Design of Dynamic Evaluation Algorithm for Classroom Mathematics Teaching

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Abstract. With the reform and development of education, there is a clear gap between our country's current evaluation theories, methods and systems and the requirements of quality education, which has become a bottleneck restricting the overall implementation of quality education. Therefore, explore and try to change the evaluation function, evaluation method, evaluation technology and other content, establishing a developmental mathematics teaching evaluation system that embodies the theory of quality education is an objective requirement for the overall implementation of quality education. The purpose of this article is to research and design the dynamic evaluation algorithm of classroom mathematics teaching. This article takes the city's key teaching reform subject "Research and Practice on the Dynamic Evaluation Method of Classroom Mathematics Teaching" as the research background to develop a classroom math teaching quality evaluation system. On the basis of inheriting the original, feasible and effective classroom mathematics teaching evaluation methods and means, this paper establishes a set of classroom mathematics teaching evaluation system structure, and uses the network-based computer evaluation system as a tool to complete the collection and arrangement of evaluation data And analysis process, provide a random evaluation platform for each evaluator, record all evaluation activities and evaluation results of the evaluator, and provide it to the evaluators for evaluation information query. This article gives a comprehensive evaluation method for teachers' mathematics teaching effect, which can be both quantitative and qualitative. It can give a comprehensive evaluation of the combination of quantity and sex to each link of teacher's mathematics teaching according to the change of evaluation information. Experimental research shows that teachers with a Ph.D. degree in language behavior are about 12% higher than those with a master's degree, and the proportion of classroom silence and technology usage is lower than that of teachers with a master's degree.

Keywords: Dynamic Evaluation, Classroom Mathematics Teaching, Evaluation System, Evaluation and Supervision Mechanism

1. Introduction

One of the important concepts of modern education evaluation is "evaluation is not for proof, but for improvement" [1-2]. How to form the internal motivation of the evaluator to improve the effect of mathematics teaching is the true goal of mathematics teaching evaluation. The purpose of the research is to establish and implement the developmental evaluation of classroom mathematics teaching and promote the development of students, teachers and schools [3-4], which is conducive to improving the effectiveness of classroom mathematics teaching and realizing the overall and harmonious development of students; it is conducive to improving the quality of teachers [5- 6], to promote the professional construction of teachers; it is conducive to improving the school's educational mathematics teaching quality and realizing the sustainable development of the school, therefore, it has greater application value [7-8].

In the research on the dynamic evaluation algorithm of classroom mathematics teaching, many scholars have studied it and achieved good results. For example, Baki M found that in the evaluation of classroom mathematics teaching, the order of seats is adjusted appropriately according to different evaluation needs, which is beneficial to better Let students participate in the evaluation of classroom mathematics teaching, which is conducive to creating a better atmosphere of participation, and is conducive to the harmonious relationship between teachers and students and between students and students [9]. Viveka S sorted out the three types of student participation, including: behavioral participation, cognitive participation and emotional participation, and these three dimensions are not completely opposed, but organically integrated and unified [10].

Based on the theoretical conception of the dynamic evaluation method of classroom mathematics teaching, this paper builds a computer network platform, completes data collection, statistics and analysis, and realizes the dynamic evaluation of classroom mathematics teaching. This article applies the related theories of fuzzy mathematics and combines the quality evaluation of classroom mathematics teaching. The index system proposes a design plan for a computer fuzzy evaluation system for classroom mathematics teaching quality, in order to evaluate the quality of classroom mathematics teaching more scientific, objective, fair and accurate. This article combines actual mathematics teaching to design a feasible evaluation and supervision program to ensure the validity of student evaluation data and the participation rate of the entire evaluation process.

2. Research and System Design of Dynamic Evaluation Algorithm for Classroom Mathematics Teaching

2.1. Conception of the Dynamic Evaluation Method of Classroom Mathematics Teaching

(1) Combination of universality and diversity of evaluation subjects

The dynamic evaluation of classroom mathematics teaching is to build an interactive evaluation system among the subjects of classroom mathematics teaching evaluation. Through student evaluation, peer evaluation, leadership evaluation, and expert evaluation, the interactive communication between the evaluation subjects is realized. Classroom mathematics teaching objectives, mathematics teaching content, mathematics teaching methods, mathematics teaching skills, classroom effects and other aspects of scientific and reasonable value evaluation, promote teachers' teaching reflection, promote students to actively participate in mathematics teaching evaluation, stimulate students' sense of subjectivity, and make Classroom mathematics teaching is full of vitality.

