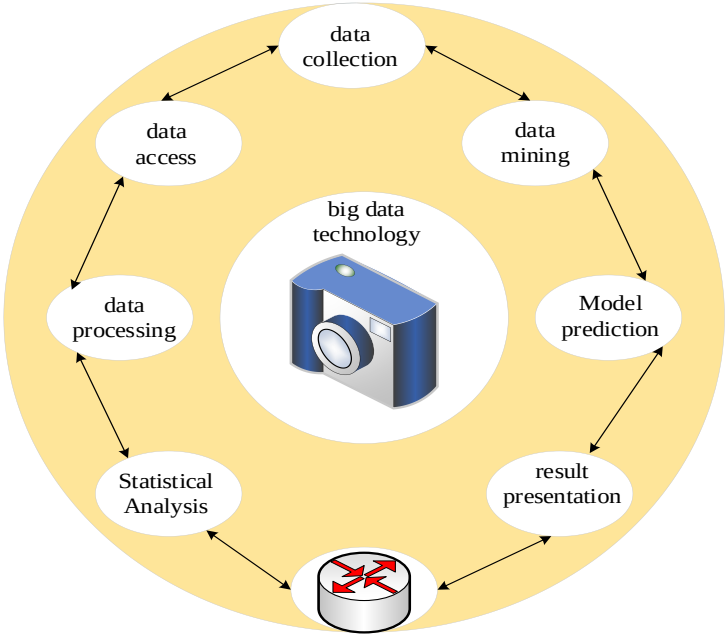

Figure 3 Technical elements of big data

From Figure 3 it can be concluded that:

1) ETL (Extract-Transform-Load) tools are responsible for extracting data from distributed and heterogeneous data sources, such as relational data, flat data files, etc. It is extracted to a temporary media layer, cleaned, transformed, integrated, and finally loaded into a data store or database for market use.

2) Data access: there are relational databases, non-relational databases, structured query languages, etc.

3) Data processing: it can use natural language processing technology.

4) Statistical analysis is as follows: hypothesis test, significance test, variance analysis, correlation analysis, multiple regression analysis, stepwise regression, regression prediction and residual analysis, etc.

5) Data mining includes classification, estimation, prediction, correlation grouping or association rules, clustering, description and visualization, complex data type mining, graphic images, video, audio, etc.

6) Model prediction includes prediction model, machine learning, modeling and simulation.

7) The results are presented with cloud computing, tag cloud, relationship diagram, etc.

(2) Research and application elements of IDET in English

At present, many provinces have introduced IDET into English teaching. As the integration of

the most popular cloud computing technology in the field of IT (Internet Technology) and the education field, it has greatly promoted the development of education informatization in China. Through online lesson preparation and “online assignments”, students can obtain learning resources, guidance, teacher-student interaction and other functions, as shown in Figure 4.

The specific content of research and application can be expanded into three parts:

1) Build a high-end think tank for IPW in colleges and universities, which is a powerful guarantee for IPW in colleges and universities

In the era of big data, the IPE of college students must continuously improve the computer application ability, network information collection ability, and comprehensive analysis ability, so as to adapt to it and make it its own strength. Therefore, in order to realize the construction of a high-end think tank of "technology + management", we need to start from the following aspects: First, to break the current "bottleneck" in the fields of cognition and information technology. College students' moral culture theorists should constantly update and accumulate knowledge in the field of information science. It combines psychology, computer, management and other disciplines to conduct basic research on data science and conduct scientific discipline construction. The second is to break through the key technical bottlenecks in technology. On the premise of the integration of teaching subject and object, a data platform with distinctive IPE characteristics should be established.

