Research Article

Construction of Higher Education Teaching Quality Evaluation Model Based on Scientific Computing

Chao Zhang,1,2 Yanyan Chen,3 and Juanjuan Qin4

1Education Management, Jiuzhou Polytechnic, Xuzhou 221116, Jiangsu, China
2University of Perpetual Help System DALTA, Manila 0900, Philippines
3Computer Education, Jiuzhou Polytechnic, Xuzhou 221116, Jiangsu, China
4Microbiology, Jiuzhou Polytechnic, Xuzhou 221116, Jiangsu, China

Correspondence should be addressed to Chao Zhang; zhangchao@jzp.edu.cn

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The recipients of higher education are the backbone of future social construction, so their education is particularly important. As the research group of scientific computing is immature, the use of it to perform related calculations can achieve a multiplier effect with half the effort. Especially now, the quality evaluation of higher education has not been determined. Therefore, this paper aims to use scientific computing to construct a scientific evaluation model for the teaching quality of higher education. For scientific computing, this paper used its data processing ability to design and improve the computational science model evaluation algorithm. For the evaluation model, it not only constructed it with the fuzzy evaluation model and analyzed the weights of the relevant indicators proposed but also designed a teaching evaluation system according to the established model in order to evaluate the teaching quality efficiently and accurately. Experiments showed that the evaluation result score for a teacher was 81.45, and 81.45 was between 80 and 90. The teacher’s classroom evaluation result was good, which showed the effectiveness of the evaluation model. The test results of the system showed that the system could load up to 80 people and run smoothly online at the same time.

1. Introduction

At present, computational science, which only involves mathematics, physics, chemistry, and other natural science fields, is developing rapidly. Many scientific computing fields are relatively mature. The main driving force for the development of these computing sciences lies in the in-depth research of this discipline, as well as the accurate judgment and reference of related interdisciplinary disciplines. When the problem involves human participation and various social, cultural, psychological, and behavioral elements, the complexity and uncertainty of the scientific calculation involved will suddenly increase. Therefore, computational human factors and ergonomics involve multidisciplinary comprehensive research, which is an extension of classical multiphysics research and classical natural science research. Establishing computational human factors and ergonomics needs to synthesize and expand the knowledge and technology of many fields of scientific computing.

Teaching quality evaluation is an important part of higher education education and teaching management. To a certain extent, higher education education and teaching is the cornerstone of Chinese talent training, which is directly related to the quality and quantity of future talents. It plays a vital role and significance in realizing the national talent strategic reserve and development and, at the same time, promoting the implementation of the new concept of education and teaching proposed by the Ministry of Education. Therefore, the establishment of a higher education teaching quality evaluation system is an important guarantee for improving the quality of Chinese talent training and realizing the new concept of national education and teaching to promote social development.

The main innovations of this paper are as follows: (1) By investigating the teaching system of higher education, it
designed a system suitable for higher education, which could fully reflect teachers’ evaluation and teaching quality system in various teaching environments. (2) It established a teacher’s teaching quality evaluation model from the perspective of new concepts and new ideas through the research and analysis of the commonly used teaching quality evaluation methods. It focused on the subjective quantification of weight values and the comprehensive evaluation of scientific calculation so that the weights retained the subjectivity of experts, and at the same time, they were more objective, and the results of the evaluation were more scientific.

