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Research Article

Teaching Mode in the Management of Higher Vocational Colleges in the Era of Big Data

Huimin Zhao

Hunan College of Foreign Studies, Changsha 410211, Hunan, China

Correspondence should be addressed to Huimin Zhao; zhaohuimin@huwai.edu.cn

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In the current information society, colleges and universities have produced a wealth of data on educational learning, research, personnel training, and student management. Changes in data formats and quantity lead to changes in quality. If university administrators can summarize these massive data, conduct effective mining and analysis, and finally present the analysis results in university management decision-making, then this should be the creative research of university administrators. In the construction of digital campuses, informatization promotes multiple innovations in teaching and management in vocational colleges, resulting in teaching big data, teaching big data, and data management needs. After analyzing the reading data of students' on-campus learning system through big data, it can be concluded that the learning data of Blue Nebula from 2017.09.20 to 2017.10.10 is 8.5 more than that of Chaoxing on average. During the period of 10.01–10.10, the learning data of the two platforms increased by 15 and 7, respectively, compared with the period of 09.20–09.30.

1. Introduction

In recent years, with the continuous expansion of the enrollment scale of colleges and universities, according to the 2017 National Higher Vocational College Rankings released by the China Science Evaluation and Research Center, the number of higher vocational colleges in China has risen to 1,346. It is also difficult for teachers to understand the real-time learning status of students and cannot implement personalized teaching for students. Graduates pour into higher vocational schools to maintain the normal learning style of the school and student life, becoming the focus of student management. Student management faces new challenges.

Big data refers to the need for new processing modes to process massive amounts of information. Influenced by big data technology, cloud computing and Internet technology have developed rapidly, and at the same time, they have provided new opportunities for teaching reform in colleges and universities. Therefore, deepening the integration of higher education models in the era of big data and colleges and universities, and understanding educational reform with systematic thinking, global awareness, and world outlook, will inevitably lead to the improvement of college education. Improving the quality will help colleges and universities to cultivate high-quality talents with both ability and political integrity.

Since the emergence of big data, the public's understanding of many disciplines has undergone tremendous changes, which also provides a new perspective for college management concepts and college knowledge construction. In the era of big data, data have become an important part of human and material resources. Colleges and universities can use high-tech data to establish effective communication between school management departments, teachers, and students and improve students' quality management and skills. Second, big data technology can be used to intervene in the learning of all students, understand and predict students' learning, learning strategies, and learning habits, and provide students with personalized and supervised teaching activities.

2. Related Work

Kuang et al. believe that diversity and accuracy are two distinct characteristics of large-scale and heterogeneous data. It has always been a great challenge to represent and process big data efficiently with a unified scheme [1]. Barbu et al. propose a novel efficient learning scheme that enforces sparsity constraints by gradually removing variables based on criteria and schedules. The attractive fact that the problem size keeps decreasing throughout the iterations makes it particularly suitable for big data learning. Their approach is generally applicable to the optimization of any differentiable loss function and finds applications in regression, classification, and ranking. The resulting algorithm builds variable screening into the estimate, and it is very simple to implement. They provide theoretical guarantees for convergence and selection consistency. Furthermore, he uses one-dimensional piecewise linear response functions to account for nonlinearities and imposes second-order priors on these functions to avoid overfitting. His experiments on real and synthetic data show that the proposed method outperforms other state-of-the-art methods in regression, classification, and ranking, while being computationally efficient and scalable [2]. Zhang et al. proposed the cyber-physical system. The system consists of a unified standard data acquisition layer, a data management layer for distributed storage and parallel computing, and a data-oriented service layer [3]. Rathore et al. believe that the assets of the remote sensing digital world generate massive amounts of real-time data (mainly referred to as "big data") every day, and the insights therein have potential significance if they are effectively collected and aggregated. In this day and age, real-time remote-sensing big data is much more than it first seems. Its ability to extract useful information in an efficient manner exposes systems to significant computational challenges, such as analysis, aggregation, and storage, where data are collected remotely. Considering the factors, it is necessary to design a system architecture that supports both real-time and offline data processing. Therefore, they proposed a real-time big data analysis architecture for remote sensing satellite applications [4]. Janssen et al. identify factors that influence big data (BD)-based decision-making through case studies. Big data (BD) is collected from different sources with different data qualities and processed by various organizational entities, creating a big data chain. The scale of big data amplifies diversity (heterogeneity of data), speed (changing data sources), and accuracy (manipulation, noise). It requires relational and contractual governance mechanisms to ensure BD quality and to be able to contextualize data. Case studies show that leveraging big data is an evolutionary process, in which progressive understanding of the potential of big data and regularization of processes play a crucial role [5]. Zhou et al. believe that big data enables machine learning algorithms to discover more fine-grained patterns and make more timely and accurate predictions than ever before. On the other hand, it poses significant challenges for machine learning, such as model scalability and distributed computing [6]. Cai et al. provide a functional framework that identifies areas of IoT big data acquisition, management, processing, and mining. He defines and describes several related technical modules according to their key characteristics and capabilities. He then analyzes current IoT application research and identifies challenges and opportunities associated with IoT big data research [7]. Zhuo et al. believe that when the amount of data is very large, that is, big data, data collection, data aggregation, and data analysis have become challenges for resource-constrained requesters. Especially in data analysis, set operations, including intersection, union, and complement, exist in most big data analysis. It is used to filter redundant data and preprocess raw data. Faced with the challenge of limited computing and storage resources, cloud-assisted methods may be a promising approach to solve big data analysis problems [8]. Moral and Villavicencio presented a qualitative study, in which 11 primary schools participated in the full-time school curriculum. First, they introduced the concept of inclusivity and its relevance to such schools. They then go on to describe the government proposal by the school management and then describe how the Aboriginal school operates. Finally, he presents the methods and results. The analysis highlights that the management model is not suitable for this type of school and that it is necessary to reconsider the model from an inclusive perspective. They conclude with reflections on the principles of inclusive education, as they believe they provide further theoretical and methodological elements for inclusive teaching work in fragile settings [9]. Tamir and Arar findings contribute to the school's theory of incremental decisions about resource allocation, consistent with institutional approaches, and inform other schools dealing with similar tasks [10]. Adil et al. analyze the existing mechanism of the school management committee (SMC) and proposes an improved framework to strengthen its processes and outcomes [11].