(2) Combination of qualitative evaluation and quantitative evaluation of evaluation methods

This paper proposes a computer fuzzy evaluation system for classroom mathematics teaching quality. The basic algorithm is as follows:

First, this paper determines the evaluation object set F, factor set U, and comment set V. According to actual needs, determine the object to be evaluated, and construct the entire object into a set, and then use fuzzy mathematical analysis to determine the evaluation factor set and comment set:

For the K evaluation indicators in each sub-factor set U, a single-level comprehensive evaluation is made. For example: $U_i = \{u_{i1}, u_{i2}, \dots, u_{ik}\}$ The weight values of the factors are assigned as

$A_i = \{a_{i1}, a_{i2}, \ldots, a_{ik}\}$, where a_{ik}>0, and U_i's comment set is $V_i = \{v_1, v_2, \ldots, v_k\}$. Carrying out a single factor evaluation for each factor of U_i, the evaluation matrix $S_i$can be obtained as:

$$S_i = \begin{bmatrix} S_{i1} \\ S_{i2} \\ \cdots \\ S_{ik} \end{bmatrix} \quad (1)$$

Among them, $S_{i1}, S_{i2}, \ldots, S_{ik}$ represent the score of each factor evaluation object. The so-called single-level comprehensive evaluation of the sub-factor set U is actually to calculate the single-factor comprehensive evaluation matrix R_i (i=1, 2, ..., n).

$$R_i = A_i * S_i = \{r\} \quad (2)$$

This means: After S_i transformation is performed on the input matrix (array) A_i, the output matrix (array) R_i can be obtained. Obviously, when A_i and S_i are known, compound operations can be performed:

$$R_i = A_i * S_i = \{r\} \quad (3)$$

Theoretically, the above compound expressions have infinite kinds of operation models. However, in the actual application process, the "weighted average" comprehensive evaluation calculation model is the most effective, because it balances all evaluation factors according to the "weight value" and is suitable for situations that require overall indicators. After comprehensively evaluating the n factors U_i of U, the total comprehensive evaluation matrix R is obtained:

$$R = \begin{bmatrix} R_1 \\ R_2 \\ \cdots \\ R_n \end{bmatrix} \quad (4)$$

Perform matrix compound operation to calculate the comprehensive evaluation result of the object to be evaluated

2.2. Design of Classroom Mathematics Teaching Quality Evaluation System

(1) Functional requirements of the system

1) System goals

Establish a classroom mathematics teaching quality evaluation system, collect, process, transform, count, analyze and summarize information in each link of the teacher's work, make a comprehensive, fair, objective and accurate evaluation of it, and promote the evaluation of teacher mathematics teaching quality Standardization and proceduralization, improve work efficiency and ensure the quality of evaluation work. With the database management system as the core and the computer network as the platform, it provides convenient, timely and accurate information query to various departments, faculty and students in the school, realizes data sharing, and meets various management needs of the school.

2) Evaluation data collection

Considering that in the actual mathematics teaching process, the three evaluation subjects of leaders, experts and peers cannot limit their participation in each round of evaluation in a timely manner. Therefore, when designing data collection, the entire evaluation subject is divided into two parts, one part It is student evaluation, and the other part is evaluation by leaders, experts and peers. Student evaluation requires every student to actively participate in each round of evaluation, while the evaluation of leaders, experts and peers only provides a data basis for comprehensive evaluation.

3) Configuration modeling

The database server provides database services to the application server. The initial setup, evaluation data management, evaluation summary processing communicate with the application server, and the application server provides users with application services of mathematics teaching quality

evaluation management business. Each node is a browser/server distributed system, and shared applications are placed on the application server node.

(2) The key technology of the system

The system view of interacting objects is a kind of collaboration, that is, the view of the objects that depend on the context and the mutual links, together with the message flow on the data link between the objects. This viewpoint unifies data structure, control flow, and data flow in a single view. Cooperation and interaction are expressed in sequence diagrams and collaboration diagrams. It is a series of use cases that guide all behavioral views, and use cases show part of the system functions seen by external users of the activist system.

2.3. Detailed Design of Classroom Mathematics Teaching Quality Evaluation System

(1) Principles of establishing evaluation index system

1) Scientific principles

Classroom mathematics teaching has its own internal laws. To carry out element analysis or process analysis of class mathematics teaching, establish an index system, implement evaluation should follow its internal laws and highlight the main characteristics of mathematics teaching activities. The establishment of the index system must have a unified classification benchmark, and the indexes are mutually incompatible, non-overlapping, and non-crossing, so as to improve the reliability and validity of the evaluation.

