

# Comprehensive Management of Teaching Quality Driven by Educational Big Data

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**Abstract:** With the continuous development of information technology, the continuous improvement of information systems in colleges and universities, and the increasingly indispensable management of teaching in colleges and universities, the data in the field of education is constantly increasing, and big data technology is gradually being applied to the field of education. However, the traditional teaching management model ignores the importance of real-time data; the evaluation of teaching quality is mostly subjective, and lacks objectivity. The purpose of this article is to study the comprehensive management of university teaching quality driven by educational big data. This paper first analyzes the content of educational big data collection for different roles of teachers and students, then studies the big data collection principle, and then analyzes the main problems in the construction of the current higher education quality monitoring and evaluation platform. Aiming at the main existing problems, this article puts forward corresponding solutions. Based on this, this article designs and implements a university teaching management system based on big data. The system is mainly divided into a system administrator module, a teacher education administration module and a data center module. By testing the function and performance of the system, the data bug rate of the system is only 5%. The experimental results prove that the performance of the system designed in this paper can meet the actual needs.

## 1. Introduction

At present, China's colleges and universities are gradually expanding enrollment, and the number of students receiving higher education is gradually increasing. China's higher education is in a stage of rapid development. With the continuous improvement of the university's information management system, the information collected through the information system has grown exponentially. Many universities have only stored and simple statistics on the data, which has masked the true value of these data and it is difficult to obtain useful data from them. Information has caused the situation that the existing teaching big data cannot be fully utilized. The traditional teaching management system has been unable to adapt to the increasing number of students now year by year, which is not good for improving the teaching management level of colleges and universities.

Collecting data through current smart phones saves time, saves labor costs, is easy to operate, and the collected data has strong objectivity and a large amount of data, which has important academic research significance [1-2]. At the same time, these data have the characteristics of large data volume, complex structure, and fast generation frequency. Therefore, it is very useful to apply big data analysis to teaching quality evaluation. It can comprehensively analyze the hidden results between teaching quality evaluation results and various factors. The internal connection of the analysis results will be displayed to the school management department and teachers and students intuitively [3-4]. In summary, an objective, scientific, and reasonable evaluation system for teaching quality is constructed, and the index data in the evaluation system are collected in real time, and a teaching management model centered on teaching big data and teaching quality evaluation is established to allow teaching teachers and counselling Teaching managers such as teachers, deans, department heads, and school leaders monitor the development of teaching work in real time, increase teaching management in colleges and universities, and promote the development of

teachers and schools, as well as the development of society [5-6].

This article first introduces the content of big data collection for teachers and students in different roles, then analyzes the principle of big data collection, and then puts forward the main problems in the construction of the current higher education quality monitoring and evaluation platform. Aiming at the main existing problems, this article gives corresponding suggestions. Based on this, this article designs and implements a university teaching management system based on big data. The system is mainly divided into a system administrator module, a teacher education administration module and a data center module. The experimental results prove that the system designed in this paper can meet the actual needs.

## **2. Method**

### **2.1 Educational Big Data**

#### (1) Data collection content

##### 1) Students

The main task of the student as the learning subject is to complete his own learning. Schools can't keep track of students' learning in the classroom in real time. Students can learn about their academic accomplishment through the last academic year, but they can't understand their mastery of knowledge points. The performance of students' attendance and performance in time can directly reflect the quality of guidance and management. Student attendance refers to the attendance rate of students in the class. The student's usual grades are based on the student's test results and answers to the class questions to determine the comprehensive evaluation of the homework and student work. The data collection of students includes student attendance and peacetime performance. The two aspects are combined to determine the student's learning situation in the school, and it is used as an important content of teaching management. These data can enable lecturers and counselors, college deans Teaching managers at all levels, including the heads of colleges and departments, and school leaders, learn about the progress of school teaching through student learning, and better manage college teaching.