3. The Method of Big Data Management Teaching Mode

In the information age, a variety of new publications such as digital terminals, cloud services, and microblogs have emerged, and a lot of information has also shown a growth trend. At present, there is no unified definition of big data, but the research group believes that "mass data" and "big data" are very different, the scope and content of "big data" and "big data" are different. It is essentially impossible to use traditional software and hardware tools. Machines are used to collect data required for identification, acquisition, maintenance, monitoring, and operation. In particular, it has the characteristics of low cost, variability, large scale, and fast speed and can often be divided into fixed data, static data, and nonstatic data. In the information age, big data has become a key factor in the comprehensive utilization of human and material resources and will inevitably become a key factor in intensifying competition. A key requirement for large-scale applications is the use of advanced and sophisticated techniques and methods to generate valuable data objects. The era of big data does not mean knowing more, and more importantly, in the field of education, distance learning using data has developed rapidly, and the application of LMS has become more and more extensive, resulting in an increase in the use of data

[12]. Based on the analysis of the development of all education companies, big data not only contributes to the development of technical skills but also the development of learning management strategies and ideas for improving learning.

3.1. Scientific Planning of Teaching Through the Teaching Platform. The teaching platform is an important part of professional teaching. School education must be undertaken by professionals and carry out social practice activities with clear goals, strict organization, perfect system, and strong planning in special places with the direct goal of affecting the physical and mental development of students. The most famous ones are Blue Moyun Class, Chaoxing Learning Pass, etc. Relying on the learning platform, on the one hand, schools can adopt blended teaching, flipped classroom, and other methods to break the traditional teaching method and teach students according to their aptitude. On the other hand, they can use online day-to-day management to mobilize and integrate core learning and improve teaching, management, and decision-making. For example, ordering a digitized school-based curriculum enables the permanent preservation of materials. It flexibly manages teaching practice and promotes effective communication between teachers and students. The management strategy of school knowledge ensures scientific decision-making in education.

3.2. Improving the Overall Level of Education and Teaching in Higher Vocational Colleges. In recent years, the role of big data in managing effective education in higher education and vocational training has become more and more obvious, and its benefits cannot be underestimated. To improve the overall level of education and teaching in higher vocational colleges, it is necessary to improve the comprehensive vocational teaching ability of higher vocational teachers. In the context of quality management training, big data indicates inclusiveness, timeliness, divergence, forward looking, and management dynamics. In the era of big data, educators will focus on mining the relationship between student behavior and professional skills. It tries to find the most suitable way for students to learn through data analysis, gradually reduce the daily performance monitoring of teaching quality, and establish a highly centralized system. It is used to solve the reliability problem of educational quality management and measurement. On the basis of satisfying the rights of higher education participants, the implementation of comprehensive data analysis provides a new way to evaluate and judge the process of quality education management [13]. Higher education incorporates big data forecasting, analysis, and decision-making in academic management to address weaknesses in analysis and judgment based on personal experience and perception.

3.3. Achieving Breakthroughs in Traditional Education Methods. In terms of teaching methods, the characteristics of traditional education are that it has a fixed place, specialized teachers, and a certain number of students and has a certain management system, prescribed teaching content, and training objectives, and big data can create teaching methods. Tailored teaching for specific business needs, and analysis of teaching methods according to the needs of different teachers and students, breaks the "similarity" of traditional teaching methods and modern training. Modern courses and advanced technology provide "precision" training that enables students to become specialists in professional skills. It enhances development skills and enables high-quality employment.

3.4. Promoting Information Exchange between Schools. All researchers want to share data about scientific research and its outcomes across universities and colleges. Due to the limitations of conditions, there is not much communication between colleges and universities [12]. However, the data technology in the era of big data has realized the sharing of scientific research and research results in colleges and universities.

3.5. Innovating the Work Mode of Ideological and Political Education for Students. In real life, the Internet has penetrated every place of life and study and has become a way of life for students. On the one hand, students' mood ups and downs are affected by the Internet, and on the other hand, students view online learning materials and watch videos, thus generating a large amount of data [14]. It is necessary to strengthen the construction of the main body of online ideological and political education, expand the channels of online education platforms, adhere to humanistic care, and do a good job in risk warning. Colleges and universities should use big data technology to involve students in the academic education process. It allows students to accept this type of academic work experience, truly corrects students' negative attitudes, and encourages students to grow up healthily.

4. The Application of Big Data in the Teaching Management of Higher Vocational Colleges

4.1. Carrying Out Personalized Teaching Activities. In higher vocational colleges, classroom teaching is the main teaching method, and teachers are always in the leading position of teaching [15]. However, with the popularization of big data, more and more open education has entered the education system, and online learning has become the second way of learning for many students. Compared with traditional teaching methods, online courses have advanced training, flexible learning time, and a variety of video formats and learning methods. Educational resources can be further modified and optimized, while personal learning relevant to students can be pushed to them.

The comparison between precise teaching based on big data and traditional teaching mode is listed in Table 1.

Table 1: Comparison of precise teaching based on big data and traditional teaching mode.

		Traditional mode	Big data collection, analysis, and compensation
On campus	Teach	Traditional teaching	Layered teaching
	Evaluation	Follow the score	Pay attention to the lack of knowledge points and abilities
	Review	Wrong topic	Find the source and talk about the method
Off campus	Operation	Unified work	Personalized homework
	Review	Independent review	Precise compensation

Relying on big data technology, teachers in training colleges can easily find what they really need in complex data. It improves the level of teacher training and data analysis based on career potential, which greatly improves the overall management of education. With proper instruction, skilled teachers can use a variety of online courses and online tools to employ teaching methods such as the more flexible flipped classroom. It helps to integrate teaching methods and learning concepts into classroom teaching, technical knowledge, and the workplace. By integrating teaching materials through cloud computing, educators can adapt their work focus to teaching methods and learning management, laying a solid foundation for achieving the ultimate teaching goal.

Through Table 2, the teaching situation of teachers can be monitored in real time, and schools can intervene in time for teachers with abnormal conditions, and teachers with excellent performance can be commended and encouraged.