2. Related Work

Teaching evaluation is an important means to measure the quality of teaching. A good teaching evaluation system can not only fully reflect the level of teaching but also play a linking role in improving the teaching system of teachers in the future. Teaching evaluation is mainly aimed at evaluating methods, effects, and results in terms of educational and teaching activities or students’ daily ability training. On the one hand, it enhances the trust and fairness of teachers in the evaluation results, and on the other hand, it points out the problems existing in teachers’ past education and teaching and corrects them in time to improve the overall teacher level of the school. Trangenstein J A was devoted to the problem of solving nonlinear systems of equations. Through the Krylov subspace method, the iterative method for solving linear systems of equations could be extended to nonlinear systems. Direct search methods and stochastic minimization problems were also discussed [1]. Through 12 computational projects, Danaila I aimed to solve problems numerically from a wide range of applications, including fluid mechanics, chemistry, elasticity, thermal science, computer-aided design, signal, and image processing [2]. Zhang discussed a container-based package management scheme, which can alleviate the complexity of maintenance and reduce human error [3]. Cuartas presented a new method for the analysis and optimization of landfill design variables. The method extracted knowledge based on computer simulations of multiple models and systematic analysis of the resulting data. It could be extended to the optimization of other complex systems that had a direct impact on the environment. The experiments demonstrated the effectiveness of the proposed method for improving the design and operation of landfills [4]. Huang, who believed that the traditional English teaching quality evaluation is inefficient and the evaluation statistics were very troublesome, combined the Gaussian process improvement algorithm and used the mixed Gaussian to explore the distribution characteristics of the samples to improve the classical correlation vector machine model. In addition, Huang proposed an active learning algorithm that combined sparse Bayesian learning and a mixture of Gaussians to strategically selected and label samples and built a classifier that combined the characteristics of the sample distribution. Through comparative experiments, it was found that this research model performed well in the evaluation of English teaching quality of the traditional model and network model, which proved that the algorithm had certain advantages and could be applied to the practice of English intelligent teaching systems [5]. Kong studied the fuzzy comprehensive evaluation method in the teaching model evaluation method, readjusting the weight factor in the evaluation model. The simulation results showed that the Gaussian kernel function parameter optimization method has strong advantages. In addition, it could accurately reflect the quality of teaching and accurately determine the weight of teaching quality evaluation indicators at the same time [6]. The purpose of Trškanc was to assess student teaching practices, the role of school mentors, and the delivery of quality metrics for all participants in the process (i.e., school mentors, students, teacher mentors, teacher coordinators, and school coordinators in the Faculty of Arts) method. The results showed that the selected indicators of teaching practice quality were specific and general enough to be used in the internal evaluation and quality assessment of any teaching practice (taking history courses as an example), including various teacher education courses at universities in Slovenia and abroad [7]. However, after the summary of relevant research, it could be found that teaching evaluation often restricted teachers’ behavior and simply evaluated teachers’ teaching, which was obviously unreasonable.

3. Scientific Computing

The progress of science largely benefits from numerous innovations in computing. The collection, organization, transformation, and analysis of information play an increasingly important role in the scientific field [8, 9]. Applied computer science provides a formal framework and exploration tools for scientific research. Why is the human factor problem so difficult to deal with by using traditional scientific computing methods? How to integrate multi-granularity models, multilevel interactions, and multi-objective evaluation into human-centered prototype design and manufacturing? Which theories, techniques, methods, and tools can help advance the effective solution of human factors design and verification scientific problems? This chapter will describe the main part of the human factor design and verification solution based on scientific computing from four aspects: method system, theoretical system, technical system, and tool system. It is the construction of a human-machine-environment intelligent system for scientific computing modeling and simulation. The computational science framework is shown in Figure 1.

The first aspect of inspiration comes from the rise of Scientific Computing (SC). Computing has revolutionized scientific practice. Scientists increasingly rely on the automatic extraction of useful information from data, and scientific work is more reflected in the insight into the relationship between data [10]. In the future, science will involve automated processing in many aspects: data collection, information storage, hypothesis formation, and testing, etc. Computing will become more and more important in the formation and testing of scientific hypotheses. With the aid of computers, the breadth and depth of data
relationships will make the formation and testing of scientific hypotheses unsustainable. The formation and testing of scientific hypotheses under the necessary breadth and depth of data relationships can be completed with the help of the system model, and the cycle time for completing the formation and testing of scientific hypotheses can be reduced to the expected requirements. The purpose of scientific computing is to gain understanding rather than data. The computer programs can be implemented and run by establishing mathematical models, and designing and solving calculation methods. Scientific computing can comprehensively study the evolution of complex systems in computer virtual experiments in a relatively low-cost way and obtain a comprehensive and accurate understanding of the research objects under various conditions. Scientific computing has become a basic means of scientific research alongside theory and experiment. It plays a significant role in many scientific fields and engineering applications and has unlimited potential.

