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Construction and Implementation of Application-Oriented Undergraduate Teaching and Teaching Evaluation System Based on Multiple Information Fusion

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ABSTRACT

At present, many schools implement teaching quality evaluation systems with student performance and practical activities as the core data of evaluation. Based on the introduction of the training objectives and discipline nature of the information management and information system specialty, this paper analyzes the construction principles of the multi-disciplinary curriculum system of the specialty and puts forward relevant countermeasures for the construction of the multi-disciplinary education system. This paper introduces the definition of practical teaching evaluation system and teaching evaluation algorithm. Among them, naive Bayesian algorithm can improve the sample accuracy by 95%, so it is necessary to build an application-oriented undergraduate practice teaching evaluation system.

KEYWORDS

Applied Undergraduate Teaching, Multi-Information Fusion, Professional Training, Teaching Evaluation

INTRODUCTION

When the teaching quality evaluation system is implemented in many schools, it takes student performance and practical activities as the core data for the evaluation (Chen, 2021). Obviously, the evaluation of teaching quality is not just a process of entering relevant comments at the end of the term, but a dynamic mode to manage teachers' business performance and student guidance during school (Dai et al., 2019). The evaluation process for teaching quality is widely discussed due to its complexity and the lack of clear indicators. (Bao & Yu, 2021). Schools have not established a recognized evaluation system for the evaluation of teaching quality. In addition to the main evaluation, the evaluation standard should also be another evaluation, self-evaluation, and various types of comprehensive evaluation. The evaluation methods tend to be diversified, and the evaluation mode is based on systematization (Yang et al., 2015). This evaluation method can better reflect the comprehensive evaluation of teaching quality and comprehensively measure and evaluate a teacher's teaching quality.

Application-oriented colleges and universities should embody the word "application" more in discipline development, professional structure, curriculum, teaching content, and other aspects

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to cultivate high-quality application-oriented talents with strong social adaptability and innovative consciousness (Shi, 2019). Agricultural modernization is developing synchronously with new industrialization and urbanization. The key of agricultural informatization lies in talents. The lack of high-quality talents has become the biggest bottleneck in the development of agricultural informatization. To match the development of modern agriculture, agricultural informatization talents should not only have solid professional theory and practical ability but also have the application ability combined with the "three rural" issues, especially the application and development ability of agricultural information technology. Practical teaching is the bridge and link to realize the combination of theoretical knowledge and practical ability (Wu et al., 2021). It plays an important role in developing students' practical abilities, cultivating innovation ability, and improving comprehensive quality. The practical teaching system can be divided into a broad sense and a narrow sense. The broad sense practical teaching system is a whole composed of practical teaching objectives, content, management, and a condition support system. In a narrow sense, the practical teaching system refers to the practical teaching content system (Zhang, 2021). It is embodied in the teaching plan and revolves around the training objectives of professional talents. Through reasonable teaching settings and reasonable allocation of various practical teaching links, it establishes a teaching content system that complements theoretical teaching. Practical teaching is an important way to cultivate students' innovative spirit and practical ability, directly affecting the quality of higher education. As the product of the popularization of higher education, the important function of application-oriented colleges and universities is to cultivate high-quality application-oriented talents to meet the needs of social development. Therefore, the construction and implementation of a practical teaching system plays a vital role in cultivating high-quality applied talents (Cai & Wang, 2022).

Practical teaching plays an increasingly important role in the education of application-oriented undergraduate colleges and universities, and scientific, reasonable evaluation of practical teaching cannot only be used to adjust the setting of practical courses; it also must help schools understand whether the effect of practical training meets the needs of students and determine how to find and improve the problems in practice. But at present, the evaluation system of practical teaching in application-oriented undergraduate colleges is not perfect and cannot effectively guarantee the quality of practical teaching. To better improve the quality of practical teaching and ensure its smooth development, building a scientific, effective evaluation system of practical teaching is necessary (Zheng et al.,2018). On the basis of introducing the training objectives and discipline nature of the information management and information system specialty, this paper analyzes the construction principles of the multidisciplinary curriculum system of the specialty, puts forward relevant countermeasures for the construction of the multidisciplinary education system, and finally puts forward the practical teaching evaluation algorithm based on naive Bayesian (NB). The study of a practice teaching evaluation system in applied undergraduate colleges and universities is of great significance in promoting teaching reform, improving education quality, promoting students' development, and enhancing employment competitiveness. It can provide scientific guidance for practice teaching, promote the optimization and innovation of education and teaching, and make positive contributions to the comprehensive development of students and the satisfaction of social needs.

This article includes five sections. The first section is the introduction. The second section is about the research summary of practical teaching evaluation in application-oriented undergraduate colleges. The third section is about the connotation definition system of practical teaching evaluation system, which refers to an organic whole with specific functions formed by the interconnected system of several related things or some consciousness. The fourth section is about the teaching evaluation algorithm. In the whole process of teaching evaluation, different evaluation index dimensions are formulated according to the diversity of evaluation contents and methods. The fifth section is about the necessity of building an application-oriented undergraduate practical teaching evaluation system and the urgent need to improve the quality of undergraduate talent training.

RELATED WORK

Practical teaching is an effective way to consolidate theoretical knowledge and deepen theoretical understanding. It is an effective teaching method to integrate theory with practice, cultivate students to master scientific methods, and improve practical ability (Chen et al., 2020). To develop science and technology culture, colleges and universities should strengthen their practical teaching links. With the popularization of higher education, colleges and universities that cultivate applied talents urgently needed by society have entered a stage of rapid development. Strengthening practical teaching is the need to cultivate applied talents who meet the requirements of society, and after it becomes popular, higher education faces this new historical task. In recent years, application-oriented colleges and universities have developed rapidly in practical teaching, but there are still many problems restricting the improvement of talent training quality in application-oriented colleges and universities. Building a reasonably practical teaching system has become an important topic for application-oriented colleges and universities.

