

Research on Building Vocational Education Teaching Quality Evaluation System Based on Big Data Technology

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Abstract—The evaluation of teaching quality is indispensable in the system of higher vocational education. It not only involves the macro-control of teaching activities and the scientific management of education, but also is an important means to ensure and improve teaching quality and cultivate more high-quality application-oriented talents. Therefore, this paper, based on the characteristics of vocational education, starts from the micro perspective and combines empirical research methods to analyze the evaluation system of teachers' teaching quality. It is helpful to enrich the relevant research on the evaluation system of teachers' teaching quality by deeply thinking about the weight of each subject in the evaluation system, the rationality of evaluation criteria, the contradiction between evaluation procedures and teachers' needs, and other issues. The research shows that the application of big data technology in the teaching quality evaluation system can effectively improve the quality of vocational education and teaching, laying a solid foundation for the cultivation of applied talents.

Keywords-big data; Vocational education; Teaching quality; Evaluation system

1 INTRODUCTION

At present, colleges and universities generally establish digital campus platforms, on which teachers' information portals, educational administration management systems, scientific research management systems, student management systems and other information systems are built, forming a large number of valuable data resources. These data resources contain rich information needed for teaching evaluation. Based on the characteristics of vocational education and big data mining technology, this project has built a diversified evaluation system for vocational education teaching quality. It mainly includes teacher evaluation, student evaluation, curriculum evaluation, specialty evaluation and management evaluation [1]. It also proposes to use modern information technology to collect, analyze and optimize information, break through the subjectivity and one sidedness in the traditional teaching quality evaluation system, integrate fragmented evaluation into systematic evaluation, and make the teaching evaluation of vocational education more scientific and reasonable. Improve the level and efficiency of teaching quality evaluation in an all-round way.

2 THE SIGNIFICANCE OF BIG DATA IN VOCATIONAL EDUCATION

In recent years, with the rise of new scientific and technological revolution, big data technology has been rapidly developed and applied in Internet, Internet of Things and other media. Big data technology mainly focuses on cloud computing, data mining and analysis, and solves many problems that cannot be solved in the past [2]. The arrival of the big data era has not only formed an industrial chain with huge economic volume, but also promoted the optimization and adjustment of the industrial structure and the optimization and upgrading of related work. Local colleges and universities also produce a lot of data every day [3]. It is necessary to make rational use of these data, especially in the evaluation of teaching quality in local colleges and universities, which is embodied in the following three aspects.

2.1 The need to improve the quality of higher education

With the development of China's society and economy, higher education has changed from elite education to mass education, and the development goal has also changed from a large-scale development model focusing on quantity to a refined development model focusing on quality. Vocational education pays more attention to practical teaching, scientific research, software and hardware facilities, teacher quality and other indicators, which can well reflect the strength of refined development of universities [4]. In order to count all these indicators, it is very complicated and cumbersome to use traditional methods. However, using big data technology can more quickly and accurately quantify the indicators, so that vocational education can find its own goals and positioning, and help improve the quality of higher education.

2.2 The need to improve the scientific nature of decision-making

In order to make the decision-making more objective and scientific, vocational education must take necessary technology as an auxiliary means. The data mining analysis method can excavate more valuable results, so that the vocational education teaching management department can more clearly see the advantages and disadvantages of teaching quality evaluation, which is conducive to making more reasonable decisions [5]. The introduction of big data analysis methods in teaching quality evaluation can not only provide teachers and students with better services, but also ensure the right of teachers and students to know and improve the transparency of school governance.

2.3 The need to improve the efficiency of school management

The use of data mining is of great help to improve the efficiency of organizations. For the evaluation of vocational education teaching quality, data mining technology brings not only the update of the evaluation system, but also the change of teaching management [6]. College teaching managers can use their energy and time in more valuable school management affairs.

3 THE APPLICATION OF BIG DATA IN VOCATIONAL EDUCATION TEACHING QUALITY EVALUATION SYSTEM

The main content of this paper is the research on the application of big data technology in vocational education teaching quality evaluation system, including the following two parts:

3.1 Establishment of data cleaning rules

The implementation of teaching quality evaluation is inseparable from the construction and application of big data information platform. From the perspective of the implementation of vocational education teaching evaluation, vocational education still has many deficiencies in the construction of information software and hardware infrastructure, such as the teaching evaluation management system, teacher management information system and comprehensive educational administration system, which are in an independent state [7]. Due to the independence of the three systems, all of them are original data without any processing, which can ensure the originality and purity of the samples. It is precisely because of this that data cleansing rules need to be established before formal data mining. The cleaned data can effectively improve the quality of data mining results and make the mining process more effective and accurate. The data source of this study mainly comes from the database of teaching evaluation system, teacher management information system and comprehensive educational administration system. The data involved in data mining exist in databases of multiple systems and run on different database platforms [8]. The data structure and data definition in each database are also different. Therefore, in order to successfully complete data mining, build a data warehouse and efficiently clean these data [9].