Computational modeling at the system level will involve many heterogeneous models, and the integration of related heterogeneous models is the difficulty in automatically constructing and improving computational models [11]. Scientists will make detailed records of the experimental process and observation results to facilitate experimental reproduction and result analysis. They will search for objects matching specific criteria from datasets, compute statistical properties of data, analyze and mine data for characteristic patterns, and other information extraction that requires efficient large-scale dataset management [12]. From the perspective of processing systems, internal and external inputs, and execution outputs, living systems, like stored-program computers, are the aggregates that acquire and process information and make and execute decisions. The functions of living systems are the result of choices made at many different levels, and choices can be understood as the target functions that are optimally executed. The description of information processing in procedural imperative language can be used to determine the meaning and purpose of computer code strings, which are equivalent to the target function of the optimal execution of the living system. Three methods can be used to realize the measurement of meaning and purpose or target function. The first is the rule-constrained equation method. The second is the numerical stochastic simulation approximation method. The third is the limited vocabulary causal storage method [13]. The analogy between the living system and the stored-program computer, especially the realization of the meaning and purpose of the computer code string by the procedural imperative language or objective function measure of the optimal execution of the living system, makes the study of complex human-machine and environmental systems a potential area of scientific computing.

The second aspect of inspiration comes from the development of Computational Science (CS). At present, the relatively mature computational sciences include computational mathematics, computational geometry, computational statistics, computational physics, computational
geophysics, computational particle physics, computational mechanics, computational structural mechanics, computational fluid dynamics, computational fluid dynamics, computational physical mechanics, computational chemistry, computational neuroscience, computational biology, and computational economics. Emerging computational sciences include computational life science, computational cognitive science, computational materials science, computational quantum mechanics, computational chromodynamics, and computational relativity.

For scientific computing, the domain-specific language of big data has great application potential. The domain-specific language that it provides with parallel computing capability can significantly improve computing efficiency and lay a solid foundation for the further development of related fields. The existing domain-specific languages for scientific computing and big data either have limited functions or do not have parallelization functions, which often have considerable limitations in practical applications [14].

4. Comprehensive Evaluation Model

Construction of Teaching Quality in Colleges

4.1. Comprehensive Evaluation of Fuzzy Theory. In fuzzy theory, it is usually assumed that there are the following sets:

$$U = \{x_1, x_2, x_3, \ldots, x_n\},$$
$$V = \{y_1, y_2, y_3, \ldots, y_m\}. \quad (1)$$

When it is a finite universe, A is the fuzzy element in the set U, and R is a Fuzzy matrix on U × V, and two Fuzzy matrix operations are A.R. In the whole operation process, the fuzzy matrix acts as a relay, whose essential meaning is to convert the fuzzy element vector A in the set U to another domain V through the Fuzzy matrix and express it in the form of the fuzzy element vector B, that is, the Fuzzy matrix acts as a relay, whose essential meaning is to convert fuzzy elements, set Y has n elements. When set X to set Y in a fuzzy relationship, which can be represented by a matrix.

In the comprehensive evaluation model, A is the set of fuzzy vector element weights, R is the fuzzy relationship linking U and V, and B is the result of comprehensive evaluation.

The mathematical model of the fuzzy comprehensive evaluation of secondary indicators involved in this paper:

$$B = A.R = (b_1, b_2, \ldots, b_m),$$
$$B = A. \begin{bmatrix} B_1 \\ B_2 \\ \vdots \\ B_m \end{bmatrix} = A. \begin{bmatrix} A_1.R_1 \\ A_2.R_2 \\ \vdots \\ A_m.R_m \end{bmatrix}. \quad (2)$$

The judgment model is shown in Figure 2.