Wang (2018) recommended that at present, all agricultural and forestry colleges and universities actively explore new models of talent training according to the new requirements of national or regional agricultural informatization development. Li et al. (2011) stated that the characteristics and advantages of the information technology vocational education major in agricultural universities are not obvious; rather, they are similar to other information technology majors in universities, but have a low degree of integration with the dominant disciplines of the university. Professional talent training lacks characteristics and advantages. Yin et al. (2021) stated that the research directions of teacher and student teams are scattered and that the number of teams is small, thereby leading to insufficient efforts to cultivate the professional quality of innovation and entrepreneurship. These limited resources cannot provide a comprehensive guarantee for the training of senior applied talents in the field of digital agriculture. According to Ke (2019), the practice curriculum system is old, the practice teaching content and form are single, the teaching mode is backward, and the "one-to-many" face-to-face guidance cannot take into account all students. Ke (2019) also stated that there are many obstacles in the interaction between teachers and students, that students' professional differences and personalized training are insufficient, and that there are professional homogenization problems. According to Lu and Zhao (2016), the integration of "industry, university, research and education" is low, and the advantages of scientific research and social services are not prominent, the characteristics are not distinct, and the competitiveness is lacking. The mechanism of resource sharing and collaborative education is not perfect, the combination of teaching and scientific research and actual production is not close, and the driving ability of innovation and entrepreneurship is insufficient. Zhang (2016) stated that there is a lack of practical teaching resources, insufficient support for the cultivation of students' practical ability, difficulties in the effective implementation of practical teaching resource sharing and collaborative education mechanism, and an insufficient combination of professional practice and actual production. Zhang (2016) also posited that students skill characteristics are not prominent, and their core competitiveness is not strong. According to Chen (2013), practical teaching plays an increasingly important role in the education of applied undergraduate colleges; scientific, reasonable practical teaching evaluation can be used to adjust the setting of practical courses and supplement and improve the course content. Chen (2013) also stated that practical teaching can help schools understand whether the input and output of practical training meet expectations, whether the distribution of teaching resources is reasonable, and whether the effect of practical training meets students' needs and helps determine how to find and improve the problems in practice. Gao (2016) stated that the current practical teaching evaluation system of application-oriented undergraduate colleges is not perfect, and therefore, cannot effectively guarantee the quality of practical teaching. To better improve the quality of practical teaching and ensure its smooth development, building a scientific and effective practical teaching evaluation system is necessary. According to Guo et al. (2013), the examination of experimental courses is mainly based on students' attendance, experimental

results, and experimental reports; however, there is no clear evaluation index to evaluate students' innovation ability, thinking ability, professional consciousness, and so on. Zhang (2017) stated that the evaluation of teachers' practical teaching is divided into two parts: (a) the evaluation of curriculum and teaching content and (b) the evaluation of individual teachers. However, the evaluation questions set in most teaching evaluation systems are not in depth, and the questionnaire design is not perfect. Generally, there are only a few existing options, and students can only score simply (Yang et al., 2021). Students' evaluation opinions are not specific and cannot meet the needs of teachers. In addition, students' academic progress is rarely directly considered in the evaluation, thus leading to the inability to reflect teachers' teaching effects and teaching levels.

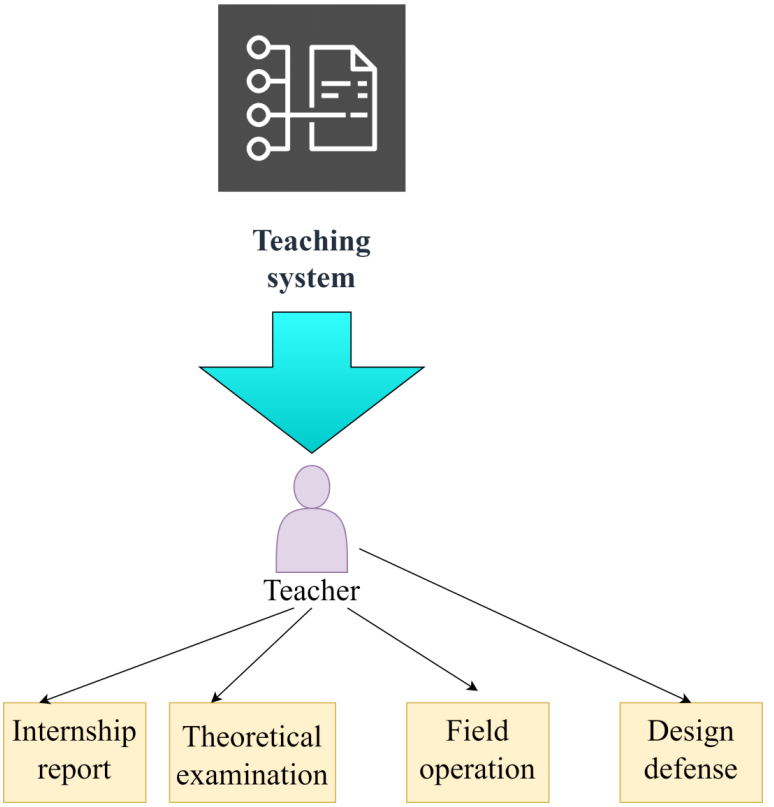
At present, the evaluation of practical teaching in application-oriented colleges and universities is carried out from two aspects: teachers and students. The examination of students' practical ability is not reflected in the course performance evaluation except that the grades of experimental courses, graduation theses, and internships are calculated separately. A single assessment method is not conducive to the cultivation of students' practical abilities, and cannot comprehensively and correctly evaluate students' learning effects. In addition, the form of teaching evaluation for teachers is too simple. Most schools only let students evaluate courses and teachers at the end of the term. In the chemistry teaching management of application-oriented undergraduate colleges, inorganic chemistry teaching evaluation is an important indicator that can effectively and intuitively reflect the teaching quality of inorganic chemistry, and whether the teaching process is consistent with the final examination results. Teaching evaluation generally refers to the process of judging and evaluating the teaching activities in specific courses with reasonable methods according to the standard parameters formulated. Teaching evaluation should have a series of characteristics, such as science, impartiality, objectivity, reflection, and so on. Based on scientific and reasonable teaching evaluation, teachers and school teaching management departments can make corresponding teaching strategies and management measures to promote the improvement of teachers' teaching levels and the planning of curriculum mode of teaching departments (Kotsia et al., 2008). The teaching purpose of inorganic chemistry in applied undergraduate colleges is to cultivate applied talents with chemical literacy and provide fresh blood for industrial development.

DEFINITION OF PRACTICAL TEACHING EVALUATION SYSTEM

System refers to an organic whole with specific functions formed by the interconnected system of several related things or some consciousness. Specifically, it includes two meanings: (a) the things that constitute the system are related to each other rather than irrelevant and (b) a construction process that is artificial. Only when these two meanings are met can it be called a system (Borràs et al., 2015). The development of students' application skills should serve as a guide for the creation of a comprehensive and scientific student evaluation system. This system should be constructed using various components, such as graduation theses, experiments, practical training, and practice. To ensure that every training has a report or result and that the professional instructor provides the overall results of the training and records them in the course results, colleges and universities should first improve the supervision and administration of practical teaching both within and outside the school.