The main technical framework architecture is divided into data source layer, data conversion layer, data warehouse/data mart layer, analysis and processing layer, data mining layer and user presentation layer. Their interdependence is shown in Figure 1:

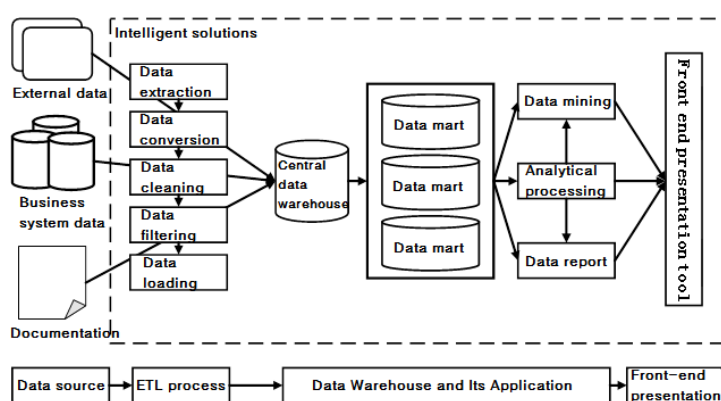


Figure 1: Technical framework architecture

3.2 Data mining algorithm

Based on the idea of data mining, the data mining algorithm of principal component analysis[10], clustering analysis and association rules is used to analyze and process the teaching evaluation data, find out useful patterns or laws, find out the factors affecting the teaching quality (such as support, confidence, etc.) through the analysis of these patterns or laws, and propose effective methods to improve the teaching quality (such as data mining analysis report).

Through the empirical analysis of massive teaching evaluation data, the objectivity of teaching evaluation data is demonstrated from the overall reliability, retest reliability[11-12], consistency of multiple source data, and consistency analysis based on time series to test the effectiveness of students' teaching evaluation. In addition, with the help of factor analysis, explore the rules hidden in the teaching evaluation data, so as to improve the teaching quality and promote the professional development of teachers. As shown in Figure 2:

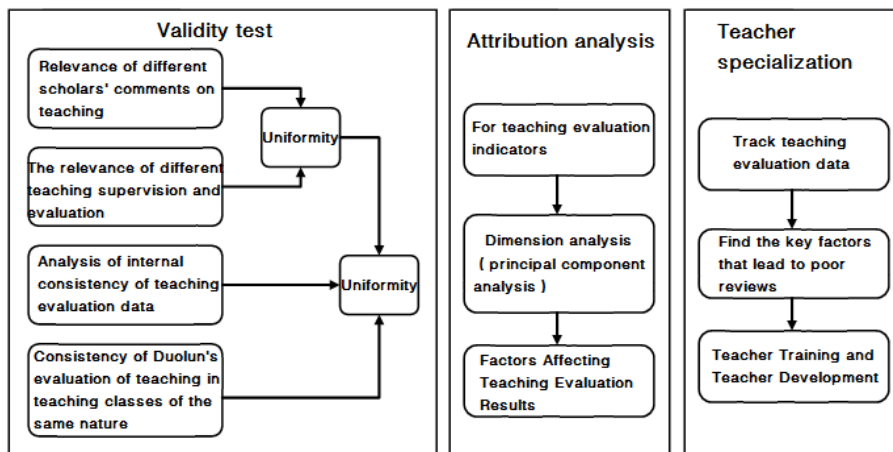


Figure 2: Flow chart of effectiveness study

4 APPLICATION EFFECT ANALYSIS

Through the practical application of the teaching evaluation management information system in a university in the early stage, a large amount of evaluation data has been accumulated in the system database. When the software is implemented, at the end of the semester, the students evaluate the teachers, and the relevant data are collected in the database. The school analyzes the large amount of data collected according to the students, classes, and teachers, and shows the rules of the data in the form of charts, which is conducive to the teachers to do the corresponding processing in the following teaching process. The visualization of teaching evaluation feedback data is shown in Figure 3.