The top ten attractive teachers in Guangdong Province in 2018 are listed in Table 2.

4.2. "4WD" Mode. "Four-wheel drive" is a training model for cultivating compound talents in the new century, which is proposed on the basis of analyzing the characteristics of the current situation of vocational education in China. The "four-wheel drive" model is a new model of Internet education and a subversion of the traditional education model. Individual "DIY learning" will replace the traditional "teacher-student" teaching model. Its basic elements are shown in Figure 1.

Practical needs are the foundation, driving teaching resources, teaching methods, and ensuring teaching quality. Teaching resources guarantee the implementation of teaching means; teaching means are specific measures that reflect the quality of teaching and can improve the quality of teaching. Teaching quality supports the needs of practice, which provides high-quality compound talents for time needs [16]. The four elements support each other and drive each other.

4.3. Experiential Teaching Mode. Based on the theory of information-informed teaching and constructivism, the teaching process is based on the five principles of lesson preparation, democracy, independence, unity, and freedom. It develops a new learning environment. Teaching activities should not be limited to classrooms, adopting a variety of new teaching methods such as knowledge and games in addition to teachers and students, allowing students to prepare themselves and teachers to help teaching. On the other hand, it breaks the teaching mode of the past. It creates a teaching method that is supervised by students and teachers in parallel by teachers.

The experiential teaching mode is shown in Figure 2.

4.4. Application of Database Course Teaching Reform Model. In this study, the random entry method is used to reconstruct the curriculum system. The content of database courses is complex and covers a wide range. The random entry method is used to reconstruct the curriculum system, and the knowledge is repeatedly infiltrated in different situations to achieve the integration of knowledge [17], as shown in the existing teaching mode diagram (Figure 3) and the reformed mode diagram (Figure 4).

From the comparison between the existing teaching model and the reformed model, it can be seen that the new curriculum is divided into four parts: the first stage uses practical technology and new cases of technology application to stimulate students' interest in learning and set learning goals. Parts 2, 3, and 4 organize courses from the DBMS system application operation level (such as using enterprise manager tools), DBMS system statement level (such as SQL statements), and development tool programming (such as ADO.NET programming) [18]. Combining the contents of these three parts is more conducive to students' continuous development of their cognitive abilities. Furthermore, it leaves theory behind. Once students are familiar with the process, it enhances their interest in learning the theory of work and achieves good learning outcomes.

4.5. Providing Powerful Tools for Student Behavior Management. The biggest headache for student administrators right now is that they cannot collect enough data in a timely manner to monitor education, much less expect regular monitoring at all times. This study uses big data to solve this problem. By collecting students' daily behavior information, each student's behavior can be accurately obtained. This may not provide early warning of all possible problems, such as disconnection, learning activities, alcoholism, and personal thoughts, and the entire management model is based on data repair and optimization. Through deep mining and extensive data analysis, it integrates the results of data analysis into school management and operations. With the scientific and intelligent management, the teaching service can be completed. For example, behavior records such as meal cards and access control information can analyze students' personalities and misbehavior. At the same time, once we have information on student behavior,

Table 2: Top ten charismatic teachers in Guangdong province in 2018 (vocational college group).

Ranking	Name	Annual growth charm	Total charisma	School
1	Che	6398	6399	Guangzhou Baiyun industrial and commercial advanced technical school
2	Lei	5103	5104	Shenzhen Longgang district teacher training school
3	Huang	4967	4967	Guangdong foreign language arts vocational college
4	Deng	3644	3669	Zhuhai art vocational college
5	Jiang	2953	2965	Shenzhen vocational and technical school
6	Gao	2747	2756	Guangdong foreign language arts vocational college
7	Huang	2722	2769	Huizhou city vocational college
8	Li	2561	2563	Huizhou city vocational college
9	Wang	2437	6693	Guangzhou Baiyun industrial and commercial advanced technical school
10	He	2181	2241	Huizhou city vocational college

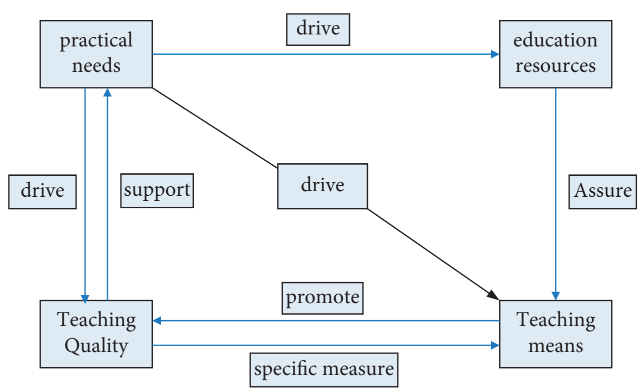

Figure 1: Schematic diagram of the basic elements of "four-wheel drive."

we can look more closely at the relationship between student performance and educational and career outcomes [19, 20]. In the past, when assessing student learning outcomes, we could simply "process" the "facts" by knowing them in the traditional way. Examples include the recent drop in grades for students due to their parents' divorce and the drop in grades for female students due to weight loss. With traditional methods, we may not be able to identify potential causes of student performance declines and provide early warnings. These problems are difficult to find from the teaching process, and students rarely talk to the counselor about related issues; it is even more difficult for teachers to learn about similar situations [21]. Through the mining and application of big data in student behavior, it is not only possible to discover the factors that may lead to the decline of students' academic performance but also give early warning and inform relevant teaching staff to provide timely guidance. The overall design framework of the application is shown in Figure 5.

In this study, the data in Figures 6–8 are obtained through the school's survey of student data. According to the weekly average data of the surveyed students for four weeks ($x1$, the first week; $x2$, the second week; $x3$, the third week; $x4$, the fourth week), the results show that when the student's highest grade is 8.9, the average student's other data are 7.98. When student grades were as low as 5.5, the student's other data averaged 5.41. This shows that the student's academic performance is closely related to other data of the student. The internal data of the data layer are shown in Figures 6–8.