2) The principle of testability

The evaluation criteria should have the characteristics of observable, perceptible, measurable and operable. The language expression should be concise, easy to understand, specific and behavioral.

3) Development principle

Education is a systematic project, and mathematics teaching is dynamic. It needs continuous reform in content and methods with the development of science and technology and changes in educational objects. Therefore, its evaluation indicators must be dynamic and developmental.

(2) The composition of the evaluation index system

The quality of mathematics teaching is a fuzzy concept. When people form a concept in their minds, it has a certain connotation and extension. The set of all objects that conform to this concept is the extension of this concept. As for the quality of mathematics teaching, it neither has a clear extension, and its connotation is also quite complicated. Generally, only a few representative indicators can be selected for its evaluation.

3. Experimental Research on the Dynamic Evaluation System of Classroom Mathematics Teaching

3.1. Selection of Research Samples

The research objects of this study are teachers of mathematics education courses in 5 universities in this city. The College of Mathematics and Educational Science has 4 departments at the undergraduate level. All courses of the 4 departments are divided into four categories according to their functional dimension classification standards: professional basic courses (ie instrumental courses), professional theory courses (ie knowledge-based courses), skill courses and practical courses. Using the stratified sampling method, one course is selected from the four types of courses in each department, and the gender, educational background and professional title of the teacher, the grade and department of the students are counted.

3.2. Excel and SPSS Software

In the processing of quantitative data in this study, two data statistical software, Excel and SPSS, were used for data sorting and statistical analysis.

4. Experimental Research and Analysis of the Dynamic Evaluation System of Classroom Mathematics Teaching

4.1. Difference of Professional Titles of Different Teachers in Classroom Mathematics Teaching

The research samples are classified according to the professional titles of teachers, including 7 lecturers, 9 associate professors and 3 professors. Analyze the differences in classroom mathematics teaching effects caused by the differences in teachers' professional titles. Compare the averages of the frequency statistics of teacher language, student language, technology use, and classroom silence in classroom mathematics teaching by 7 lecturers, 9 associate professors, and 3 professors, as shown in Table 1.

Table 1. Comparison of classroom behavior of teachers with different professional titles

Classification	Professor	Associate professor	Lecturer
Teacher speech ratio	0.64	0.66	0.52
Student speech ratio	0.18	0.09	0.16
Classroom silence ratio	0.07	0.07	0.06
Technology use ratio	0.11	0.18	0.16

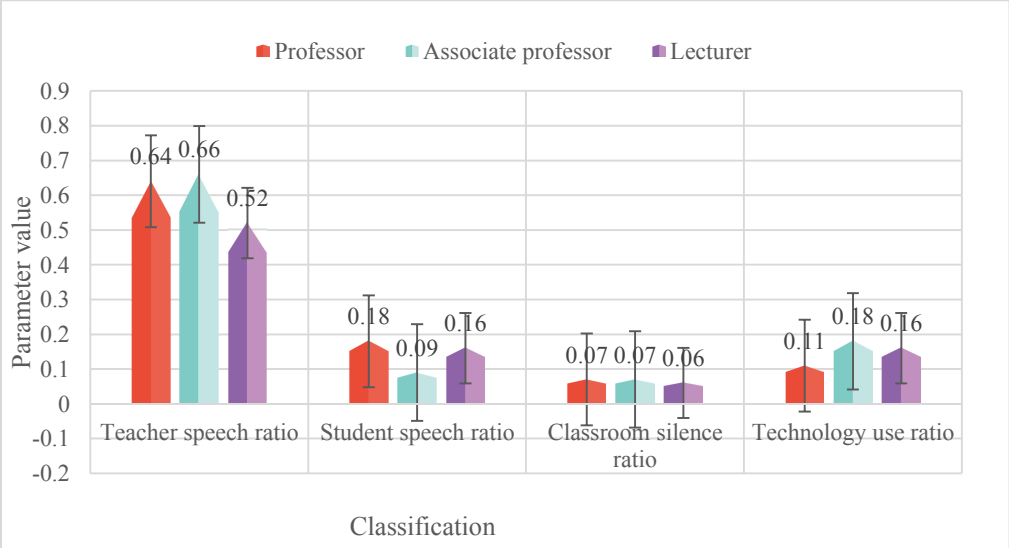

Figure 1. Comparison of classroom behavior of teachers with different professional titles