##### 2) Teacher

From the perspective of the teacher, the most important content is the student's evaluation of the teacher's classroom teaching and the student's usual performance. Students evaluation of teachers' classroom teaching can truly reflect the development of teaching. Students ordinary performance is a test of teachers' teaching results. These data are useful for teaching teachers, counselors, and deans of the college. Teaching directors at all levels, including the head of the department and the head of the school, have important guiding roles. Therefore, the students evaluation of teachers and the information of students' classroom learning in each lesson are meaningful. Only on the basis of a large amount of teaching data can we find the disadvantages of previous teaching management work. And students evaluation of classroom teaching needs to evaluate teachers' classroom teaching performance based on certain classroom teaching evaluation indicators [7-8].

#### (2) Data collection principle

The data collection is mainly composed of Android client, Web server and database. Among them, the Android client is responsible for processing the user's operation instructions and data, and sends the operation instructions and data to the Web server through the HTTP protocol. The student Android client is mainly responsible for collecting student sign-in, student leave, homework submission, classroom questions, quizzes, and evaluation of teachers' classroom teaching. The main functions of the teacher's Android client include initiating a question, initiating a check-in, initiating a question, initiating in-class detection, sending notifications to students, and communicating with students through mobile phones in class.

### **2.2 Major Problems Existing in the Construction of Higher Education Quality Monitoring and Evaluation Platform**

China started late in the monitoring and evaluation of the quality of higher education. Research

and practice on many issues are still insufficient. At present, there are still systemic deficiencies in the evaluation system, the scientific nature of data content is not strong, the evaluation subject is out of place, and quality standards Issues such as value misalignment [9-10].

(1) The systemicity of the monitoring and evaluation system needs to be improved. This compares with a more systematic monitoring and evaluation system in developed countries. Taking the United States as an example, there are three main types of evaluation agencies. It is a regional certification body, a professional certification body, and a national certification body. As the accreditation bodies of the entire 6 regions have identified the quality assurance of school education, 6 domestic accreditation bodies only implement accreditation in units of specific types of institutions, and 73 professional accreditation bodies in specific fields. From the perspective of the main body of evaluation in China, currently, government-led assessments at all levels and at all levels are the main ones, and the level of high-level third-party evaluation agencies is relatively low.

(2) The science and effectiveness of the monitoring data need to be improved. Since the expansion of college enrollment, due to insufficient investment in domestic higher education, previous evaluations have focused more on the construction of educational conditions, such as student-teacher ratio, funding input, books and equipment per student, which is also reflected in the current qualification assessment and review. Evaluation, professional evaluation and other indicators. In recent years, with the transformation of the concepts of total quality management, student-centered education and quality management, indicators such as satisfaction surveys for college students, alumni and employers, surveys of graduates, and rankings of universities and disciplines have been gradually introduced. However, there are still problems such as unclear data connotation, insufficient data collection samples, insufficient micro data volume (such as curriculum, teaching management data), and lack of comprehensiveness (data not included in graduate and higher vocational data).

(3) The use of statistical analysis results needs to be strengthened. At present, there will be relevant investigation and analysis reports for the relevant data collected by various universities, but from the perspective of content and effect, first, there is insufficient depth in the classification statistics and analysis of various data, macro and micro comparative analysis, and guidance. Problems such as poor sexuality; second, insufficient use of comparative analysis results in higher education decision-making such as the allocation of educational resources and management of discipline settings in colleges and universities; and third, for colleges and universities, the domestic and international data comparisons have not been fully utilized to improve their own disciplines and professional construction, education and teaching process.

(4) The development of big data support technology for higher education teaching quality monitoring needs to be accelerated. The main purpose of the supervision and evaluation of higher education quality is to continuously collect, dynamically track, and status information of technological factors. Through objective explanation, according to the plan set by the educational activities, whether the execution track close to the set goals is monitored, warned, and modified. In order to effectively achieve existing educational goals, data sources and data characteristics determine the attributes of big data. However, research on its key technologies, such as data mining technology, storage and processing technology, is still in its infancy, and it needs to be accelerated in practical application.

### **3. Experiment**

#### **3.1 Design of Teaching Management System Based on Educational Big Data**

The main task of the system administrator module is to maintain and manage the basic information and data of the database.

The teacher's educational affairs module mainly provides teachers with the function of viewing information related to their own teaching on the Web side, including curriculum information, student's classroom learning situation, student assignment correction.