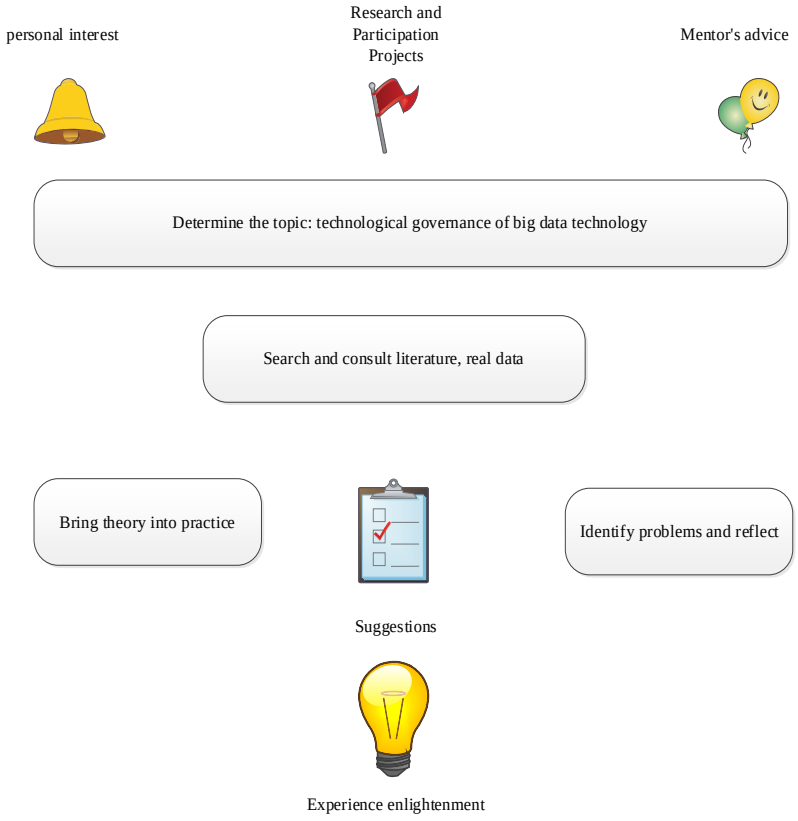

Figure 4 Research and application of IDET in English IPE

2) Strengthen the long-term mechanism of IPW of college students and promote the sharing of information resources

"Shared development" is a main direction of the current IPW in colleges and universities, and it is also a problem worthy of attention. Massive data has universal and guiding significance, "breaking the extensive communication between people, people and information, and information

and information".

It is necessary to make full use of online and offline data sources in the moral education work of colleges and universities, strengthen the exchange of data sources, and create a new situation of teacher-led, student-involved, and multi-disciplinary coordination. It can be developed, promote inter-subject dialogue and cooperation, break the boundaries of time and space, low information exchange rate, and insufficient resource coordination. In addition, IPE in colleges and universities should also organically link educational goals and educational plans, starting from two aspects of teaching and synthesis. It can strengthen the exchange of information between colleges and departments, explore method innovation and broaden the field to clarify the powers of colleges and departments, establish a comprehensive data sharing platform, a public resource database, and build a basic information database for college students. It can realize cross-departmental and cross-regional cross-departmental information system sharing between college admissions offices and employment offices.

3) Improve the accuracy of IPE research for college students by implementing accurate data identification

With the development of information technology today, college students have gained more knowledge and more choices in study and life. Accurate identification of data requires both accurate and comprehensive identification. By collecting, storing, analyzing and mining the information left by college students on the Internet, we can understand their psychological activities. The relationship between the psychological status of college students and other events is analyzed more precisely, and the influence of different groups on their psychological status is pointed out.

It comprehensively, objectively and accurately evaluates the psychological and emotional changes of college students from the aspects of preference for various information of college students. Through the real-time, multi-dimensional visual description of the "student portrait", the student's learning behavior is accurately analyzed. People need to be clear about who they want to help. After clarifying the purpose of education, educators "target" target groups from relevant areas of the school (classrooms, libraries, canteens, etc.) and use data to analyze them. For example, by analyzing the consumption status of college students' all-in-one cards, we can understand their family status and provide them with services such as "work-study" and "green channel". At the same time, through the model of "big data + e-books", the management system of college student services has been further improved. The third is accurate tracking and identification, and conducts security grading, content pre-review, sensitive vocabulary screening and individual interviews for the educated.

