Research on Processes of Service-oriented Teaching Quality Management Based on Big Data

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Abstract. The management of teaching quality is subordinate to and serves the main teaching activities of colleges and universities, which is an important means to improve the teaching quality. Today, we can make college teaching quality management more dynamic, accuracy and objectivity with the gradual construction of big data environment. We can maintain the right direction and achieve the best results of teaching activities in the continuous rectification give full play to its service function by reasonable evaluation, scientific prediction and effective intervention. This paper focuses on three key issues of evaluation, prediction and intervention in the construction of service-based teaching quality management system, discusses the main contents, process and methods related to teaching evaluation, and lays a theoretical foundation for the realization of service-based teaching quality management system in the big data environment.

1. Introduction
The traditional teaching quality management activity is a summary of the teaching work in a certain period, which is a static process. We can service the teaching quality management activity in the ongoing teaching activity dynamically after big data technology is applied to the teaching quality management activity, so the teaching quality management activity can play a positive role in promoting the evaluation subject.

![Figure 1. The processes of service-oriented teaching quality management based on big data figure.](image)

We must solve the key problems existed in evaluation, prediction and intervention, so that we can evaluate how the teaching task is completed objectively, predict the next development of teaching activities based on big data support scientifically, and make necessary intervention in the development of teaching activities based on the prediction. Only in this way, we can make teaching activities achieve the best teaching effect under reasonable intervention and steadily promote the improvement of teaching quality, as shown in Figure 1.
2. Implement Credible Assessment and Consolidate Service Foundation

Credible evaluation refers to the accuracy of teaching quality evaluation results, which is the basic support of follow-up prediction and intervention activities, and determines the reliability of teaching quality evaluation services. In order to realize credible evaluation, we should grasp three key issues: timeliness of evaluation, diversity of data sources and intuitiveness of evaluation results, establish appropriate standards, and realize real-time, multi-dimensional and objective evaluation activities.

2.1. Timeliness

Timeliness means that the evaluation object (teacher or student) can view the stage (every day, every week, every month, every semester, every year or other time period specified in the teaching evaluation) or the overall evaluation conclusion through the client-side evaluation platform of big data at any working time after the evaluation starts. Teachers and students can track their own teaching or learning status and discover their shortcomings or insufficient in time. We can use the evaluation system as an online service tool in that way. As long as the big data platform mines new data, the evaluation results should be fed back to the client service object in real time.

2.2. Multidimensional

Multidimensional means the evaluation service object should be combined with the actual needs of evaluation to promote teaching, the evaluation data of the same teaching unit (Teaching and Research Office, professional department, college) can be aggregated to evaluate the teaching unit Learning management can also be evaluated by tracking and analyzing students in class and student team. We can also excavate and analyze the development of disciplines and specialties in the whole process of teaching activities according to the needs, and form a scientific evaluation of curriculum, specialty and teaching team construction, so as to realize multi angle, all-round and hierarchical evaluation services.

2.3. Objectivity

Objectivity means that the result of evaluation must be true, reliable and fair. Therefore, in the context of big data, the teaching evaluation must break the simple normalized scoring evaluation mode, and the results should be as faithful to the original meaning of the information reflected by the data as possible, rather than the abstract, conceptual and subjective evaluation index scores. In order to achieve this requirement, we can use mature data display service technology in the evaluation service of teaching quality of the college, and analyse and display the evaluation results in different graphic forms such as line chart, dot chart, bar chart, pie chart, instrument chart, etc. In order to show the evaluation results intuitively and vividly, it shows the data itself, reflects the data orientation, and makes the evaluation results objective and credible.

![Figure 2. The objects and contents of prediction figure.](image)
3. Carry out Reasonable Prediction and Find out Service Problems

The prediction service of big data has been increasingly applied in the commercial field, which plays an increasingly important role in seeking development, avoiding risks and allocating resources for various industries. In the teaching quality evaluation activities, the prediction service ability of big data should also play an active role in promoting the healthy development of teaching activities.

In order to achieve effective prediction, the prediction service object should be reasonably distinguished in the teaching quality evaluation activities, and we should define the prediction content clearly, as shown in Figure 2.

3.1. Prediction Content of Students

For students, the content of the prediction reflects the characteristics of the combination of special and comprehensive, short-term and long-term, score and ability. We divide the content of prediction into three categories: single course performance prediction, stage comprehensive evaluation result prediction and final post capacity prediction. Such a division can help students to understand the subsequent learning based on the assessment of reality.

Individual course scores prediction refers to separate out the possible final assessment results of the students before they have completed a certain course and have not finished the final assessment by data mining based on individual learning attitude, preparation before class, classroom performance, homework after class, stage test, interactive communication and other actual conditions of the students. In addition to the test scores, we can also predict whether the students can apply the knowledge they have learned to solve practical problems, the credit ranking in the class, and the possible learning problems.

General assessment prediction in a certain stage refers to the evaluation results of the learning status, knowledge level, ability and quality of the students in the specified period, and the possible problems in teaching. The prediction is based on analysis of the course data completed and being studied by the students in a specific period of time (such as month, semester, year, etc.).

Post capacity prediction refers to the prediction of whether students can meet the requirements of the ability and quality of a given post after graduation according to the existing data of students. This prediction can be said to be the ultimate prediction of the evaluation process. This prediction result must be analysed item by item according to the training objectives of the students. In the prediction results, the ability degree that the students may achieve is predicted in the form of diversified data expression. It can help the students to find the deficiencies, weaknesses and shortcomings according to the training objectives of the positions, so that the students can constantly adjust the state, methods and emphasis of learning, and finally meet the requirements of the positions when they graduate.