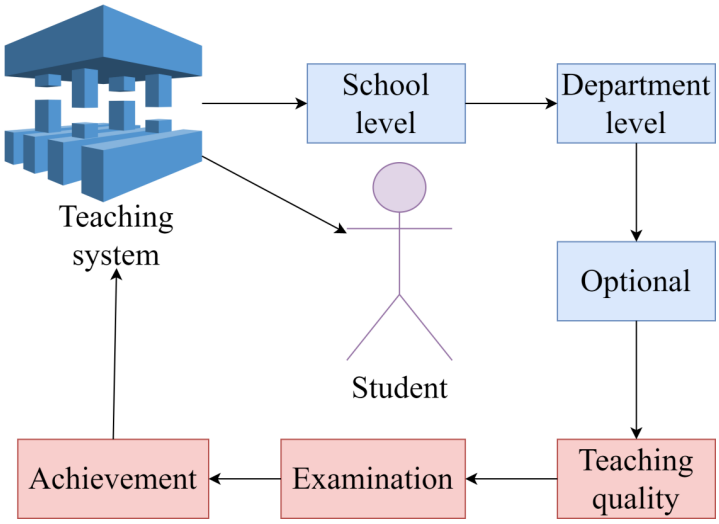
From the perspective of the development law of education, when education develops to a certain scale in quantity, the quality problem will inevitably become the focus of attention. A well-known fact is that many factors affect the quality of education, and among them, education-led teachers are the most critical factors that affect the quality of education. Studying the factors that affect the quality of teachers' classroom teaching is a significant step to reasonably design teaching evaluation methods and improve classroom teaching effect. When establishing a student-centered classroom teaching quality evaluation system, teachers at colleges and universities need to consider the characteristics of college students' physical and mental development, the types of basic courses and professional courses, and the indicators and their weights in the evaluation system. The teaching evaluation system is a unified

Figure 1. Teaching evaluation system



whole composed of the basic knowledge structure, framework, teaching content design, teaching method design, teaching process design, and teaching result evaluation of the teaching process (Parikh & Chen, 2008). According to the requirements of training objectives, specific quality standards are formulated for each link of practical teaching, and the teacher questionnaire index system at three levels of school level, department level, and self-selection is designed. The indicators at the school level include the overall evaluation of teachers' teaching effects and curriculum quality to understand the overall effect of teaching. Department-level indicators are the core teaching evaluation indicators set by the departments according to the specific requirements of the departments to facilitate the follow-up work of the departments. Self-selected indicators are teaching evaluation indicators designed or selected by teachers in combination with the characteristics of disciplines and courses. In terms of time, course evaluation can be carried out many times in a semester. In terms of form, curriculum teaching evaluation can combine immediate teaching evaluation with summative teaching evaluation. Real-time teaching evaluation refers to letting students evaluate the classroom in a timely manner through the smartphone survey application so that teachers can understand their teaching effects in a timely manner, adjust the ongoing teaching in a timely manner, and ensure the teaching quality. The final teaching evaluation at the end of the unit and the end of the semester is conducive to the teachers to check what the students have finally learned and to make a more comprehensive evaluation of their curriculum designs and teaching abilities. At the same time, primary school students see that the course has been improved in time owing to their own evaluations, and the motivation to participate in the evaluation has been enhanced; this process is conducive to the formation of a virtuous circle, as shown in Figure 2.

Figure 2. Basic teaching system



Practical teaching runs through the whole undergraduate education stage. In the professional talent training program, each semester should have specific practical teaching content. Practical teaching runs through the whole undergraduate education stage. In the professional talent training program, each semester should have specific practical teaching content. Application-oriented undergraduate colleges and universities should establish an effective practical teaching quality evaluation monitoring and feedback system, formulate and revise the overall teaching evaluation plan, and promote the smooth progress of teaching evaluation activities as planned. First, the members of the evaluation department should be diversified. The evaluation department shall be composed of professional institutions outside the university, enterprise experts, administrative departments inside the university, college leaders, peers, students, and other personnel. The power of diversified members will form a relationship of checks and balances and supervision so that the evaluation department will reach a neutral and impartial state. Therefore, the index design and evaluation process of evaluation should be relatively in line with the characteristics of the public and should not be inclined to some colleges or individuals to ensure the objectivity and impartiality of the evaluation results. Second, the evaluation activities should be carried out in the whole process. A complete closed-loop monitoring and feedback system can be formed through the forms of practical teaching regular meetings, supervision and inspection, peer evaluation, survey app software survey, practical teaching briefing, student evaluation of teaching, student symposium, school office automation system, and so on.

The construction of a practical teaching content evaluation system is the core of the construction of a practical teaching evaluation system, which should be classified and constructed according to the characteristics of practical teaching links. Practical teaching content modules usually include five categories: quality development module, experimental teaching module, internship training module, thesis design module, scientific research innovation module, and so on. The corresponding teaching preparation, teaching methods, teaching means, and teaching content of each module are different. The corresponding evaluation methods of each module should pay attention not only to the results of learning results but also to the practical process. According to the characteristics of the practice link, the corresponding process evaluation standards are formulated, and the practice teaching process evaluation is carried out according to the standards, and the practice teaching process evaluation is carried out throughout the whole process of curriculum teaching. When constructing a practical teaching evaluation mechanism, teachers should consider the particularity of practical teaching and

form closed-loop management from the formulation of practical teaching plan to implementation, supervision, and evaluation, and then to continuous improvement. While formulating the talent training plan, teachers need to determine the practical teaching curriculum system. According to the practical teaching curriculum system, teachers need to establish practical teaching courses, further organize practical teaching contents, and carry out practical teaching through experiments and training venues. Teachers need to carry out the evaluation of students, peers, and supervision experts in time in the teaching process. After the course teaching, teachers and students should be organized to conduct course investigation in time to form a course investigation report. At the same time, teachers should change the traditional practical teaching evaluation methods and evaluation models; promote the use of virtual, simulation, and other technical means; promote the organic integration of information technology and practical teaching; and improve the scientificity, timeliness, accuracy and integrity of practical teaching evaluation. See Figure 3 for the complete evaluation system.

