Design of a Hybrid Classroom Teaching Quality Evaluation System Based on Information Technology

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Abstract. With the rapid development of today’s information technology, it is an inevitable trend for the reform and development of education and teaching in colleges and universities to promote education modernization through education informatization. Information management has penetrated into the teaching and management of colleges and universities. Based on information technology, this paper studies the design of a data mining algorithm-based hybrid classroom teaching quality improvement evaluation system model, which fully reflects the quality of hybrid classroom teaching based on information technology in universities. In order to accurately grasp the current status of the current mixed classroom teaching quality, this experiment has been collected, sorted, and studied in recent years for analysis. A neural network algorithm is used to construct a model for it. This algorithm is combined with a questionnaire survey method to screen the mixed classroom teaching quality evaluation indicators of college information technology. Finally, a BP model is constructed through the classroom teaching quality and the model calculation samples are selected. The teaching quality can be obtained after calculation. Experimental research results show that with the advent of the information age, the development of blended teaching is divided into three stages. The first is based on technology, and the second is based on the interactive method of online and offline technology teaching. The third is to focus on the learning experience of learners. Blended teaching is a sublimation of traditional teaching mode and a return to traditional concepts. This brand-new teaching model will surely become the new normal of the education model in the future.

Keywords: Information Technology, Mixed Classroom, Teaching Quality, Teaching Evaluation System

1. Introduction
Blended teaching is a new strategy based on traditional classroom teaching and network teaching. The teaching philosophy of taking teachers as the leading and student-based teaching has become precise teaching and individualized teaching[1]. The practice of blended teaching is limited by concept renewal, resource sharing and value appeal. It is still difficult to realize the structural reform of the teaching model. By improving the comprehensive quality of college teachers, integrating and optimizing
teaching resources, accurately positioning the relationship between teachers and students, and constructing quality evaluation. Promote the application of system and local conditions to provide a new direction for teaching reform. With the technological revolution of cloud computing, big data and the Internet of Things, the cross-border update of educational thinking, teaching models, and teaching tools, the path of knowledge transmission has changed from singularity to diversification, and the characteristics of online teaching that break through the limitations of time and space have brought educational innovation. New possibilities.

Different from traditional classroom teaching, and also different from online teaching, blended teaching is a new strategy based on the above two teaching modes. It aims at multi-dimensional integration of teaching theory, teaching environment, teaching methods, teaching resources, teaching styles and evaluation systems. To achieve the whole process of synergy between traditional curriculum teaching and online teaching, but the unclear value demands, immature technology application and untimely update of concepts in mixed teaching practice still make it difficult to break through the overlapping layers of teaching resources. The core of education and teaching returns to students, and the shift from teaching-centered to student-centered is the core of effectively achieving student training goals. In this process, the application of education informatization is a clear realization path provided by students as a teaching center.

In the context of current information education, the online and offline hybrid model has broken the static classroom teaching, and the dynamic and continuous teaching content centered on student characteristics can be greatly supplemented. Teaching evaluation can be divided into broad sense and narrow sense. In a broad sense, teaching evaluation refers to the evaluation of all factors that affect teaching activities. In a narrow sense, teaching evaluation is a process of systematically testing the teaching of teachers according to certain teaching goals and standards, and evaluating the value, advantages and disadvantages of teaching, so as to improve the teaching effect. Teaching assessment is not only an important part of the teaching process, but also the foundation of all effective teaching and successful teaching. In the past, teaching evaluation was mostly carried out by manual operation, paper printing, and manual statistics. To a certain extent, there were problems such as large workload, long work cycle, and waste of manpower and material resources. With the gradual popularization of the use of computers and networks and the increasing function of computer processing information, teaching evaluation should also conform to the trend of the times, using information technology and modern tools to improve the quality and efficiency of evaluation.