4.6. System Module Establishment. "Six people" education is a big goal. The gist of the "six people" is that the reputation of the people is the standard, the support of the people's heart and the people's strength is the basis, the public opinion is the basis, the people's wishes and the people's aspirations are the directions, the people's benefit is the goal, and the people's suffering is the dereliction of duty. The evaluation index system of "six-dimensional citizens" is defined by information technology. Schools have every right to assess and record dynamic profiles of student growth, provide relevant information, and assess learning outcomes in various school departments. The system module is shown in Figure 9.

The main sources of data collection on "six people" education are listed in Table 3.

5. Big Data and Teaching Management in Higher Vocational Colleges

5.1. Fitness Formula. The complexity of the fitness function is the main component of the complexity of the genetic algorithm, so the design of the fitness function should be as simple as possible to minimize the computational time complexity.

The fitness function is defined as follows:

$$f_G = \frac{j_{\text{in}}^G}{\left(j_{\text{in}}^G + j_{\text{out}}^G\right)^{\alpha}}. \quad (1)$$

Among them, G is a divided community; j_{in}^G represents the sum of the number of interconnected edges of all nodes in the community G, which is twice the sum of the internal edges of the divided community G. j_{out}^G is the sum of the number of edges connecting the nodes in community G to the outside of community G; α is an adjustment parameter that controls the size of the community. According to experience, the α value of 1.0 to 1.7 is more appropriate, and the α value selected in this study is 1.4 [22, 23].

For any node A in the network, its fitness to community G is defined as the change of community G with and without node A, that is

$$f_G^A = f_{G+A} - f_G. \quad (2)$$

Among them, f_{G+A} and f_G represent the fitness of community G including node A and the original community

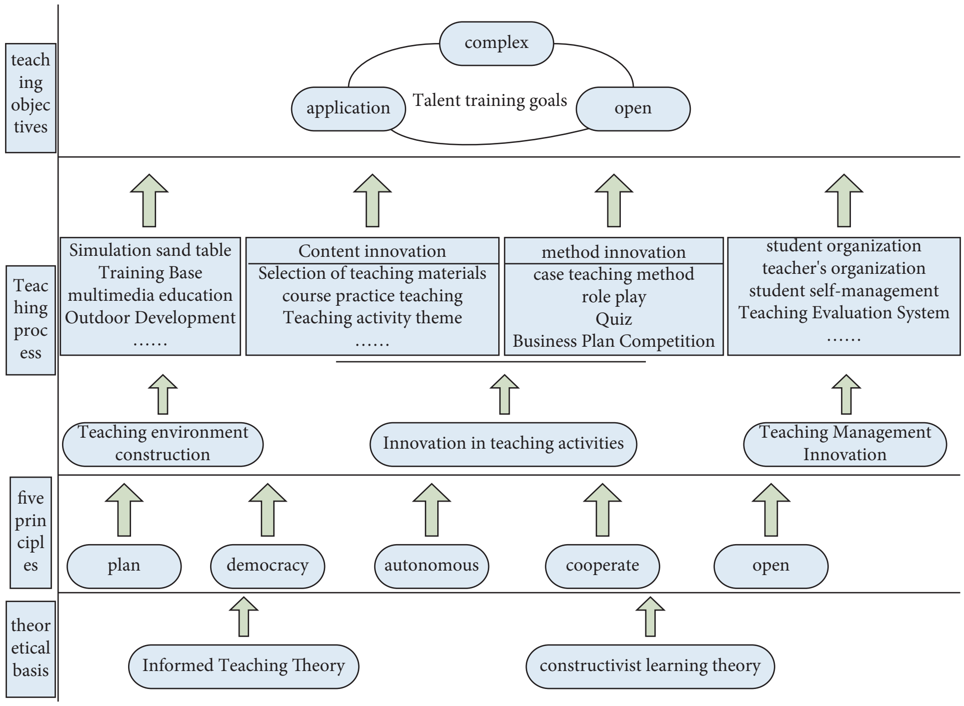

Figure 2: Experiential teaching mode diagram.

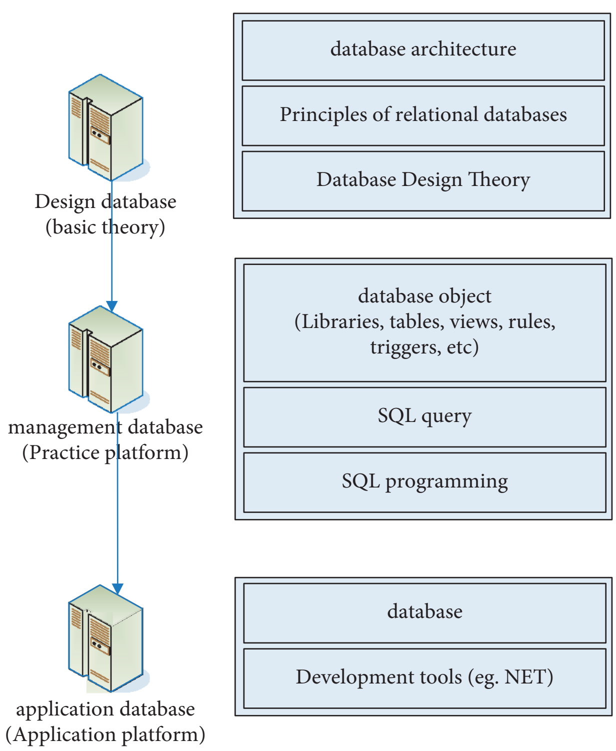

Figure 3: Existing teaching mode diagram.

G not including node A, respectively. If $f_G^A > 0$, then it means that the fitness of node A increases after joining community G; if $f_G^A < 0$, then it means that the fitness of node A decreases after joining community G [24].