3.2. Prediction Content of Teachers

For teachers, the content of the prediction includes the learning situation of students and the final evaluation performance of teachers themselves, which facilitates teachers to urge students to learn, and adjust their teaching activities in time.

The prediction of comprehensive grade of class mainly predicts whether the final grade of the class meets the normal distribution characteristics, whether the comprehensive grade of the class meets the requirements of the curriculum standard, and which students may have the situation of reduced learning enthusiasm, insufficient concentration, and insufficient preparatory knowledge in the subsequent learning. It can help teachers grasp the overall development trend of class teaching and deal with individual or universal problems.

The prediction of teachers' personal evaluation results of teaching refers to the prediction of the final results in the teaching quality evaluation activities that teachers need to participate in, including the prediction results of teachers' morality, professional knowledge, teaching ability, teaching effect and other projects, as well as the comparison with other teachers. This prediction can help teachers to understand their own advantages and needs in the teaching process correctly, comprehensively and objectively, which lay a foundation for purposeful self-regulation.
3.3. Prediction Content of Administrators
The management objects are divided into two types. The managers of student management units mainly check the overall prediction of students' and class students' performance, so that they can give targeted education and help for the designated students. The managers of teaching management units (such as teaching and Research Office, department and College) mainly check the prediction of the comprehensive performance of teaching team, the performance of course construction, and the development of discipline and specialty.

The prediction of the teaching team's performance refers to the reasonable prediction of the individual and overall evaluation of the teaching team according to the evaluation items of the teaching quality of the teachers. This prediction demonstrates whether the teaching activities of the teaching team can achieve the expected results, whether the teaching team is increasingly mature, whether there are potential problems, etc., so that the managers can intervene through the management means and dynamically urge the teaching Team to improve teaching quality.

The prediction of course construction achievements refers to the reasonable prediction about whether a course reaches the expected construction or reform goals after the arrival of a given time node, whether a course has progress compared with the previous course teaching, the development trend of course teaching quality, etc. This prediction based on the overall idea of rolling development of course construction, so that the managers can reasonably analyze the course construction and course teaching according to the prediction results. According to the prediction results, managers can reasonably analyze the areas that may need to be adjusted, improved and strengthened in the course of curriculum construction and teaching implementation, which ensure the continuous improvement of the quality of curriculum construction by dynamic supervision.

The prediction of achievements in discipline and specialty construction refers to the prediction of evaluation performance made within a specified period based on the comprehensive analysis of multiple course construction and teaching conditions of a subject major. The prediction contents include whether the subject curriculum arrangement is reasonable, whether the subject construction is up to the standard, whether the teaching talents meet the needs, and the comparison with other professional disciplines, etc.

4. Implement Effective Intervention to Achieve Service Purpose
There are three main steps in the evaluation of service-based teaching quality. The evaluation mainly tells us what problems have occurred in teaching, the prediction tells us what consequences these problems will bring, and the intervention tells us what measures we should take to deal with them effectively. Therefore, the intervention is the practical stage of the evaluation service used to optimize the teaching quality.

In order to implement teaching intervention scientifically, it is necessary to establish intervention standards, and clarify the early warning conditions, intervention measures and interveners in the intervention content.

It is very important to define the early warning conditions in the intervention activities, because the intervention in the teaching quality evaluation activities based on big data mainly adopt the problem-oriented intervention method. This method first finds the existing problems and possible impacts through the evaluation and prediction links, and then compares with the pre-set critical early warning conditions. The intervention system needs to give early warning in time once the existing problems may not be corrected in the later period or may have serious consequences, so that it can remind the specific intervention implementers to take necessary intervention measures, eliminate the teaching hidden dangers, and escort the teaching activities.

Intervention measures are specific suggestions for solving specific problems through mining and analysis within big data environment. There may be multiple intervention measures for each problem. For each intervention measure, the format standard must be clear, indicating the intervener, the intervened object, and what the intervention content is, so that we can implement the intervention strategy specifically. If a student is unable to understand and use the learning contents due to the lack of basic knowledge reserve, the real-time evaluation shows that the learning enthusiasm of the student is not enough, and the prediction shows that the student's performance may not up to standard, then the
intervention strategy given by the evaluation system may be that the student team arranges a student which is good at this subject to help him in the course preparation, and contacts the class instructor to give special after-school guidance to the student.

The intervener is the executor of the interference measure. In the problem-oriented intervention method, the one who solves the problem is the intervener. For different problems, the types of interveners will be different. For the problems of students, the intervener can be himself (Such as he needs to abide by the classroom discipline, etc.), classmates, teachers, student team leaders. For the problems of teaching, the intervener can be the teacher himself, colleagues, experts, teaching unit leaders. The intervener actually implements intervention measures of specific problems.

5. Conclusion
The realization of service-based teaching quality management is the functional goal of teaching quality management system under the condition of big data. This paper focuses on the three key problems of teaching quality evaluation, prediction and intervention supported by big data and rooted in the service purpose of teaching quality evaluation. We analyze the specific content, process and method of three stages motioned above, which lays a theoretical foundation for the construction of service-based teaching quality evaluation system.

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