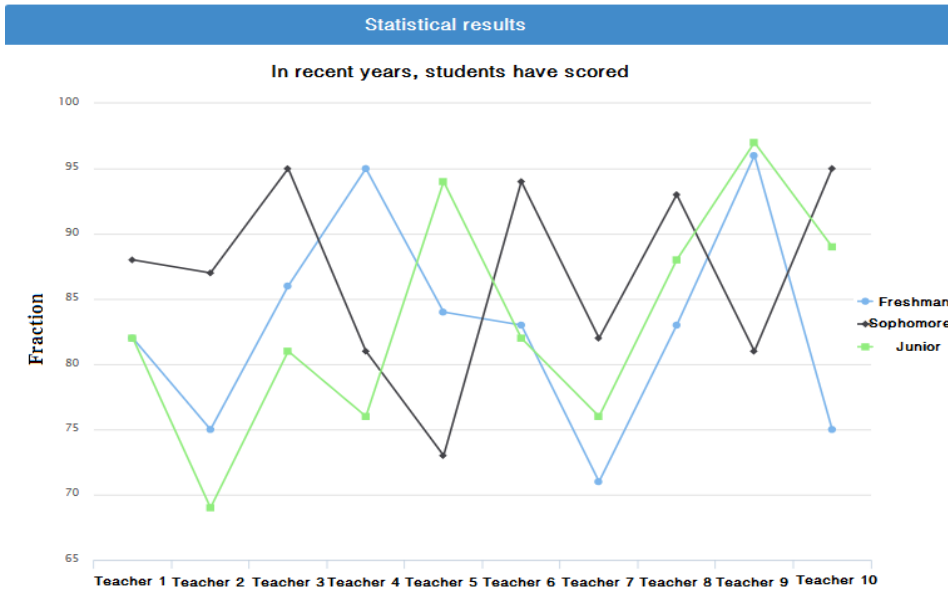


Figure a Student grading in recent years

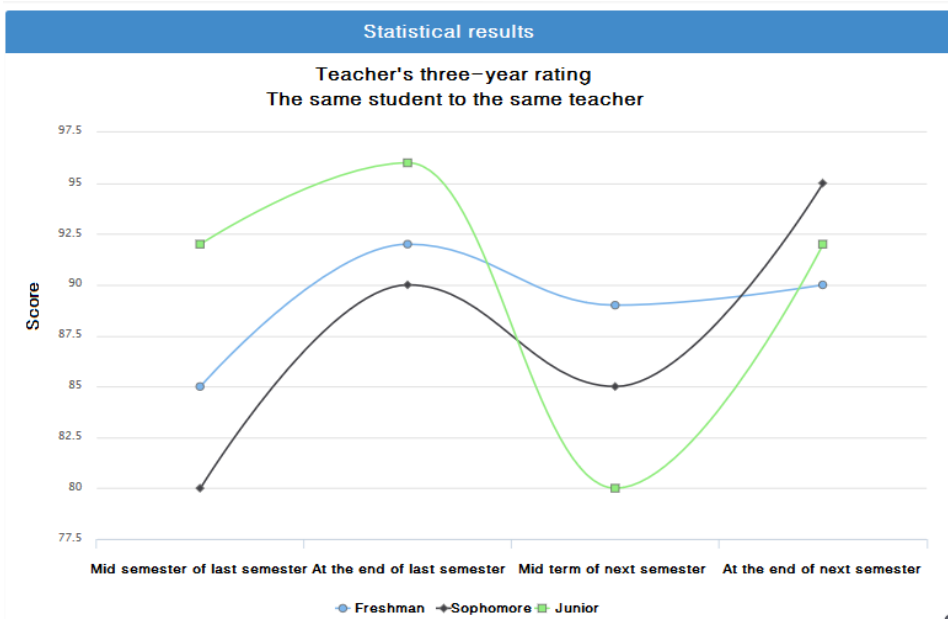


Figure b Teacher's three-year rating

Figure 3 Visualization of teaching evaluation feedback data

- The principal component analysis can be used to find out the main components from the complex indicators to determine the correlation between the variables of teacher evaluation and conduct comprehensive evaluation. At the same time, it can solve the problem of traditional multi index weight or subjective determination of index weight, making teacher evaluation more objective and reasonable.
- The mining algorithm of association rules is reasonably referenced in the process of teaching evaluation, so as to find the basic relationship between teacher information and teaching effect, which lays the design premise and supporting reference for the research and development of teaching evaluation means.
- On the basis of the principal component analysis of the samples, the principal component scores are used as variables for cluster analysis, and all teachers in the samples are classified according to the teaching evaluation results, which is convenient for us to understand the distribution of teachers' teaching evaluation quality grades, so as to effectively carry out teaching management.
- To overcome many drawbacks of the traditional unified evaluation model of teaching quality, we collected and analyzed teaching information through big data technology, and carried out evaluation work in a qualitative and quantitative way, so that the enthusiasm of teaching management of each teaching unit was encouraged, a good atmosphere of full staff management and full process participation was achieved, and the teaching quality was significantly improved.

5 CONCLUSIONS

This paper mainly studies the role of big data technology in vocational education teaching quality, and constructs a diversified evaluation system for vocational education teaching quality according to the characteristics of vocational education development. And the evaluation method of teaching quality is scientifically improved by using data mining technology, which also enables teachers to get more accurate feedback results of teaching quality inspection from students, departments and expert groups. In this way, teachers can be promoted to improve the deficiencies in the teaching process, and they can also learn more about their good aspects in teaching, so as to develop their strengths and avoid weaknesses in the future teaching work and improve their teaching level. In future research, we should consider mining more hidden data in teaching through big data technology to provide more research basis for future smart education and promote the development of China's overall education.

ACKNOWLEDGEMENT

Key scientific research projects of colleges and universities in Henan Province (21B880051)

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