To sum up, when judging whether each node wants to join the community, it is necessary to calculate the original community j_{in}^G, j_{out}^G and the community j_{in}^G and j_{out}^G after joining the node, which increases the computing time. Therefore, the fitness formula is improved. The original fitness formula of community G is as follows:

$$f_G = \frac{j_{in}^G}{\left(j_{in}^G + j_{out}^G\right)^{\alpha}}. \tag{3}$$

The fitness formula after community G joins node A is as follows:

$$f_{G+A} = \frac{j_{in}^{G+A}}{\left(j_{in}^{G+A} + j_{out}^{G+A}\right)^{\alpha}}. \tag{4}$$

After joining node A, the edge j_{in}^A connecting the node A to the community G and the edge j_A^G connecting the node A of the original community G are both internal edges, and the edge j_{out}^A connecting the node A and the external nodes of the original community G becomes the external edge, so

$$\begin{aligned} j_{in}^{G+A} &= j_{in}^G + j_{in}^A + j_A^G, \\ j_{out}^{G+A} &= j_{out}^G + j_{out}^A - j_{in}^A a. \end{aligned} \tag{5}$$

So

$$j_{in}^{G+A} = j_{in}^G + 2 j_{in}^A. \tag{6}$$

That is, the community fitness after adding person A node is as follows:

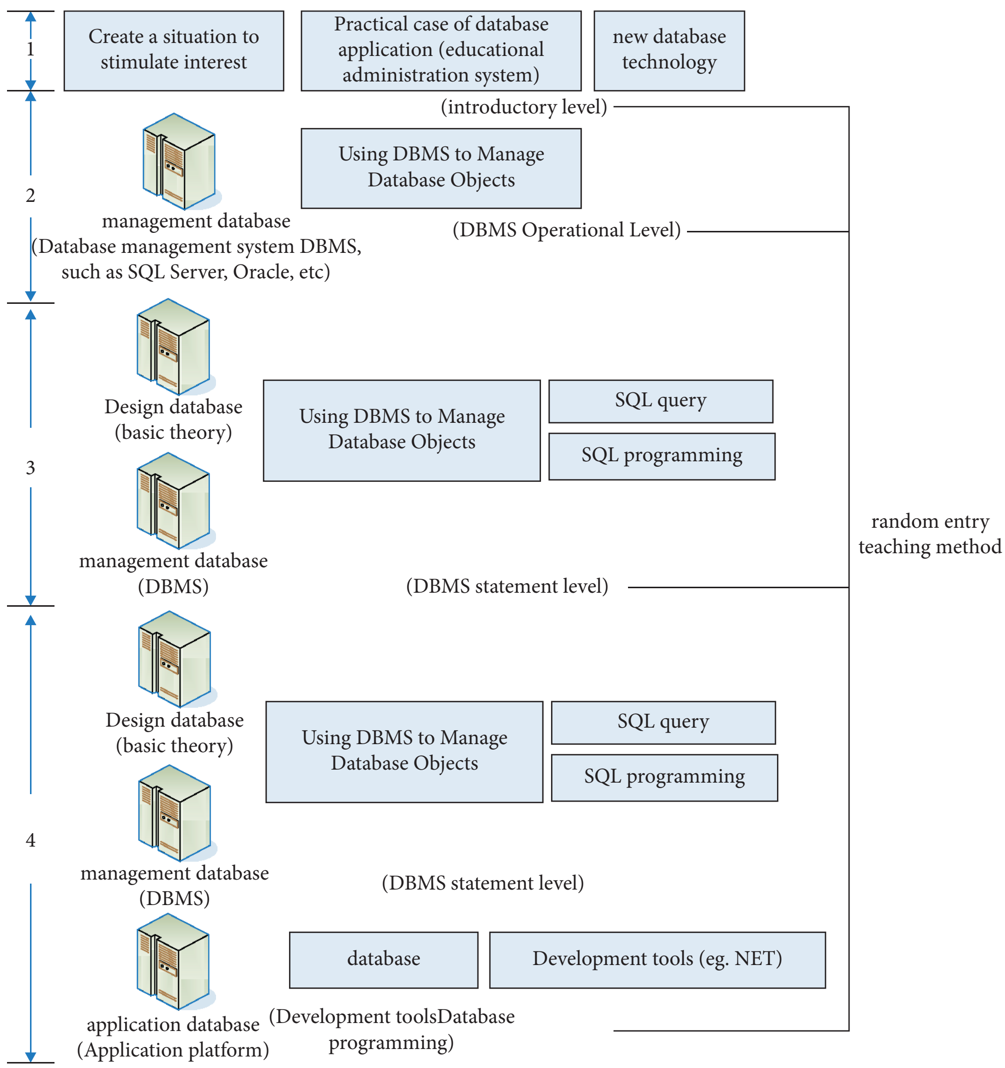

Figure 4: Teaching mode after the reform.

$$f_G = \frac{j_{\text{in}}^G + 2 j_{\text{in}}^A}{\left(j_{\text{in}}^G + 2 j_{\text{in}}^A + j_{\text{out}}^G + j_{\text{out}}^A - j_{\text{in}}^A\right)^{\alpha}} = \frac{j_{\text{in}}^G + 2 j_{\text{in}}^A}{\left(j_{\text{in}}^G + j_{\text{in}}^A + j_{\text{out}}^G + j_{\text{out}}^A\right)^{\alpha}}. \tag{7}$$

Therefore, it only needs to calculate j_{in}^G and j_{out}^A of the initial community G once, and every time a new node is added, it only needs to calculate j_{in}^G and j_{out}^A to meet the requirements, which reduces the time consumption.

5.2. Principal Component Analysis (PCA). Principal component analysis (PCA) is a statistical process. The principle of PCA is to use the eigenvector matrix U to represent a high-dimensional vector x and project it to a low-dimensional vector to represent a low-dimensional vector y and only lose some secondary information. It uses an orthogonal transformation to convert a set of potentially correlated observations of each entity variable with distinct numerical values into a set of uncorrelated linear variable values, called principal components. The original PCA method can be refactored as follows:

Step 1. Suppose the data matrix of the sample is

$$X = \begin{bmatrix} x_{11} & \cdots & x_{1p} \\ \vdots & \ddots & \vdots \\ x_{n1} & \cdots & x_{np} \end{bmatrix}. \tag{8}$$

The initial data are normalized as follows:

$$x_{nm}^{*} = \frac{x_{nm} - \overline{x}}{\sqrt{\text{var}\left(x_m\right)}}. \tag{9}$$

In the formula,

$$\overline{x} = \frac{1}{i} \sum_{n=1}^{i} x_{nm}, \text{var}\left(x_n\right) = \frac{1}{i-1} \sum_{i=1}^{i} \left(x_{nm} - \overline{x}_m\right)^2. \tag{10}$$