4.2. Fuzzy Model Construction. Through the fuzzy judgment relationship R, the fuzzy comprehensive evaluation model TR(U,T,R) is obtained and B = A.R is a subset in the universe of discourse V.

$$b_j = \vee(a_i \lor k_j), k = 1, 2, L, n; \quad j = 1, 2, L. \quad (3)$$

There exists

$$\sum_{i=1}^{m} b_j \neq 1. \quad (4)$$

To normalize the results, assume

$$b_j = \max(b_1, b_2, \ldots, b_m). \quad (5)$$

There is b_j for a comprehensive decision result of the transaction. Different decisions make different models. Model one: A(\land, \lor).

$$b_j = \max\left\{(a_i \land r_{ij}), 1 \leq i \leq n\right\}, \quad j = 1, 2, \land, m. \quad (6)$$

There are certain problems in this type of model. The total number of weights remains unchanged. When too many elements are involved, the weighted value of each element will be reduced, which will affect the final evaluation result. In order to solve this problem, the optimization weight coefficient is adopted, and the method is as follows:

$$a_i = \frac{na_i}{m \sum_{i=1}^{m} a_i}, \quad i = 1, 2, \land, n. \quad (7)$$

After the result is obtained, a_i is then normalized to get the following:

$$a_i = \left(\frac{n}{m}\right)a_i, \quad (8)$$

where a_i is the final optimization weight coefficient, n is the number of evaluation elements, and m is the overall number of evaluation sets.

Model two: M(\ast, \lor).

$$b_j = \max\left\{(a_i \ast r_{ij}), 1 \leq i \leq n\right\}, \quad j = 1, 2, \ast, m. \quad (9)$$

Model 2 includes two calculation modes. One is multiplication calculation, that is, symbol \ast, and the other is taking the maximum value, that is, symbol \lor. The biggest difference between the two calculation modes is that in the calculation, the former will not lose the element information, but the latter will lose the important information of the element. When a_i \leq 1, a_i \ast r_{ij} is obtained, a_i is the correction value of r_{ij}, the main factor directly affects the result and has
nothing to do with other factors. According to the characteristics of this model, this kind of model is suitable for the comprehensive evaluation of a single element.

Model three: \( M(\cdot, +) \).

\[
b_j = \sum_{i=1}^{n} a_i r_{ij}, \quad j = 1, 2, \ldots, m, \quad \sum_{i=1}^{n} a_i = 1.
\] (10)

Model \( M(\cdot, +) \) is more suitable when the evaluation target involves multiple evaluation factors. The model includes almost all factors, and also includes the information carried by each element. In the above mathematical model, \( a_i \) and \( r_{ij} (i = 1, 2, \ldots, n; j = 1, 2, \ldots, m) \) have no boundary range and \( a_{ij} \) is still required normalized processing.

Model four:

\[
b_j = \sum_{i=1}^{n} a_i r_{ij}, \quad j = 1, 2, \ldots, m.
\] (11)

Or

\[
b_j = \min \left[ 1, \sum_{i=1}^{n} a_i r_{ij} \right], \quad j = 1, 2, \ldots, m.
\] (12)

Model five: \( M(\land, \oplus) \).

The model is a combination of small-sum and ring-sum operations, a summation calculation with a top range of 1, that is,

\[
x \oplus y = \min \{ 1, x + y \}.
\] (13)

Through this model, there is the following:

\[
b_j = \sum_{i=1}^{n} a_i \land r_{ij}.
\] (14)

That is,

\[
b_j = \min \left[ 1, \sum_{i=1}^{n} a_i \land r_{ij} \right], \quad j = 1, 2, \ldots, m.
\] (15)

4.3. Calculation of Fuzzy Comprehensive Evaluation Results

4.3.1. Weighted Average Method. The weighted average method is mainly based on the size of the weight, and the overall operation of all factors is based on the overall characteristics of things. Its calculation method is as follows:

\[
b_j = \left( a_1 \cdot r_{1j} \right) \oplus \left( a_1 \cdot r_{1j} \right) \oplus \cdots \oplus \left( a_n \cdot r_{nj} \right), \quad j = 1, 2, \ldots, m.
\] (16)

4.3.2. The Main Factor Highlighting Method. The main factor highlighting method is similar to the main factor determination method. It selects the main factors from many factors and analyzes them in reverse. To a certain extent, it also reflects the negative influence of the main factor, which is the difference between it and the main factor determination method. Its calculation method is as follows:

\[
b_j = \max_{i=1}^{m} \left( a_i \cdot r_{ij} \right), \quad j = 1, 2, \ldots, m.
\] (17)

Or

\[
b_j = \left( a_1 \cdot r_{1j} \right) \oplus \left( a_1 \cdot r_{1j} \right) \oplus \cdots \oplus \left( a_n \cdot r_{nj} \right), \quad j = 1, 2, \ldots, m.
\] (18)

Here, \( \min_{i=1}^{m} \) represents the smallest of the \( m \) data selected for comparison, and \( \land \) represents the larger of the two selected numbers compared with each other.