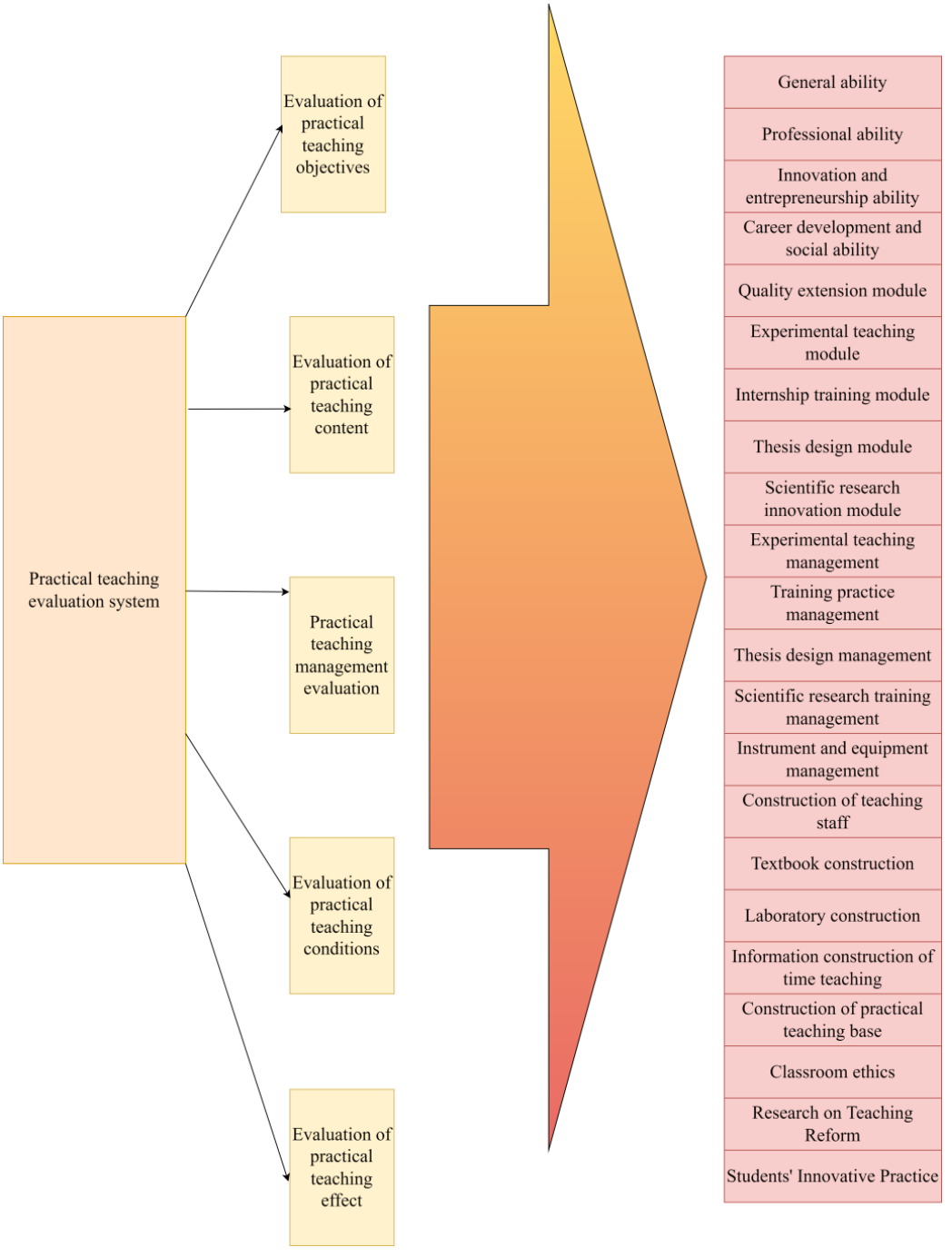
The student teaching information clerk is the school to grasp the teaching trends in a timely, accurate, and comprehensive manner. It is established by giving full play to the main role of students in teaching and teaching management activities. The academic affairs office sets up a teaching information officer management center. The office is located in the teaching quality management section. Information stations are set up in teaching colleges (departments). The head of the station is the teaching secretary. The teaching information clerk is responsible for collecting information about teachers' teaching, students' learning, teaching management, teaching facilities, and so on. Major information and emergencies are reflected at any time, and the clerk is responsible for supervising the handling of feedback information. The information feedback of teaching informants strengthens the information communication among teaching management departments, teachers, and students. It has played an important role for the school to grasp the teaching dynamics in a timely, accurate, and comprehensive manner and maintain the teaching order. Starting from the training needs of applied talents, the effect of practical teaching should be evaluated according to four elements:

- Teachers' morality and style of work
- Students' style of study and examination
- Teaching reform research
- Students' innovative practice

Teachers' morality and style is the foundation for colleges and universities to establish morality and cultivate people. The evaluation of practical teaching effect should take the evaluation of teachers' morality and style as the primary evaluation standard and evaluate teachers' professional ethics in the teaching process. The academic atmosphere and examination atmosphere are important means for colleges and universities to implement the cultivation of moral character. In the process of evaluating the effect of practical teaching, teachers should use the style of study and examination of students as an important basis. Teaching reform research is an important means to adapt to the law of the times of teaching development and to improve the quality of practical teaching. Including the research situation of practical teaching reform in the evaluation index of practical teaching effect helps promote practical teaching reform. The teaching evaluation is shown in Figure 4.

The establishment of the evaluation system is to change the function that evaluation pays too much attention to screening and selection, advocate developmental evaluation, play the role of evaluation in promoting human development, protect students' self-esteem and self-confidence, reflect respect and care, pay attention to individual needs, and pay attention to the process of development and change. The evaluation of students should not only focus on their academic achievements but also discover and develop their various potentials.