Data center module. According to the different permissions of teaching management users, to

provide users with data within the permissions, such as the counselor's data can be viewed much less than the dean or department head can view. Teaching management users mainly include counsellors, college leaders or department leaders, and school leaders. Through the statistical analysis of student data and teacher data, teaching management personnel can find deficiencies in teaching work. If student attendance is significantly reduced, schools should strengthen students' attendance management is used as the basis for carrying out the honorary selection work such as the selection of student scholarships and the application of teachers' honorary certificates.

### 3.2 Experimental Environment

This system combines data mining technology, C #, .NET and other technologies with big data. Based on teaching big data, it uses the Android platform provided by Google and the web platform developed based on .NET for data collection, data processing and big data. Analyze and display data to different users according to different user needs.

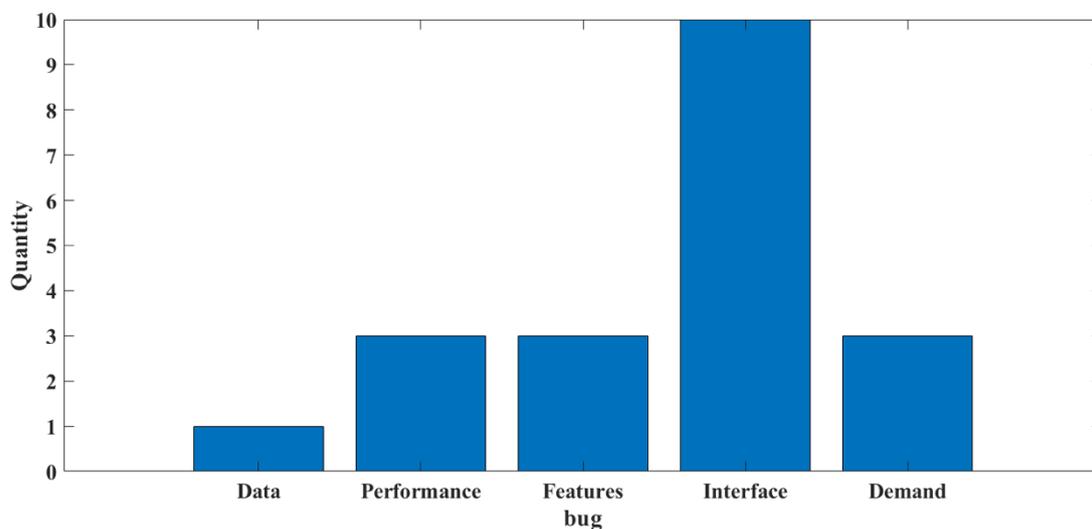
## 4. Discussion

### 4.1 Experimental Results and Analysis

As for the test analysis results in this paper, this paper mainly focuses on the performance of the system. For this reason, a rigorous test is performed, and all tests meet the design expectations. This paper tests the system by testing methods such as black box testing and functional testing. This test is ideal. Some bugs were found and corresponding improvements were made. The results are shown in Table 1 and Figure 1:

**Table 1.** Experimental results

| Bug      | Data | Performance | Features | Interface | Demand |
|----------|------|-------------|----------|-----------|--------|
| Quantity | 1    | 3           | 3        | 10        | 3      |



**Figure 1.** Experimental results

### 4.2 Suggestions on Promoting Comprehensive Management of University Teaching Quality Based on Big Data

Based on the current realistic monitoring mechanism of university teaching quality, if you want to achieve comprehensive monitoring of campus internal teaching, provide top-level design colleges with strong information support, promote scientific decisions and resources, rationalize division of labor, and promote the connotation construction of universities, you need to use big data and Network information technology builds a variety of information platforms covering the entire university, diversified disciplines, diverse evaluation methods, convenient and simple operation, and timely feedback of the teaching quality monitoring system.

(1) Institutional guarantee is the foundation of construction

Major colleges and universities should pay full attention to the construction of the teaching quality monitoring system, promulgate the teaching quality monitoring policy of colleges, establish detailed monitoring of the teaching quality of functional departments and related educational institutions with different job responsibilities and tasks, and provide a strong guarantee for education and teaching in accordance with the law. For example, formulate relevant policy documents, such as the “Leader Listening System”, “Education Supervision Work Regulations”, “Education Information Staff Work Regulations”, “Teacher and Student Network Evaluation Teaching Practice Methods”, “Practice Opinions on Teachers' Classroom Education Quality Evaluation Practices” and other relevant policy documents. Effective monitoring can be implemented in accordance with chapter teaching quality.