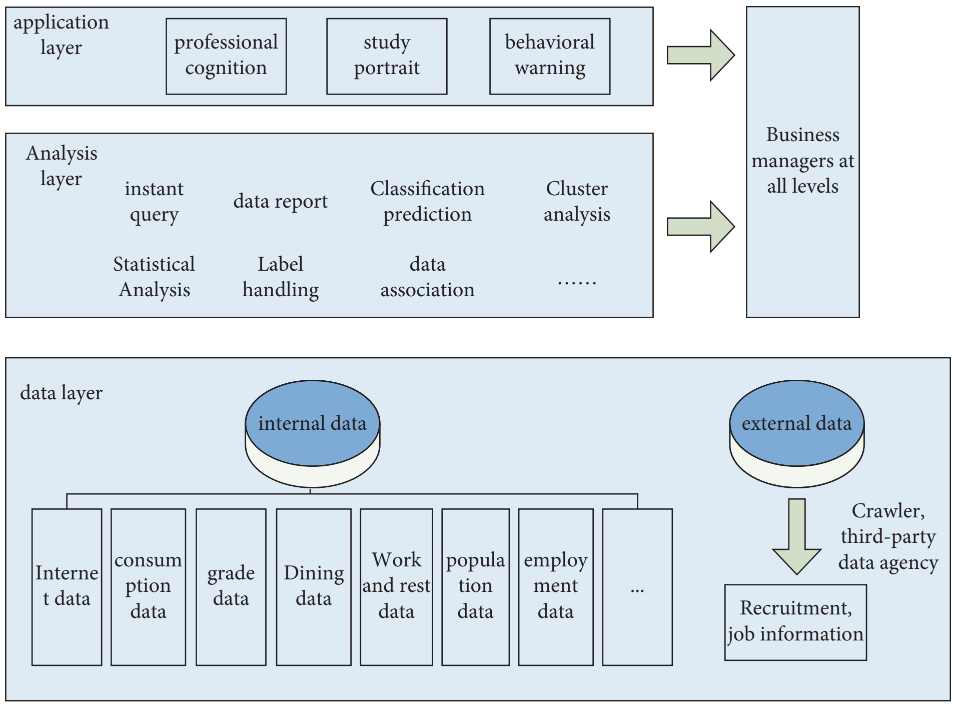

Figure 5: Overall design framework.

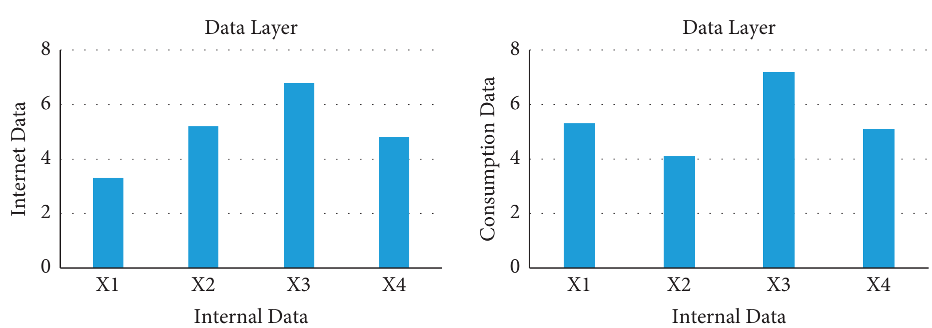

Figure 6: Internal data 1 of the data layer.

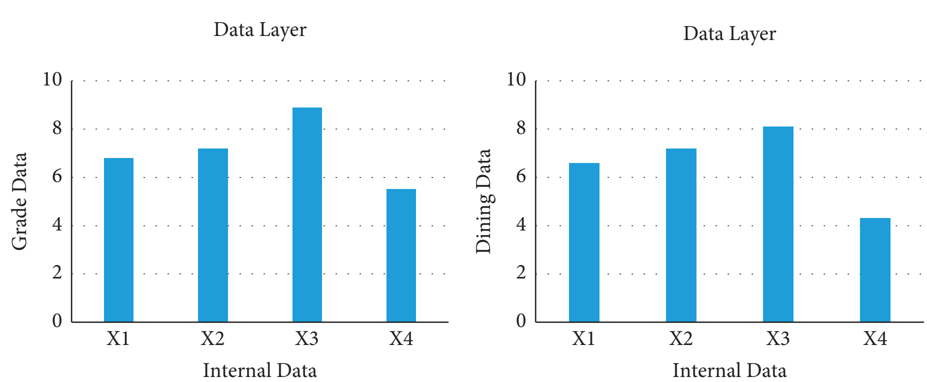

Figure 7: Data layer internal data 2.

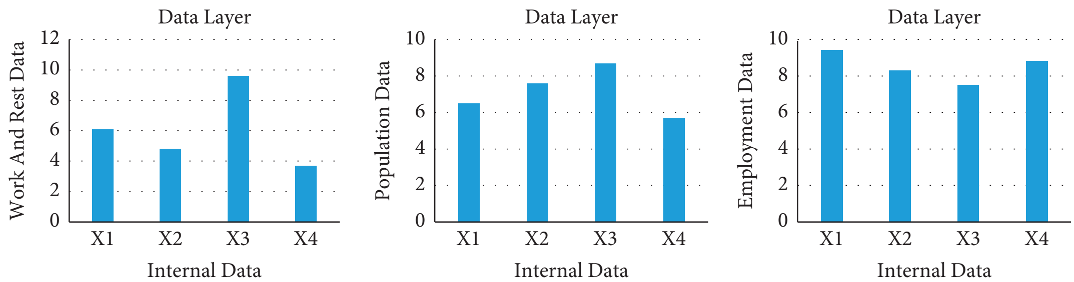

FIGURE 8: Internal data in the data layer 3.