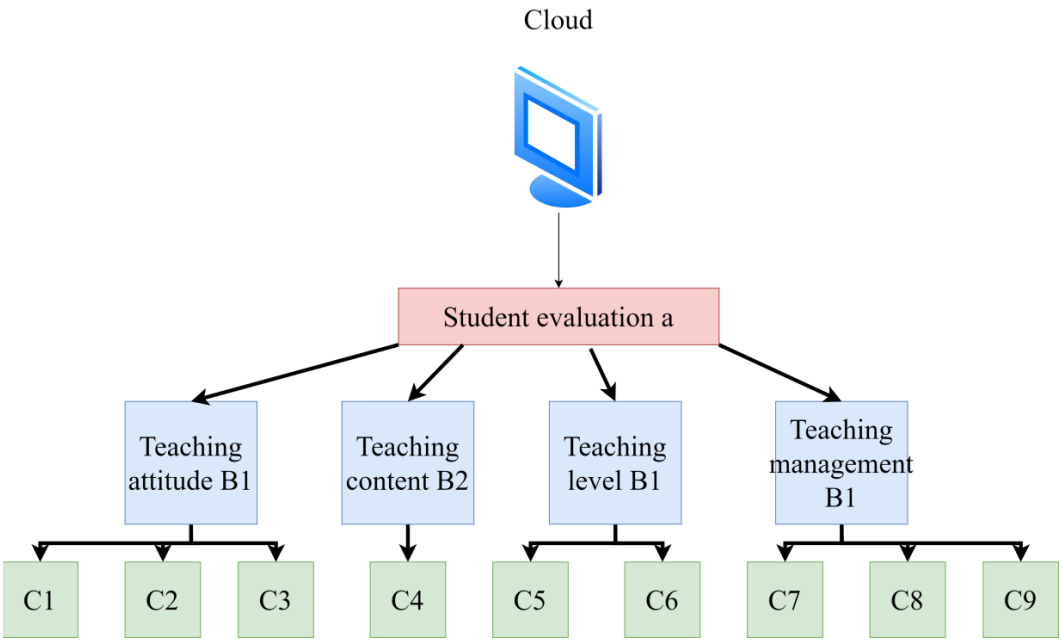
Figure 3. Complete evaluation system



TEACHING EVALUATION ALGORITHM

In the whole process of teaching evaluation, different evaluation index dimensions are formulated according to the diversity of evaluation contents and methods. Among them, the evaluation indicators

Figure 4. Student teaching evaluation



include five forms of basic courses, professional courses, experimental courses, internships and training, and graduation thesis or design. Two types of tables for teachers and students are designed, 23 first-class indicators, and 29 second-class indicators are planned, and the scores of each type of indicators are given according to their respective calculation methods (De Paola et al., 2016). This design comprehensively considers a variety of factors and strives to make an objective, reasonable evaluation of teaching quality. However, the management of the school or college determines through discussion and research the scores, calculation methods, and weights of various indicators in this method. Among them, human intervention factors are very large, and the collected data and information cannot fully reflect the real situation of the practical teaching process, and sometimes even lead to the wrong reflection of the facts. This factor essentially violates the requirements of effectiveness and scientificity in the management of teaching quality in colleges and universities. The neural network possesses robust nonlinear fitting capabilities, enabling it to effectively map intricate nonlinear patterns. Furthermore, its straightforward learning approach makes it highly suitable for computer-based completion tasks. Simultaneously, the neural network excels in nonlinear mapping, possesses strong memory and decision-making abilities, and exhibits exceptional adaptability through self-learning mechanisms. The neural network algorithm plays an important role in the system with its five characteristics of self-learning, self-organization, associative memorization, parallelism, and fault tolerance. In the process of practical teaching evaluation and analysis, it improves the convergence speed of data, reduces the output error, solves the nonlinear optimization problem of network data processing, and avoids the error coefficient of local minimum points, making the data spontaneously converge to the global minimum points. To a certain extent, in addition to improving the network performance and improving the speed of data analysis, it also ensures the accuracy and avoids the generation of errors. The application of a neural network algorithm in the system plays an important role in eliminating human factor intervention and ensuring the integrity of data. Logistic regression (LR) is a classical machine learning algorithm, which is often used to complete the task of binary classification and can be used to estimate the probability of an event. Logistic regression is based on sigmoid function, whose mathematical expression is shown in equations (1)–(4).

$$h_w(w) = \frac{1}{1+\exp(-w^t x)} \tag{1}$$

$$P(y \mid x; w) = (h_w(x))^y (1 - h_w(x))^{i-y} \tag{2}$$

$$L(w) = \sum_{i=1}^{m} P(y \mid x_1, w) \tag{3}$$

$$I(w) = \log L(w) = \sum_{i=1}^{m} (y_i \log, h_w) \tag{4}$$

Let the evaluation function calculate the formula shown in equation (4), rank the advantages and disadvantages of all individuals, and select and capture network individuals according to the formulas in equations (5)–(7):

$$f_1 = \frac{1}{E(i)+1} \tag{5}$$

$$E = \sum_{k=i} (d_a^q(k) - y(k))^2 \tag{6}$$

$$P_i = \frac{f_i}{\sum_{i=1} f_i} \tag{7}$$

Naive Bayesian

The Bayesian classification algorithm is a classification method of statistics. It is a kind of classification algorithm using probability and statistical knowledge. In many cases, the NB classification algorithm can be compared with the decision tree and neural network classification algorithm. The algorithm can be applied to large databases, and the method is simple, the classification accuracy is high, and the speed is fast. The NB algorithm is based on statistical theory, which is simple to implement and insensitive to missing data, but its performance in practical application may be lower than that of theory. The reason is that the NB algorithm is based on an assumption that the characteristic attributes of data are not related to each other and do not affect each other, which rarely occurs in practice. The projection of the kernel function makes the originally nonlinear separable space become linearly separable and then solves the classification problem in the projected space. The choice of the kernel function has a crucial impact on the performance of the SVM model. Table 1 shows several common kernel functions in practical application scenarios.

The aforementioned solution process can be carried out smoothly only when the training set samples are linearly separable, but in the actual scene, it is almost impossible to have completely

Table 1. Common kernel functions

Name	Expression	Parameter
Linear kernel	$\mathrm{k}(x_i, x_j) = x_i^t, j$	**Nothing**
Polynomial kernel	$\mathrm{k}(x_i, x_j) = \left(x_i^t, j\right)^{\mathrm{d}}$	$\mathrm{d} \geq 1$ **, Multiple times**
Gaussian kernel	$k(x_i, x_j) = \exp(-\frac{x_i}{2a^2})$	$\mathrm{a} \succ 0$ **Gaussian kernel bandwidth**

linearly separable data, and it is often nonlinear separable. For the nonlinear separable case, the hyperplane cannot be described by linear equations, so the above solution process is not applicable. The kernel method is proposed to solve this problem. Kernel method in SVM refers to the use of the kernel function to deal with the situation of spatial nonlinear separability. Specifically, it uses the kernel function for spatial transformation, projects the original nonlinear separable space to a higher dimensional space, and makes the training set samples become linearly separable in this space. In the new space, the sample data are linearly separable, and the hyperplane can be expressed as shown in equations (8)–(10).