4.3.3. The Main Factor Determination Method. The main factor determination method should pay more attention to the decisive role of a single factor while fully emphasizing its internal main factors. The one that directly affects the result is the largest value, which is not disturbed by other value changes within a certain range. Its calculation method is as follows:

\[
b_j = \min_{i=1}^{m} (a_i \land r_{ij}), \quad j = 1, 2, \ldots, m.
\] (19)

4.4. Evaluation Index Set Construction. The first step is to set the criterion level evaluation index \( U = \{ U_1, U_2, U_3 \} \). \( U_1 \) is the teaching organization and management quality of tourism management majors in colleges and universities, \( U_2 \) is the evaluation of the learning quality of students majoring in tourism management in colleges and universities, \( U_3 \) is the teaching quality evaluation of teachers majoring in tourism management majors in colleges and universities.

And then, set up the index layer evaluation index set, which is marked as \( \{ U_k \} \), \( k \) is the number of indices under \( U_k \). Such as \( U_1 = \{ U_{11}, U_{12}, U_{13}, U_{14} \} \), of which, \( U_{11} \) is empathy; \( U_{12} \) is professional and curriculum setting; \( U_{13} \) is communication and process management; \( U_{14} \) is the environment for teaching and learning, and the rest of the indicators are analogous. On the basis of the above summary, the evaluation index set of the specific criterion layer and index layer of this case is shown in Figure 3.
The Analytic Hierarchy Process, or AHP for short, was proposed in the early 1970s and is a multiobjective, multilevel decision-making evaluation method. It is especially suitable for complex problems that are difficult to analyze and make decisions in social systems with quantitative methods. It is especially suitable for complex problems that are difficult to analyze and make decisions in social systems with quantitative methods. Its main idea is that when people evaluate and make decisions on decision-making behavior and objects, they can express and process people’s subjective judgments in quantitative form and rank them in order to facilitate managers to make accurate decisions. It is one of the evaluation methods with practical effect [15, 16].

With the AHP method, a hierarchical structure index system can be established, and the subordinate relationship of factors can be explained at the same time. By subjectively comparing the two indicators, the logical structure relationship between the concepts is formed, that is, the hierarchical structure model. Then it compares and judges each index in the system, establishing a judgment matrix, and finally obtaining the weight of each factor. AHP scales, through comparison, transform subjective judgments into digitization and objectification and scientifically quantifies qualitative index concepts to enhance practicability, and the obtained results can more truly reflect the actual situation.

According to the above procedures and steps and the sorted judgment matrix, the weight of each secondary indicator was calculated [17], as shown in Table 1.

Although AHP can more objectively and accurately explain the facts of the research question in the process of use, there is also the phenomenon of personal opinions, preferences, and emphasis of subjective judgments when constructing the judgment matrix, which will cause some deviations in the judgment results. At this time, a fuzzy comprehensive evaluation model is introduced to quantify the qualitative indicators with ambiguity so that some complex factors with uncertain boundaries and ambiguity can determine the weight of each indicator according to a certain number of standards. Therefore, the fuzzy comprehensive evaluation of teaching quality with fuzzy mathematics theory is a good supplement and improvement to the AHP.

According to the above results, the teacher’s evaluation result score was 81.45. It was an evaluation result obtained by using the fuzzy comprehensive evaluation algorithm, which was an algebraic value from 0 to 100. The higher the score, the better the quality of classroom teaching. While 81.45 was between 80 and 90, the teacher’s classroom evaluation result was good.