(2) The quality index system should be the core

In accordance with relevant national professional and curriculum indicators, according to the actual situation of professional talent training, and in accordance with the key control direction of teaching quality, a comprehensive and complete quality index system has been formulated, including all aspects of each link in the teaching process. On the basis of striving to improve the talent training process, a variety of student evaluation teaching modes and teacher evaluation teaching modes are implemented for the main positions of classroom teaching to guide students to carry out daily classroom teaching, after-school training, practical activities, and course assessment evaluation. On the premise of combining the final results of student evaluation teaching, teacher evaluation teaching, and peer evaluation teaching, the cooperation and cooperation between various administrative departments of colleges and universities are used to form an organic combination of college student learning effectiveness and social evaluation. The multi-source information source of education and teaching quality evaluation can better encourage and promote the construction of university teaching evaluation mechanism with academic performance as the core, so that it can be effectively applied to the construction and implementation of college professional talent training programs.

## Conclusion

The quality of education is the key to the construction and development of colleges and universities, and has an important impact on the cultivation of talents. At this point, universities should comprehensively summarize the deficiencies and problems in the past education quality monitoring, and deeply understand the importance of big data in the construction of education quality monitoring system. Second, to maximize the use of big data and network information technology, the monitoring system must follow basic laws, and the monitoring system must have major functions. The monitoring system needs to be combined with other effective paths to establish a scientific and perfect education quality monitoring system. Use systematic data analysis to further improve the quality of professional training, promote university modernization, and fundamentally improve the university's comprehensive competitiveness.

## References

- [1] Smith SM, Nichols TE. Statistical Challenges in "Big Data" Human Neuroimaging[J]. *Neuron*, 2018, 97(2):263.
- [2] Xiaofei Wang, Yuhua Zhang, Victor C. M. Leung. D2D Big Data: Content Deliveries over Wireless Device-to-Device Sharing in Large Scale Mobile Networks[J]. *IEEE Wireless Communications*, 2018, 25(1):32-38.
- [3] M.D. Lytras, Vijay Raghavan, Ernesto Damiani. Big Data and Data Analytics Research:: From Metaphors to Value Space for Collective Wisdom in Human Decision Making and Smart Machines[J]. *International Journal on Semantic Web & Information Systems*, 2017, 13(1):1-10.
- [4] Houwei Ge. Research on the Chinese Foreign English Teaching Quality Assessment with

- Intuitionistic Fuzzy Information[J]. Journal of Computational & Theoretical Nanoscience, 2018, 15(1):278-281.
- [5] Troncoso D G, Pérez C V, Vaccarezza G G, et al. [The influence of pedagogic and discipline training on the teaching quality of university professors]. [J]. Revista Medica De Chile, 2017, 145(5):610.
- [6] Maya Narayanan, Andrew A. White, Thomas H. Gallagher. Twelve tips for teaching quality improvement in the clinical environment[J]. Medical Teacher, 2017, 40(10):1-7.
- [7] Guri Skedsmo, Stephan Gerhard Huber. Measuring teaching quality: some key issues[J]. Educational Assessment Evaluation and Accountability, 2019, 31(2):1-3.
- [8] Brian Lewthwaite, Helen Boon, Tammi Webber. Quality Teaching Practices as Reported by Aboriginal Parents, Students and their Teachers: Comparisons and Contrasts[J]. Australian Journal of Teacher Education, 2017, 42(12):80-97.
- [9] Heather A. Robinson, Anneliese Sheffield, Alana S. Phillips. “Introduction to Teaching Online”: Usability Evaluation of Interactivity in an Online Social Constructivist Course[J]. Techtrends, 2017, 61(2):1-8.
- [10] Ning H. Analysis and Design of University Teaching Evaluation System Based on JSP Platform[J]. International Journal of Education & Management Engineering, 2017, 7(3):43-50.