2. Method

2.1. Teaching quality evaluation model

In practical applications, the overall distribution P is usually unknown, so it is impossible to evaluate an accurate quality evaluation system by directly obtaining the conditional expectations of the teaching quality that needs to be estimated. Considering that the teaching effect is related to the teaching plan and corresponding student characteristics and behavior performance, an accurate teaching quality evaluation model is constructed based on the following regression model:

\[ E(Y|A,X) = \gamma^T \tilde{X} + A \cdot (\beta^T \tilde{X}) \]

The \( \gamma^T \tilde{X} \) part of the model describes the basic influence of student characteristics and behavior on the teaching effect, while the \( A \cdot (\beta^T \tilde{X}) \) part describes the influence of student characteristics and behavior on the teaching effect under different teaching plans. In fact:

\[ \beta^T \tilde{X} = E(Y|A = 1,X) - E(Y|A = 0,X) \]

To sum up, the formula for parameter estimation of the hybrid classroom teaching quality evaluation model is:

\[ \beta_{LASSO} = \min_{\beta} \{ ||y - X\beta||^2 + \gamma \sum_{j=1}^{p} |\beta_j| \} \]

2.2. Formulation of Appropriate Technology Evaluation Plan for Modern Mixed Classroom Teaching
The essence of the formulation of the appropriate technology evaluation plan for modern hybrid classroom teaching is to optimize the decision function \( d:X \rightarrow A \) to make the teaching effect \( Y \) the best. In other words, find the optimal decision function \( d^*(X) \), such that:

\[
d^*(X) = \arg \max_d E(Y|A = d(X), X)
\]

Therefore, to formulate a modern hybrid classroom teaching technology evaluation program only needs to find the optimal decision function \( d^*(X) \), so that under the precise teaching quality evaluation program given by it, \( E(Y | A = d(X), X) \) get the maximum value.

3. Experiment

3.1. Research objects
Before the experiment, after thinking, we decided to get better experimental data through the experiment, in order to better analyze the analysis and research of modern education technology based on information technology and big data technology. Therefore, we decided to randomly select 90 students from two classes in H University for experimental investigation, and they were studied separately. In our study, motivation (S1-S2), learning strategy (S3-S5), learning goal (S6-S8), attribution (S9-S12), curriculum factor (W1-W7) and school factor (M1-M3) come from six observation variables of external factors, and they have 29 options for reference. All items are expressed by five level scale, "1" means not conforming; "2" means not suitable; "3" means general; "4" means relatively suitable; "5" means conforming; among them, the first and second parts of the questionnaire are the main body of this paper.

3.2. Experimental design
This experiment is based on the experimental results of the mixed education mode of two classes in H University. At the end of the study, we test the students' knowledge, compare the two classes' mastery of knowledge, and use the process design of case-based teaching to get the experimental comparison results. The purpose of investigating the influence of mixed education technology on the current situation of public course teaching is to find out the shortcomings or problems existing in the teaching of public courses based on mixed education technology, so as to provide a realistic basis for the design and implementation of the teaching process in the future. After the implementation of case teaching, the students who participate in the public course of modern mixed educational technology are interviewed to evaluate the effect and satisfaction of case teaching, and further modify and improve the implementation process. In this study, 80 students from two classes in H University were taken as the research object, and they were trained and studied. After the training, the mastery test was carried out. The two classes were compared by ANOVA. Different aspects of the questionnaire survey. Although there is a lot of information in the questionnaire, it is not complete. Therefore, on this basis, we also use the method of online information. The following data analysis will unify the survey information and current situation.

4. Results

4.1. Experimental research results
Table 1. Test results of mixed classroom teaching quality factors

| Factor population | S1-S2 | S3-S5 | S6-S8 | S9-S12 | Number of items of the alpha |
|-------------------|-------|-------|-------|--------|-----------------------------|
|                   | 4     | 3     | 3     | 5      | 15                          |
|                   | 0.739 | 0.721 | 0.752 | 0.639  | 0.837                       |
| Based on standardization The alpha | 0.742 | 0.737 | 0.798 | 0.211  | 0.865                       |

Table 2. Test results of school factors about the quality of mixed classroom teaching

| α | Number |
|---|--------|
| 0.776 | 9 |
| Beta coefficient test for school factors 0.739 | 0.845 |
| α | Number |
| 0.825 | 6 |

It can be seen from the data in Table 1 that the analysis of the quality factors of mixed classroom teaching shows that the overall reliability coefficient reaches 0.837 > 0.8, which indicates that the data obtained in this experiment is very good. Moreover, we can find that the internal reliability coefficient of each stage is always lower than the overall coefficient after the internal factors are processed in different stages, which shows that our experiment has always maintained a good internal reliability.