5. Teaching Quality Evaluation System Design in Colleges

In the classic MVC pattern, M refers to the business model, V refers to the user interface, and C refers to the controller. The purpose of using MVC is to separate the implementation codes of M and V. So that the same program can use different representations. Among them, the definition of View is relatively clear, that is, the user interface. The MVC design pattern is a design that separates the view layer, the business logic layer, and the persistence layer so that each layer is independent of the other, and each layer implements its own functional code. This layered design mode reduces the coupling between various functions and, at the same time, realizes the purpose of parallel development for the development of the system and greatly improves the maintainability, scalability, and component reusability of the system in the later stage [18]. The higher education teaching quality evaluation system in this paper used the MVC design pattern. The design and application of each layer are described in the following.

5.1. Overall System Architecture Design. The good parts of the relevant technical construction of the higher education teaching quality evaluation system were introduced before. Here, the overall architecture of the system was described with an example of user login. The user accessed the page created by the JSF tag library. The JSF page passed the value entered by the user to the messageBean (managed Bean) and then performed through the faces-config.xml file. The EJB component received the upper layer of sessionBean, namely Login.java, and performed related business processing, read...
the database data through the next layer of entityBean and persistence.xml for validation, and finally returned the processing information to the user.

The overall structure of the higher education teaching quality evaluation system designed in this paper is shown in Figure 4.

The main purpose of the design and implementation of the system is to meet the needs of the current higher education teaching quality evaluation management. In this paper, the teaching quality evaluation index system of higher education was designed through the proposed scheme of improving the teaching evaluation system of higher education. At the same time, the performance of several commonly used teaching quality evaluation models was analyzed and compared, and higher education teaching quality evaluation model was constructed. Through the research on the needs of higher education and on the basis of the leadership evaluation work, the teaching quality evaluation business of higher education was arranged. The system operation process that meets the system informatization and science was formulated. The system operation process is shown in Figure 5.

The evaluation function is the core function of higher education teaching evaluation and an important way to implement the teaching concept of higher education education. This paper mainly designed the evaluation operation for higher education teachers’ classroom teaching and daily work performance analysis. Combined with the above-designed higher education teaching evaluation system, the system query evaluation information sequence diagram is shown in Figure 6.

Figure 6 mainly describes the operation of querying the required evaluation results by inputting relevant information after the user logged in to the system. The system encapsulated the keywords queried by the user through the DateselectAction.java class to call the DateselectService.java class responsible for business logic for processing, calling the query method of the information control class QueryAndstatiticDao.java to query the required information and returned to the previous layer one by one.

5.2. Systematic Fuzzy Comprehensive Evaluation Design. Fuzzy comprehensive evaluation is the integration of the evaluator’s decision-making on the evaluation target indicators. The evaluation element set, evaluation element weight set, and evaluation set are established to determine the relationship judgment matrix and obtain the comprehensive evaluation result. The design and application of the system aim to improve the scientificity of the comprehensive evaluation results of the higher education teaching quality evaluation system through the characteristics of the fuzzy comprehensive evaluation model and maximize the retention of the subjective and objective consciousness of the evaluators in the evaluation results to make the evaluation results more accurate and convincing. The design of the fuzzy comprehensive evaluation in the system involves three main points. The first is the construction of the element set, the evaluation element weight set, and the evaluation set of the fuzzy comprehensive evaluation. Here, the input of the evaluation information is mainly obtained by extracting the evaluation system. Therefore, in the system design, it is necessary to design the evaluation information table, including the evaluator information, the evaluation content, and the corresponding evaluation value in the content. In the process of the comprehensive evaluation of the entire evaluation information, it is necessary to consider the overall operation of the system. In the comprehensive evaluation results, the elements set, weight set, and evaluation set are constructed through the calculation, and the comprehensive