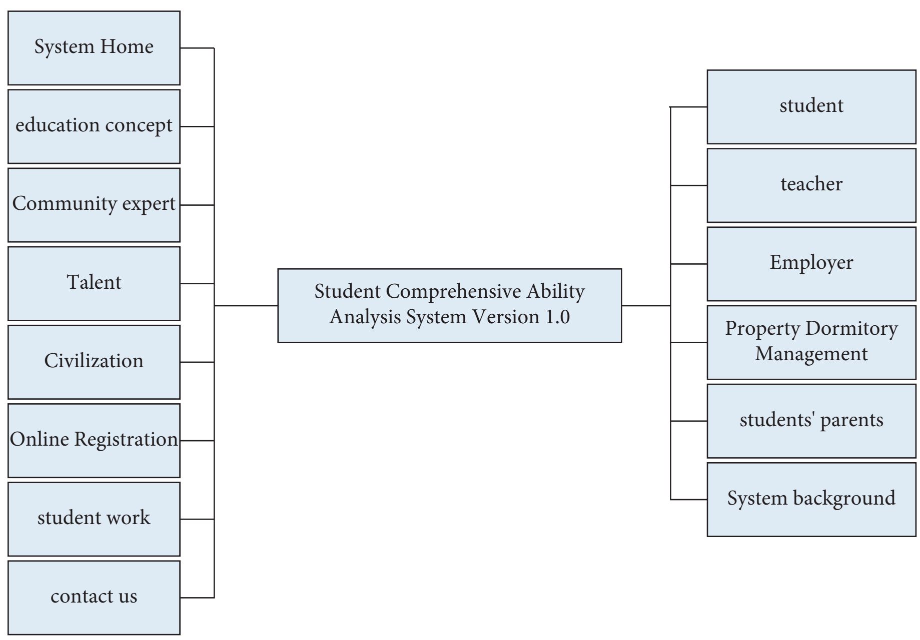

FIGURE 9: Modules of students' comprehensive ability analysis system.

TABLE 3: Main data sources.

Serial number	Content
1	Basic information of students (including whether they are members of the league or party members)
2	Student transcripts (by semester and class)
3	Classroom activity information (Blue Moyun and Chaoxing)
4	Reward and punishment information (reward name, reward level, punishment name, and punishment level)
5	Employment information (position, region, salary level, company comments, and instructor comments)
6	Club information (including club name and club title)
7	Social practice (including volunteer activities and corporate practice)
8	Graduation dissertation information (including writing, communication, structure, originality, dissertation comments, and dissertation defense speech)
9	College information (including dormitory score and discipline score)
10	College physical fitness test information
11	English AB, CET-4, CET-6 passing list and scores, and competition results information

$n = 1, 2, \ldots, i$; $m = 1, 2, \ldots, p$.

Step 2. Calculate the sample correlation coefficient matrix.

If the initial data are normalized, then X indicates that the data-related numbers after normalization:

$$R = \begin{bmatrix} r_{11} & \cdots & r_{1p} \\ \vdots & \ddots & \vdots \\ r_{n1} & \cdots & r_{np} \end{bmatrix}. \tag{11}$$

In the formula,

$$r_{nm} \frac{\operatorname{cov}(x_n, x_m)}{\sqrt{\operatorname{var}(x_1)}\sqrt{\operatorname{var}(x_2)}} = \frac{\sum_{k=1}^{k=i} (x_{kn} - \overline{x}_n)(x_{km} - \overline{x}_m)s}{\sqrt{\sum_{k=1}^{k=i} (x_{kn} - \overline{x}_n)^2}\sqrt{\sum_{k=1}^{k=i} (x_{km} - \overline{x}_m)^2}}, \quad n > 1. \tag{12}$$

Step 3. Calculate the eigenvalues $(\lambda_1, \lambda_2, \ldots, \lambda_p)$ of the correlation coefficient R and the corresponding eigenvectors:

$$a_n = (a_{n1}, a_{n2}, \ldots, a_{np}), \quad n = 1, 2, \ldots, p. \tag{13}$$

Step 4. Select the principal components and write the principal component expression.

The principal components of P can be detected by PCA, and the amount of information that can be used is reduced because the variance in each principal component is reduced. Therefore, in practical analysis, it is generally based on the contribution rate, rather than selecting the P principal component. The contribution rate is the proportion of the variance of the principal components in the total variance and is actually a combination of a certain proportion of the total eigenvalues, namely,

$$\text{Contribution rate} = \frac{\lambda_n}{\sum_{n=1}^{p} \lambda_n}. \tag{14}$$

Step 5. Calculate the principal component score.

Up-to-date information is provided for each example section of the main section, according to each model, based on the raw data, in the following form:

$$\begin{pmatrix} F_{11} & L & F_{1K} \\ M & O & M \\ F_{n1} & L & F_{nk} \end{pmatrix}. \tag{15}$$

In the formula,

$$F_{nm} = a_{m1}x_{n1} + a_{m2}x_{n2} + \cdots + a_{mp}x_{np}, \quad (n = 1, 2, \ldots, i; m = 1, 2, \ldots, k). \tag{16}$$

Step 6. According to the data in the principal components, further, test and analyze the problem.

5.3. Promoting the Value of Big Data Technology in the Teaching Management of Vocational Colleges. Big data technology is of great significance to the development of education. In the field of education, education management, teaching monitoring, thinking, and learning practices are all affected by big data. Big data can promote scientific and refined learning management. It is necessary to reflect the characteristics of vocational education such as the integration of production and education, school-enterprise cooperation, work-study integration, and the unity of knowledge and action. Curriculum improvement involves many things. It is based on capturing big data and publishing new content on a regular basis. It uses a wide range of data technologies, focuses on learning management tasks, various processes, and decisions [25], and fully integrates into big data management learning. For example, systematic planning and classification have been established in various fields such as scientific research, teaching evaluation, and quality teaching. The primary data for the implementation of all courses in the school come from the data collection standards. It can also record the data required to control the object from different sources and sources to observe each other and build the data of the multifunctional object [26, 27]. All in all, big data technology can strengthen scientific and refined course management, which needs to be promoted everywhere. After the school collects students' learning data in Blue Nebula and Chaoxing, the reading index of the school learning system is obtained. The reading index of the school learning system is shown in Figure 10.

It can be seen from the figure that the learning data of Blue Nebula from 2017.09.20 to 2017.10.10 are 8.5 more than that of superstar on average.

During the period of 10.01–10.10, the learning data of the two platforms increased by 15 and 7, respectively, compared with the period of 09.20–09.30. Big data teaching is gradually becoming the daily learning of students.