$$f(x) = w^t x + b = \sum_{i=1}^{m} a(y_i^t)x + b \tag{8}$$

$$w = \sum_{i=k}^{m} a_i, y \tag{9}$$

$$o = \sum_{i=1}^{k} a(y_i) \tag{10}$$

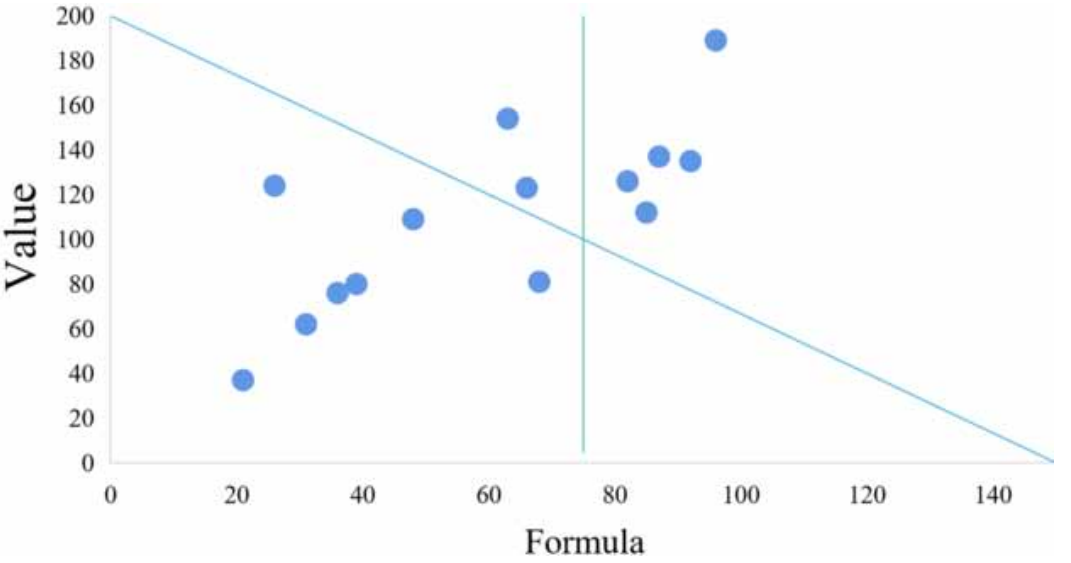
From an algorithmic perspective, the k-nearest neighbors (KNN) algorithm has only one hyperparameter. Different values of this parameter will yield varying prediction results, making its determination crucial for the classification performance of the model. After k is selected, if the value is too small, it is equivalent to predicting the target point in a small neighborhood. The target point will be very sensitive to the adjacent data points, resulting in large prediction error of the model, and the model is prone to overfitting. The reason for overfitting may be the noise in the training data, which leads to the noise learned by the model, rather than the real law. There is too little training data while using a powerful model (large representation space). This leads to too many candidate hypotheses that perform well on the training data, locking in a "false correct" hypothesis. For case 1, we used data cleaning and correction to solve it. For case 2, we either limited the model representation ability or collected more training data. After k is selected, if the value is too large, the prediction error of the model will be reduced, and the model will become simple. For example, when k is equal to the number of samples, it is equivalent to using the whole training dataset to vote on the category of the target point. At this time, no matter what the input data is, the prediction result of the model is the category with the largest sample size, which is obviously undesirable. In practical projects, a smaller value is usually taken first, and then the optimal one is selected through a cross-validation method. For the convenience of calculation $P(x|c)$, assuming that the characteristics of this vector are independent of each other is necessary so that the formula can be transformed into the maximum scatter value of the formula, as shown in equations (11) and (12) and Figure 5.

$$\mathrm{p}(c \mid x) \frac{p(c)p(x \mid c)}{p(x)} \tag{11}$$

$$P(c \mid x) = \frac{p(c)p(x_i)}{p(x)} \tag{12}$$

Support Vector Machines (SVM) have gained widespread popularity and are highly versatile in their applications. It can still show good classification performance in the case of small sample data and nonlinear classification, so it is often used in practical engineering projects. The SVM algorithm is a supervised learning algorithm based on the theory of statistics. It is widely used in data mining, text classification, portrait recognition, and other fields. When SVM is proposed, it can perform well only in linear classification problems. Later, the kernel method and soft margin enable SVM to achieve good results in nonlinear classification problems. The classification idea of SVM is to regard each sample data of the training set as a point and then find a hyperplane in the space formed by these

Figure 5. Maximum scatter value of formula



points to maximize the spacing between different categories formed by the sample points on the left and right sides of the hyperplane. The normal vector of the hyperplane is perpendicular to the vector on the hyperplane, which controls the direction of the hyperplane. The offset parameter B determines the specific position of the hyperplane in the sample space, and the plane can be recorded as (w,b). The calculation steps are shown in equations (13)–(16). The accuracy of the formula is shown in Figure 6. The formula calculation steps are shown in Figure 7.

$$w^t x + b = 0 \tag{13}$$

$$y = \frac{|\, w_t x + b \,|}{|\, w \,|} \tag{14}$$

Figure 6. Formula calculation accuracy

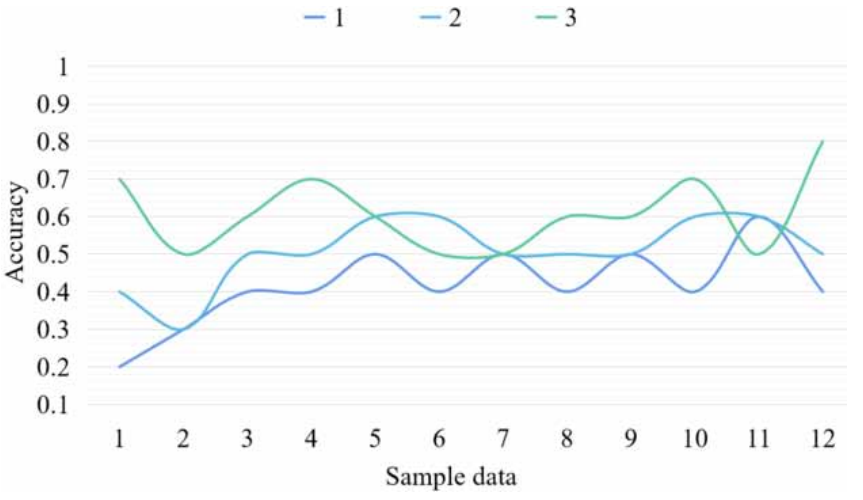
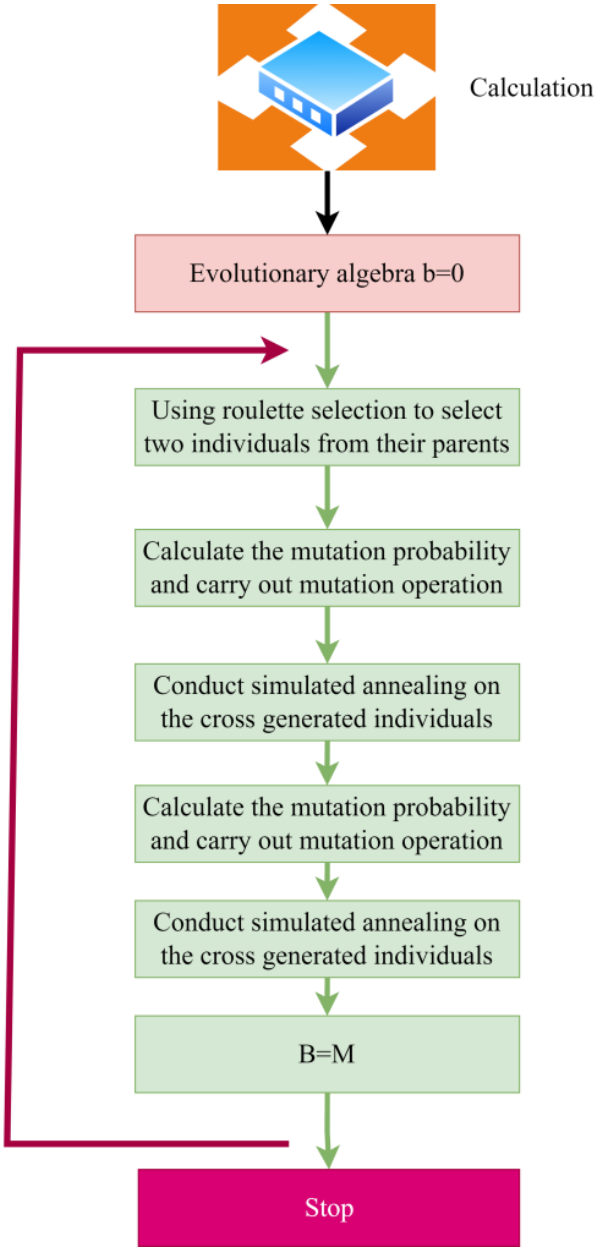