4. Application in English

A random sample of 50 people from classes A and B was used to analyze the problems, teaching effects, and teaching methods in IPE for experimental analysis, so as to provide reference for research and application research in English IPE.

(1) Analysis of the problems existing in IPE

At present, the effectiveness of moral culture classrooms is often affected by traditional teaching concepts and teaching methods. To improve the teaching effectiveness of moral culture courses, teachers should clearly understand what problems exist in teaching, coordinate the relationship between teachers and students, improve teaching methods, and strengthen study guidance, such as the lag of teaching materials. The biggest feature of English moral culture courses is that they are updated quickly, but as a teaching material, when it began to take shape, it was forgotten before it took shape. The development of things is constantly changing, but the change of textbooks is far from adapting to the changes of the new situation, making the theory and reality out of touch. The

"indoctrination" in textbooks would affect students' enthusiasm for learning.

Abstract content: English IPE lacks rigorous mathematical logic, and lacks the beauty and dynamics of Chinese. English thought and politics is an abstract art, and this book is very informative. However, most students cannot open this door from the bottom of their hearts, so teachers must use pictures to explain these abstract theories.

Inefficiency: The goal of teaching is to enable students to master what they have learned and apply it to practice. However, in moral culture classes, teachers tend to speak dryly, while students only listen very little, and there are even fewer places that can arouse their interest in the classroom. It often repeats a question several times, and many people still make the same mistake. Figure 5 is a comparative analysis diagram of the problems existing in the IPE of Class A and Class B:

Figure 5 Analysis of the problems existing in IPE

As can be seen from the figure, among the problems in English IPE cited, the largest proportion of students felt that the content was boring. There were 17 students in class A and 14 students in class B, accounting to 31% of the total. Secondly, people feel that the teaching method in the classroom is single. There are 8 students in class A and 13 students in class B, accounting to 21% of the total. The smallest proportion is poor teaching ability. There are 3 students in class A and 3 students in class B, 6% of the total. Therefore, it can be seen that the problems existing in IPE still need to be considered and improved.

(2) Analysis of the teaching effect of IPE

The main purpose of college moral culture theory courses is to enable students to establish a correct outlook on the world, life, values and history, enhance their political quality, and enhance their ability to identify right and wrong, analyze and solve problems. However, in practice, it has not aroused the students' real interest and need for Marxist theory. On the whole, the teaching effect of moral culture theory courses is not ideal. Figure 6 is a comparative analysis diagram of several teaching effects of Class A and Class B.

As can be seen from the figure, students in both classes are willing to actively participate in IPE, and those who are more interested in English. Class A has 21 students and class B has 19 students, accounting for 40% of the total number. Secondly, there are 14 students in Class A who feel that they can grasp the content taught by the teacher after listening to the class, and 17 students in Class B, accounting for 31% of the total number of students. The least is the people who feel that the

effect is obvious after listening to the class. There are 3 people in class A and only 2 people in class B, accounting for 5% of the total number of students. It shows that most people participate in the class with the mentality of listening, and those who really understand the connotation are still in the minority.