<table>
<thead>
<tr>
<th>Teaching organization and management quality $A_1$ (0.054)</th>
<th>Emptathy $A_{11}$ (0.060)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student learning quality $A_2$ (0.656)</td>
<td>Major and curriculum $A_{12}$ (0.722)</td>
</tr>
<tr>
<td>Teacher teaching quality $A_3$ (0.290)</td>
<td>Communication and process management $A_{13}$ (0.197)</td>
</tr>
<tr>
<td>Teaching and learning environment $A_{14}$ (0.021)</td>
<td>Learning value sense $A_{21}$ (0.685)</td>
</tr>
<tr>
<td></td>
<td>Quality of learning process $A_{22}$ (0.234)</td>
</tr>
<tr>
<td></td>
<td>Quality of learning outcomes $A_{23}$ (0.081)</td>
</tr>
<tr>
<td></td>
<td>Learning value $A_{31}$ (0.010)</td>
</tr>
<tr>
<td></td>
<td>Teaching passion and organization $A_{32}$ (0.070)</td>
</tr>
<tr>
<td></td>
<td>Group interaction $A_{33}$ (0.021)</td>
</tr>
<tr>
<td></td>
<td>Interpersonal harmony $A_{34}$ (0.036)</td>
</tr>
<tr>
<td></td>
<td>Knowledge width $A_{35}$ (0.702)</td>
</tr>
<tr>
<td></td>
<td>Academic administration $A_{36}$ (0.158)</td>
</tr>
<tr>
<td></td>
<td>Difficulty/progress $A_{37}$ (0.003)</td>
</tr>
</tbody>
</table>

Table 1: Weights of secondary indicators.
evaluation result table is designed in the system design. It includes the information of the teachers evaluated, the evaluation information of the evaluators, and the comprehensive evaluation results.

This paper constructed a teaching quality evaluation scheme based on a fuzzy evaluation model, which was efficient and feasible to solve the problem of higher education teaching quality evaluation. It introduced the evaluation design of higher education teaching quality evaluation system based on a fuzzy evaluation model through SA/SD analysis method. The final evaluation result data flow diagram is shown in Figure 7.
Evaluate $B = AoR$

Get the weight vector $A$
Select synthesis factor $o$
Get the fuzzy matrix $R$

Get evaluation results
.....
Get evaluation results

Get the weight vector
Select synthesis factor
Get the fuzzy matrix
.....

Figure 7: Data flow diagram of final evaluation results.

Demand collection and analysis

Theoretical design structure

Logical design

Optimize data model

Design physical structure

Theoretical check

Concrete realization

Run the experiment

Use and maintain data

Application requirements

Special rules

Figure 8: Flowchart of database design ideas.
According to the data flow of the final evaluation result of the system in Figure 7, it can be seen that the final fuzzy evaluation result obtained by the system is the value of the fuzzy evaluation B. The B value includes the weight vector A, the synthesis factor o, and the fuzzy matrix R. The construction of the fuzzy matrix is obtained through the evaluation results of multiple influencing elements. The evaluation result of a single element is obtained through the weight vector, synthesis factor, and fuzzy matrix under the layer, and the final fuzzy evaluation result contains the evaluation information of each layer element on the impact factor [19, 20].

Here the data storage and related technical design of the database are introduced through the needs of the underlying data of the system and the data needs of higher education teaching evaluation. The system database application chooses SQL Server 2008, and the specific design process of the database is shown in Figure 8.

The evaluation relationship table (Teapigx) is mainly responsible for recording the relationship between the evaluator and the evaluated teacher, including the evaluation target of the evaluated teacher and the grade of the teacher where the teacher belongs. The specific table design content is shown in Table 2.

The evaluation content table (PJNR) is mainly responsible for recording the evaluation content of the evaluators to the evaluated teachers. The specific design content is shown in Table 3.

The evaluation result table (PJGRADE) is mainly responsible for recording the specific evaluation relationship, information, and scores of the evaluator to the teacher. The specific design content is shown in Table 4.

5.3. System Function Test. The above subsections describe the implementation of the higher education teaching quality evaluation system. The evaluation function of the system was basically successful, and the implemented functions were then tested. As the complexity of user requirements increased, the functions implemented by various business logics were more closely related, resulting in lower and lower fault tolerance of the system and more and more defects. In order to realize the normal operation of the inspection system, the designed functions must meet the needs of users. This article explained the realization of the core functions of the higher education teaching quality evaluation system in teacher teaching evaluation management, evaluation weight index management, student information management, and teacher information management. In order to test whether the realized functions of the system could meet the actual needs of teaching evaluation management, this paper designed a test plan to test the realized functions. The results showed that the prototype of the higher education teaching quality evaluation system designed in this paper basically meets the requirements of daily higher education teaching evaluation management needs.