Figure 7. Calculation steps



$$w_t x_i + b \geq \frac{\mathrm{x}^2, y_i}{1} \tag{15}$$

$$\mathrm{w}' x_i = \sum_{n=i}^{w_i} y = -1 \tag{16}$$

Upon analyzing the training curve during the graph process, we observed that the genetic algorithm-back propagation (GA-BP) neural network exhibits faster convergence compared to the

previous network curve. By solving the average convergence steps of each training for 100 times, we can increase the convergence speed and efficiency of the GA-BP neural network by nearly 32% compared with the back propagation (BP) neural network, and the convergence stability is higher, and the accuracy of sample analysis can be close to 96%. The experimental results show that the GA-BP algorithm can fully improve the convergence speed and also the stability. As shown in Figure 8, the error value is shown in Table 2.

Figure 8 shows that the calculation error of GA-BP is smaller than that of BP.

Teaching Evaluation

Teaching evaluation is the key to improve teaching quality in secondary vocational colleges. The classification of teaching evaluation in our school currently includes self-evaluation, peer evaluation, and student evaluation modules. Establishing a teaching evaluation management system is an important part of the school, and this system plays a key role in ensuring the teaching effect. These three modules are used to collect the corresponding evaluation information, and the results of teachers teaching evaluations are obtained through a data mining algorithm, as shown in Table 3 and Figure 9.

The main problems in the practical teaching quality evaluation system of application-oriented undergraduate colleges and universities are as follows:

- The evaluation objective is not clear. Why should we evaluate and what is the purpose of evaluation? Some schools do not have clear objectives for the evaluation of practical teaching quality.

Table 2. Comparison of GA-BP test results

Serial Number	GA-BP Output	Error	Grade
1	0.9021	0.0010	Excellent
2	0.8124	0.0007	Good
3	0.5473	0.0014	Unqualified
4	0.6897	0.0017	Qualified

Figure 8. Schematic diagram of error convergence curve results

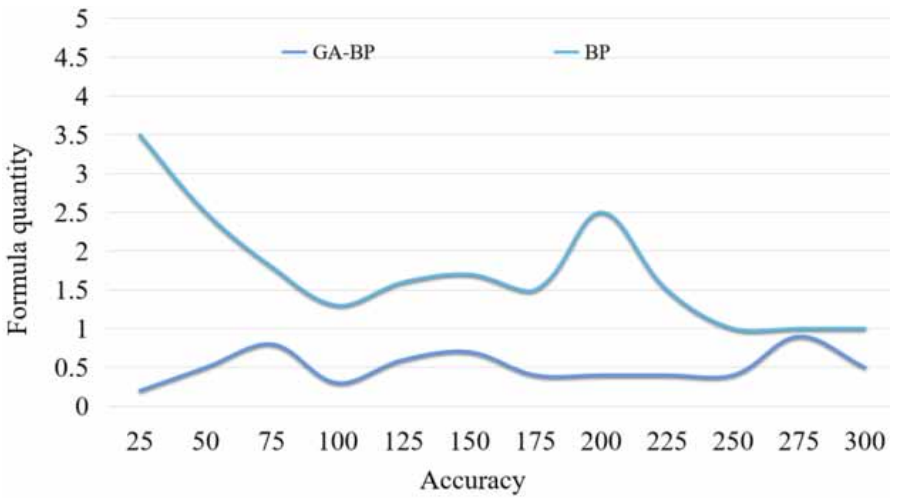
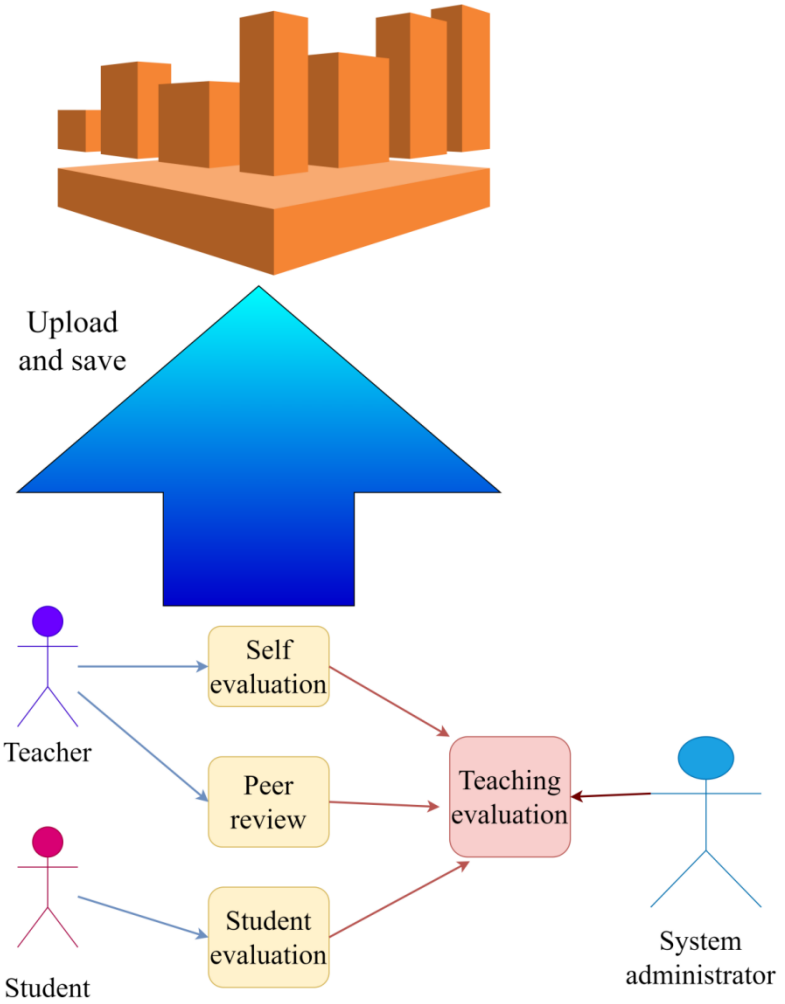