According to the experimental data, we make Table 2 and analyze it. After the analysis, the author made a detailed test on a coefficient of all the 15 options in the questionnaire, and got a reliability statistic of the general table, which can be seen in Table 2. From the experimental data and tables, we can draw a conclusion: the integrity of the questionnaire's internal coefficient is 0.825, but the standardized internal coefficient is only 0.776. Through analysis, we agree that the questionnaire after the experiment can provide reference for future experiments, but we still need to test the validity of the questionnaire by means of item analysis and reliability test.

The validity of the questionnaire refers to the degree of relevance between the experimental results we measured and the content we studied. The higher the relevance, the higher the validity. However, in order to better analyze the validity of the questionnaire, we have to analyze the factors related to the experiment. In our test, we mainly choose the appropriate sample kmo value to judge whether our experiment is suitable for factor analysis. The common analysis of kmo indicators is: 0.8 ~ 0.9 means "excellent"; 0.7 means "medium"; 0.5 ~ 0.6 means "normal"; or = 0.5 means "incredible". 817, indicating that our experiment is suitable for factor analysis.

4.2. Measured data statistics of the algorithm model in the evaluation system
Figure 1. Inflection point diagram for predicting teaching quality based on decision tree algorithm

According to the data analysis in the inflection point chart of teaching quality evaluation system precision based on strategy tree algorithm in Figure 1, the experimental results are obtained: in the early stage of the construction of strategy tree algorithm, the prediction of teaching quality evaluation effect of the algorithm is not stable, but after seven experiments and statistics of the experimental results, we compare the prediction results of each experiment with the actual results. The purpose is to improve the prediction efficiency of the current teaching quality evaluation system, improve the accuracy of the prediction data, and make it more accurate. So later we added other algorithms to solve the shortcomings of decision tree algorithm, and later found that there will be more errors, so we realized that it is difficult to take all the existing technologies into account, so finally we weighed again, chose decision tree algorithm for teaching quality evaluation, and completed the final step of mixed classroom teaching.

4.3. Questionnaire survey on attitudes and trends

Figure 2. About the results of the questionnaire survey

It can be seen from Figure 2 that after dozens of questionnaire responses, we know that most teachers, students and professionals still have high hopes for mixed classroom teaching, and expressed their views on traditional classroom teaching due to the boring mechanization of teaching. Burnout and dissatisfaction. And after some anonymous letters, we found that some teachers and students are still a little uncomfortable with the existing mixed teaching, especially some old teachers, but they also expressed their vision for the future and their support for this model. We believe that this is a good start, but some people have pointed out some of the problems we are facing for a while, that is, the
disadvantage of the decision tree algorithm-a large amount of data resources are required, and the number of samples for each category is inconsistent data.

We also thought of these problems at the beginning, and prepared to use the cosine correlation algorithm for coupling, but in the testing stage we found that they would conflict, and then we used a new neural network algorithm for testing, but found that it is better to use the decision tree algorithm, so the plan was put on hold. But we will not give up in the future. We will prepare a small mailbox to collect information about the shortcomings of the course for integration and processing, and contact the school's tutors. The capable students share the tasks together, make breakthroughs one by one, and try to make the system become Better and better.

5. Conclusion
In summary, the school's mixed teaching can achieve seamless online and offline connections, promote interaction between teachers and students, help establish a harmonious teaching model between teachers and students, "promote students to complete tasks", and mobilize students to learn independently, enrich teaching content and teaching methods, and effectively improve teaching effects. In addition, pre-class preview, classroom teaching, after-class review and guidance learning mode can enable students to master knowledge more effectively, enable teachers to quantitatively evaluate students' daily performance, and promote teachers' reflection on teaching and better learning development. However, the main body of future information technology is artificial intelligence. Artificial intelligence technology is the most advanced science and technology in today's social development. It has brought many new changes to people's learning, life and production, and can better meet people's different needs for life and work. But we cannot be satisfied with the status quo. There are still some problems in coupling various algorithms, so we should find better algorithms to solve the problem and improve the fault tolerance. We believe that this problem will be solved perfectly in the future.

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