In order to test the stability of the system, the actual simulation mode was adopted. Students of a certain major (106 people) were invited to enter the system at the same time for teaching quality evaluation. The network environment was the campus network, which must be operated on the computer during operation. At the same time, it logged into the administrator system to check the operation of the system and used the software to record the response time of the system. The time to open the page meant the time...

### Table 2: Evaluation relationship table.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type of data</th>
<th>Character size</th>
<th>Callout</th>
</tr>
</thead>
<tbody>
<tr>
<td>PJID</td>
<td>Vachar</td>
<td>10</td>
<td>Reviewer ID (primary key)</td>
</tr>
<tr>
<td>PJTEAID</td>
<td>Vachar</td>
<td>10</td>
<td>Teacher number being evaluated</td>
</tr>
<tr>
<td>PJLB</td>
<td>Vachar</td>
<td>10</td>
<td>Evaluation type (primary key)</td>
</tr>
<tr>
<td>TEAGRADE</td>
<td>Vachar</td>
<td>10</td>
<td>Teacher grade</td>
</tr>
</tbody>
</table>

### Table 3: Evaluation content table.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type of data</th>
<th>Character size</th>
<th>Callout</th>
</tr>
</thead>
<tbody>
<tr>
<td>PJNRID</td>
<td>Vachar</td>
<td>10</td>
<td>Evaluation content number (primary key)</td>
</tr>
<tr>
<td>PJCONTENT</td>
<td>Vachar</td>
<td>25</td>
<td>Comment content</td>
</tr>
<tr>
<td>PJCONZB</td>
<td>Vachar</td>
<td>10</td>
<td>Evaluation content indicators</td>
</tr>
</tbody>
</table>

### Table 4: Evaluation results table.

<table>
<thead>
<tr>
<th>Name</th>
<th>Type of data</th>
<th>Character size</th>
<th>Callout</th>
</tr>
</thead>
<tbody>
<tr>
<td>PJGR ADEID</td>
<td>Vachar</td>
<td>10</td>
<td>AutoNumber (primary key)</td>
</tr>
<tr>
<td>PJID</td>
<td>Vachar</td>
<td>10</td>
<td>Reviewer ID</td>
</tr>
<tr>
<td>PJTEAID</td>
<td>Vachar</td>
<td>10</td>
<td>Teacher number being evaluated</td>
</tr>
<tr>
<td>PJLB</td>
<td>Vachar</td>
<td>10</td>
<td>Evaluation category</td>
</tr>
<tr>
<td>PJNRID</td>
<td>Vachar</td>
<td>20</td>
<td>Evaluation content number</td>
</tr>
<tr>
<td>GRADE</td>
<td>Vachar</td>
<td>50</td>
<td>Evaluation score</td>
</tr>
<tr>
<td>PJTIME</td>
<td>Datetime</td>
<td>8</td>
<td>Evaluation time</td>
</tr>
</tbody>
</table>
from entering the account to entering the evaluation system. The operation reaction time represented the time from when the evaluation was clicked to when the evaluation was completed. The experimental results are shown in Figure 9.

6. Conclusions

This paper systematically analyzed the current higher education teaching quality evaluation system, consulting the relevant teaching evaluation literature, proposing solutions to the problems existing in the current higher education teaching evaluation, and earnestly studying the actual needs of the current higher education teaching quality evaluation. Drawing on the current construction of teaching quality evaluation system in colleges and universities, this paper designed a teaching quality evaluation system model suitable for the higher education system and subdivided the system model to improve the structure of the higher education teaching quality evaluation index system. The accuracy of the comprehensive evaluation of teaching quality was realized in theory, which was of great significance to promoting the digital management of higher education teaching. But there are still many areas that need to improve in the article: (1) The higher education teaching system is facing reform, and whether the system can fully meet the needs of the reformed teaching evaluation management is not certain. (2) Regarding the fuzzy theoretical model selected by the system, how to achieve a more efficient and better teaching quality evaluation is a problem that needs to be further studied.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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References