5.4. Big Data Brings Changes to College Teaching Management. Teaching management is an important part of management activities in colleges and universities. It has the characteristics of extensive coverage, cumbersome, and large amount of data and periodicity. The use of big data technology can provide a platform for teaching management innovation. In terms of teaching, big data is leading the reform of teaching mode. In terms of scientific research, big data is opening up new scientific research models. In terms of management, big data helps schools manage intelligently. The traditional teaching management mainly includes teachers arranging courses, students choosing courses, exams, score entry, and so on. At present, most colleges and universities have established a teaching management system, which makes teaching management systematized and computerized, and facilitates the use of teachers, students, and teaching administrators. However, these teaching

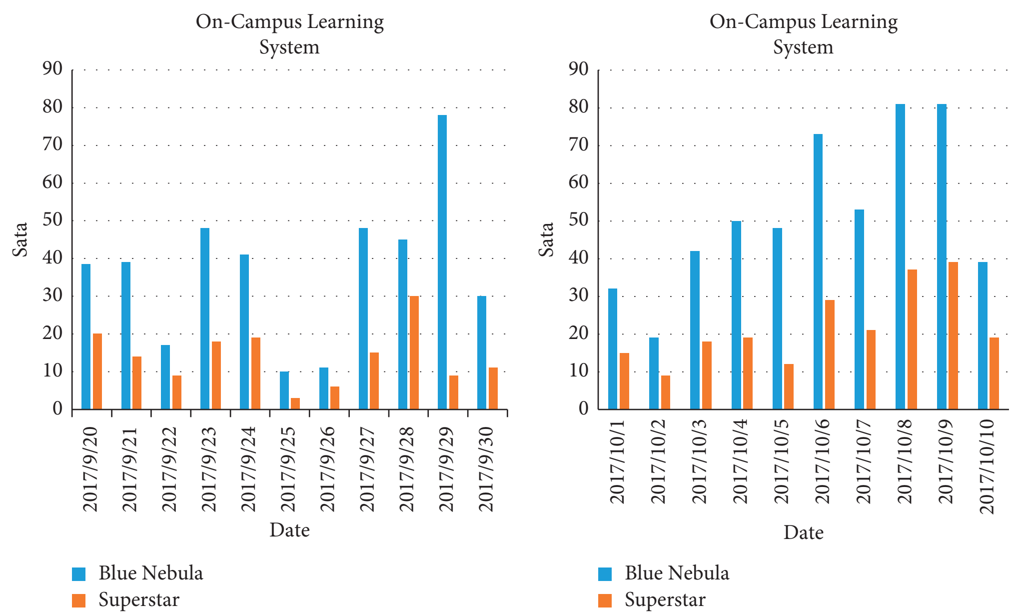

Figure 10: Reading index of intramural learning system.

management systems often have the problem of islanding and transactionalization. All kinds of personnel only complete basic functions such as query and input on the system. It cannot mine and analyze the internal data of the system, and the teaching systems of various colleges and universities cannot effectively communicate with each other, resulting in the formation of isolated islands between schools.

Using big data technology, on the one hand, the useful information hidden in the teaching system can be deeply excavated. For example, the corresponding elective and minor courses can be recommended for students based on their test scores in multiple semesters. It can provide each teacher with a teaching evaluation report based on the students' course selection and teaching evaluation information. On the other hand, big data technology can break through the barriers of colleges and universities and share educational resources. It provides students with a better educational environment. For example, the MOOC platform built through cloud computing and big data technology enables people to enjoy the education of first-class universities such as Harvard and Princeton without leaving home.

Due to the broad definition of university decision-making and the complexity of decision-makers, the decision-making process in universities is diversified. Some researchers categorize college decision-making models into four categories: "bureaucratic" models, which rely on the knowledge and ability of decision-makers to make decisions. It is a "college-type" model that balances the interests of multiple groups within a university through a process of "consensus." Various power groups and interest groups express "political" models of different demands through "communication." There is also an "organized anarchy" model of uncontrollable and inconsistent decision-making. The main weakness of these models is the lack of strong decision support, especially as policymakers only try to make "good" decisions based on "built-in thinking."

5.5. The Role of Big Data in Educational Applications. The ultimate goal of big data analysis in education is to improve students' academic performance:

(1) Big data in higher education can motivate teachers to improve teaching methods and improve teaching skills. Through the analysis of student behavior data, it is possible to identify students' study habits, study rules, and factors that affect students' study. Through mining, regularity can be found, and potential problems of student behavior can be intervened in advance. It allows teachers to guide and adjust their teaching and learning strategies. It creates and facilitates teaching strategies that are specific to students.

(2) Big data in higher education can promote the establishment of a learning platform for students, allowing students to adapt and improve learning efficiency. It understands students' learning status and their own situation, provides students with a learning experience that suits them, and provides students with personalized activities. The learning content is adjusted according to the students'

learning habits to meet the needs of the students' learning courses.

(3) Big data in higher education can provide useful data for educational decision-making. It contributes decisive data to the rise of vocational training in China. It can use educational big data prediction to realize the concept of decision-making, thereby improving decision-making ability. Some scholars suggest using big academic data and computer simulation technology to assist in optimizing academic choices. In this way, educational development options for higher education can also be adjusted to become more scientific and sustainable.

6. Conclusion

In the era of big data, the dissemination of data information is faster, and the data statistics for students' knowledge learning and skills mastery are also more convenient. Compared with the ability test, it can more accurately reflect the real situation of students' learning. This is more beneficial to the establishment of the education evaluation system, the overall improvement of the teaching level, and the transformation of the teaching method. The establishment of an information platform in higher vocational colleges can provide students with channels and platforms for communication and exchange, and at the same time, they can also collect real data of students in time to provide analysis data for the school's education quality management. Finally, in the process of education reform, colleges and universities need to integrate the characteristics of the era of big data, improve the application of Internet thinking, and pay attention to the improvement of academic skills. We should focus on solving the shortcomings of the traditional education model, formulate education reform plans from the perspective of the public, promote the reform plan of education and teaching in colleges and universities, improve the quality of teaching in colleges and universities, develop students' practical skills, and cultivate high-quality talents.

Data Availability

No data were used to support this study.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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