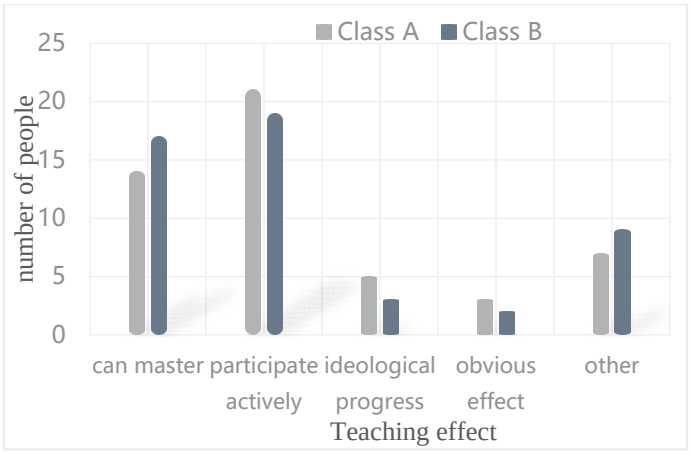

Figure 6 Analysis of the teaching effect of IPE

(3) Analysis of teaching methods in IPE

At present, with the increasing attention of curriculum ideology and politics, in order to achieve better results in college English teaching, it is necessary to combine blended learning with curriculum ideology and politics, and actively explore a variety of teaching methods and models. Therefore, it is necessary to correctly understand and understand the positive significance of mixed teaching of English in senior high schools, clarify the ideas of solutions, and strive to solve problems. This action plan would focus on the renewal of blended learning concepts, the improvement of blended learning systems, the innovation of blended learning methods, and the expansion of blended learning to ensure the quality of college English teaching. Figure 7 is a comparative analysis diagram of several teaching methods in Class A and Class B:

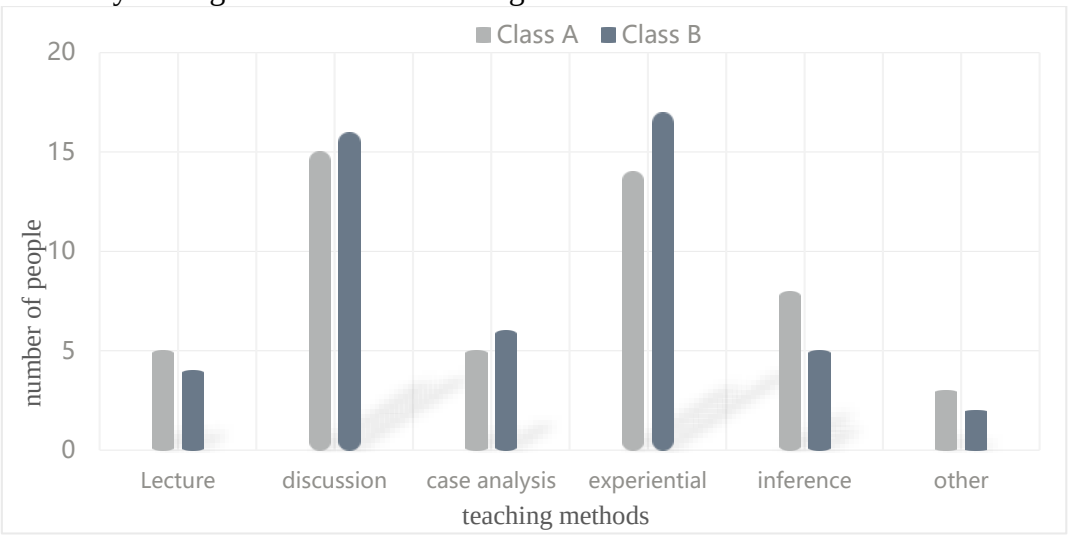

Figure 7 Analysis of teaching methods in IPE

As can be seen from the figure, the difference in teaching methods in IPE depends on the students' interest in that teaching method. It is not difficult to conclude that discussion teaching and experiential teaching are more attractive to students in teaching methods, and the teaching effect is also better. There are 15 students in class A and 16 students in class B, accounting for 31% of the

total number of students. There are 14 students in class A and 17 students in class B, accounting for 31% of the total number of students. Followed by reasoning teaching, there are 8 students in class A and 5 students in class B, accounting for 13% of the total number of students. Therefore, it can be concluded that in English IPE, the teaching ability of teaching staff to be interested in the teaching methods of students can be cultivated as much as possible, so that the role of moral culture can be brought into play. The research and application of the IDET constructed here in English IPE has improved the effectiveness of IPE by 9.12%.

5. Conclusion

This article reflects and evaluates the current educational situation, and actively explores and practices in terms of content and methods, so as to cultivate a high-quality moral culture talent. In this experiment, the analysis of teaching methods in IPE, the analysis of teaching effect of IPE, and the analysis and analysis of problems existing in IPE were obtained. The experimental results show that the research and application of the IDET constructed in this paper in English IPE improves the effectiveness of IPE.

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