Table 3. Description of teaching evaluation use cases

Item	Content
Basic operation process	The user logs in to the system and enters the teaching evaluation page.
Optional operation process	Teachers enter the self-evaluation page, select the corresponding options, and then click Submit. Teachers enter the peer evaluation page, select the corresponding teachers and courses for evaluation, and then click Submit. Students enter the student evaluation page, select the corresponding courses and teachers, evaluate, and then click Submit.
Case name	Teaching evaluation

Figure 9. Use case diagram of teaching evaluation



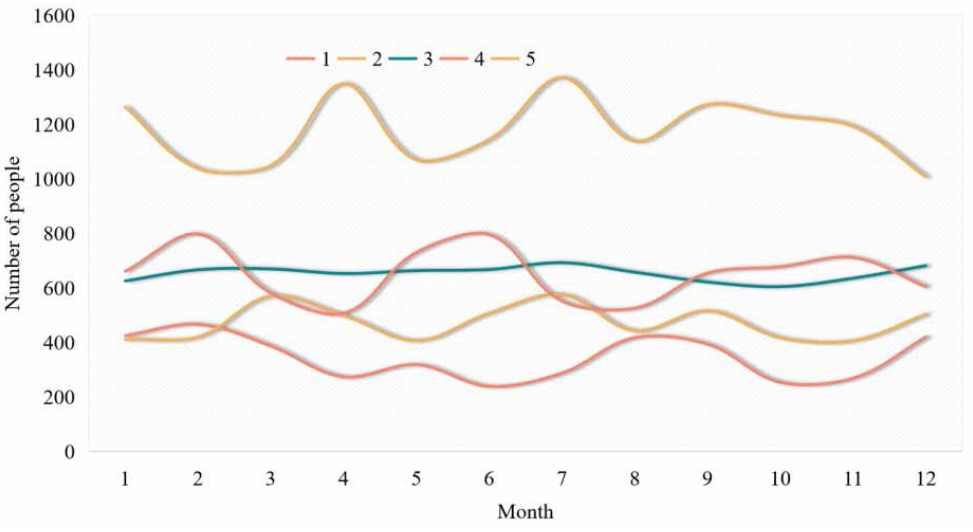
- The evaluation subject lacks diversity. Some schools' practical teaching activities are evaluated by teachers and students, and the main body of practical teaching quality evaluation is the relevant functional departments, teaching units, or practice units of the school.

- The evaluation standard is unscientific. Some schools' practical teaching quality evaluation indicators are not clear, some are not operable, some evaluation standards are not specific, and some are divorced from the actual requirements of production.
- The feedback mechanism of evaluation results is not perfect. Some schools' feedback mechanism for the evaluation results of practical teaching quality is not perfect, and some do not give timely feedback to the evaluation results. Some did not pay enough attention to the application of evaluation results and did not play the role of promoting teaching, reform, and construction with evaluation.

Practical teaching is an effective way to cultivate application-oriented talents and an important platform to consolidate theoretical knowledge, cultivate innovative awareness, and improve practical ability. It shoulders an important mission in the training system of applied talents. With the increasing importance of practical teaching, establishing a scientific, effective evaluation system of practical teaching is particularly important. This system has become an important means and tool to strengthen the management of undergraduate practical teaching and improve the quality of practical teaching. The establishment of a practical teaching system in application-oriented undergraduate colleges must meet the training objectives of application-oriented talents. The determination of the training objectives of applied talents cannot copy the talent training objectives of other colleges and universities. The current situation, foundation, characteristics, and regional economic characteristics of the university must be taken into account, and the focus must be on cultivating high-quality applied talents with strong practical ability. The orientation of application-oriented undergraduate colleges determines the orientation of their talent training objectives and then determines the construction of the practical teaching system. All majors in colleges and universities should optimize talent training programs according to the training objectives and specifications of applied talents, take social needs as the guidance, take the cultivation of students' application and innovation abilities as the purpose, and comprehensively consider the teaching objectives, teaching contents, teaching methods, teacher strength, teaching management, quality evaluation, and other connotation elements. The talent growth rate in recent years is shown in Figure 10.

Figure 10 shows that improving the internal quality evaluation system of colleges and universities and improving the teaching quality are very beneficial to the increase of talents. All majors should

Figure 10. Talent growth rate in recent years



cultivate talents according to the corresponding goals. The main goal of schoolwork is to improve education and teaching quality; strengthening teaching management is the primary means of achieving this goal. To improve education and teaching quality comprehensively, we recommend the following actions: take ideological work as the lead role, strengthen the implementation of teaching management as the primary means, and establish and improve the incentive mechanism as the driving force. To mobilize teachers' and students' enthusiasm, go all out and collaborate to improve education and teaching quality comprehensively.

CONCLUSION

This article enhances the index system for implementing the teaching center status by including teaching evaluation indicators related to cultural construction. The improvement of the teaching evaluation system from multiple perspectives is crucial in enhancing teaching effectiveness and achieving curriculum objectives. The proposed NB teaching evaluation score can significantly improve sample accuracy by 95%. The study highlights the importance of a student-centered approach in application-oriented undergraduate colleges and the need to optimize the teaching evaluation model to uncover students' learning potential. A robust teaching evaluation system is essential in promoting students' interest in learning, providing a specific and evidence-based assessment of teaching and learning, and creating an environment that fosters growth and professional belonging among teachers.

DATA AVAILABILITY

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

CONFLICTS OF INTEREST

We declare that we have no conflicts of interest.

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