As shown in Figure 1, it can be seen that at the average level, teachers of different professional titles manipulate differences in mathematics teaching behavior. In contrast, the proportion of mathematics teaching behaviors of lecturers and teachers has changed significantly, while the distribution of mathematics teaching activities of professors and associate professors is more reasonable. However, in the classroom mathematics teaching of the lecturer, the teacher's language level is low and the level of technical use is high; the teacher's language level in the classroom mathematics teaching of professors and associate professors is relatively large, and the students in the classroom are taught more languages, and the proportion of classroom silence is the smallest, but the use of technology is the ratio is not ideal.

4.2. Difference of Academic Qualifications in Classroom Mathematics Teaching of Different Teachers

The research samples are classified according to the academic qualifications of the teachers, with 4 doctors and 12 masters. Analyze the differences in classroom mathematics teaching effects caused by the differences in teachers' professional titles. Compare the averages of the frequency statistics of

teacher language, student language, technology use, and classroom silence in classroom mathematics teaching for 4 doctors and 12 masters. The experimental results are shown in Table 2.

Table 2. Difference analysis of teachers with different academic qualifications

Classification	PHD	Master's degree
Teacher speech ratio	0.58	0.52
Student speech ratio	0.17	0.13
Classroom silence ratio	0.04	0.07
Technology use ratio	0.21	0.28

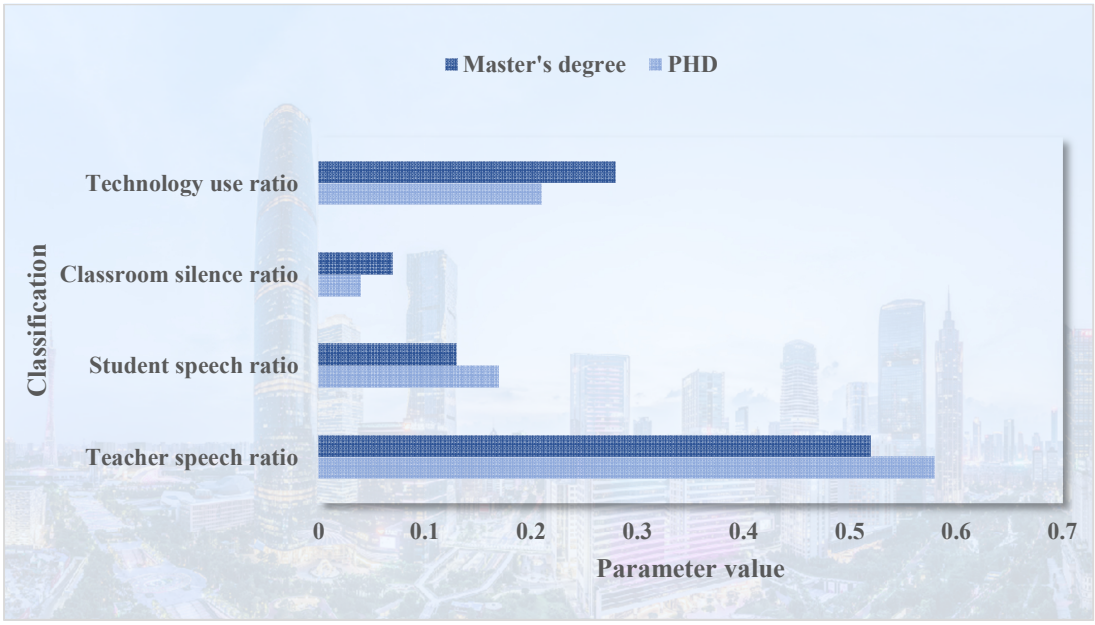

Figure 2. Difference analysis of teachers with different academic qualifications

As shown in Figure 2, it can be seen that teachers with a doctorate's degree in language behavior are about 12% higher than those with a master's degree, and the proportion of classroom silence and technology usage is lower than that of teachers with a master's degree.

5. Conclusions

Based on the actual status and needs of mathematics teaching management in our country, this paper designs this set of mathematics teaching evaluation system, and strives to improve the practicability of the system, and provides a new mathematics teaching evaluation method for teachers and mathematics teaching managers. In the process of system development and design, the defects of the traditional classroom mathematics teaching evaluation model were overcome, and the characteristics of flexibility, dynamics, interactivity, real-time, effectiveness, and humanity were highlighted.

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