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Research Article

The Evaluation of University Course Quality under the Background of Wireless Communication and Big Data

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In recent years, education issues have been the focus of attention from all walks of life. An important indicator for measuring the level of education in colleges and universities is the quality of teaching. It determines the level of the students' basic quality that is the target of training. Curriculum is the core of forming teaching quality and the core element of cultivating talents. Curriculum evaluation is an important means to detect and diagnose the teaching quality of schools and the source of talent training quality.The purpose of this article is to study the quality evaluation system of college courses under the background of wireless communication and big data, taking students as the initiators of evaluation activities, positioning the factors that they are interested in, and referring to the selection of evaluation indicators in other research results to determine the evaluation system of this study. Through students' evaluation of Japanese MOOC courses, the evaluation system constructed by the laboratory is evaluated. The method of collecting evaluation data is to issue electronic questionnaires and then perform statistical analysis on the results of the questionnaires after collection, to understand the current status of MOOC course learning and the degree of recognition between learners and evaluation indicators. Through the analysis of the questionnaire data, the reliability and validity of the questionnaire are tested to ensure the validity and reliability of the questionnaire data. The evaluation indicators are screened by factor analysis, and the entropy method is used to determine the weight of the evaluation indicators, thus forming the final MOOC course evaluation. Reorganizing and constructing the Japanese curriculum quality evaluation index system conforms to the general law of the construction of the index system.

1. Introduction

The development of higher education has extremely important significance for the country's progress potential and competitiveness enhancement [1]. As a strategic undergraduate education in higher education, its teaching quality has attracted much attention. And curriculum is the core of forming the teaching quality; how to evaluate it has always been the focus of many experts and scholars. Many experts and scholars have also launched scientific research in this field. Course evaluation models with various advantages have opened up a very broad vision for our evaluation work. It provides a useful reference for the construction of the entire higher education curriculum evaluation system [2]. It can also provide reference for other universities. With the development of the times, the main criteria for evaluating higher education courses are also changing, but "student-oriented" and "focus on the classroom" have always firmly occupied the central position [3]. It has aroused great attention of researchers to the quality of the classroom [4].

As we all know, the scientific setting of courses can not only maximize the combat effectiveness of existing teacher resources but also teach in time according to the needs of social development, thereby enhancing students' adaptability to the social environment [5]. In this context, the scientific evaluation of classroom teaching quality has become more significant. Various evaluation models have emerged one after another. The most representative one is the OBE system. Its advantage lies in the combination of quantitative and qualitative analyses. It helps to grasp the student's classroom status in all aspects [6]. The evaluation model adopted

by Imansari and Sutadji is the CIPPO model. The CIPPO model consists of the context, input, process, product, and result. On the context dimension, it includes the vision and mission of the learning plan and the purpose of the learning plan. In terms of input, the dimensions include academic performance, course structure, qualified lecturers, and course syllabus. The dimensions of the process include academic activities, implementation of industry practices, PPL and KKN, facilities and infrastructure, learning strategies, resources and learning media, and learning evaluation [7]. Eisenberg et al. describes the development and evaluation of a 2-year longitudinal quality improvement (QI) and patient safety course that matches the teaching education and experiential learning in the pediatric emergency medicine scholarship. The course includes the development of a comprehensive teaching series and an improvement project determined, designed, and implemented by the researcher. The course is evaluated through questionnaire surveys before and after participating in the course, as well as the clinical impact of the completed project and the evaluation of academic achievements. After completing the QI course, the comfort level of using QI tools (including running and control charts) has improved and I am familiar with the difference between QI and traditional clinical research. Researchers agree that QI will be beneficial to their careers and believe that they are more likely to participate in future QI projects [8]. The construction of these models strongly proves the positive effect of the curriculum evaluation system on the improvement of teaching quality.

An important indicator to measure the educational level of colleges and universities is the teaching quality. Teaching quality is the most intuitive reflection of teaching effect. It determines the basic quality level of students as the training target. The combination of new technology and teaching quality evaluation reflects the progress of the evaluation system. This combination can bring innovation to the teaching quality evaluation method and enrich the application richness of big data and wireless communication technology. The development of this research is aimed at the learning effect produced by the learners in the course of MOOC course learning. First, clarify the scope of research and the perspective of the trainee's attention. By assigning points to the students' attention perspective, a more scientific evaluation index system is constructed. The expert evaluation method is used to score and explain the indicators, the evaluation indicators are modified according to the evaluation points proposed by the experts, and the final MOOC course quality evaluation standards are determined according to the learners' perspectives. Subsequently, courses were selected randomly on the MOOC platform and the evaluation model was verified in practice.

2. Research on the Evaluation System of University Course Quality under the Background of Wireless Communication and Big Data

2.1. Principle of Wireless Communication. Wireless communication is a communication system that uses a radio to transmit and transmit signals. Its main components can be divided into hardware devices such as transmitting and receiving and communication channels. At this stage, communication hardware mainly includes inverters, transmitters, and antennas. The difference in communication channels is the main way to classify the communication system, such as "long wave, medium wave, short wave," etc. which are all classified according to this method [9].

In hardware equipment, the function of the inverter is to realize the two-way conversion between digital signals and electrical signals and the function of the transmitter is to complete signal amplification and transmission. After the transmitter emits electromagnetic waves, the electromagnetic wave energy will propagate in space and the receiving ability of the receiver is only a small part of it. When the wireless telecommunication signal is transmitted again, a large part of the energy will be lost. Based on this principle, scientists have developed a variety of signal transmission methods for different loss phenomena such as diffraction (ground wave), reflection and refraction (sky wave), direct (space wave), etc. [10]. The former is mainly used to propagate shortwave signals, and its transmission distance is short, but the signal is stable. The latter is responsible for the transmission of long-wave signals, which is characterized by a long transmission distance, but the transmission is unstable and will change with the change of day and night or climate, so the frequency band should be changed frequently during transmission [11].

2.2. Construction Principles of the Evaluation Index System

2.2.1. Principles of Scientificity and Objectivity. The scientificity first refers to the judgment model that assumes the objective facts, and the objectivity first refers to the objective existence [12]. The construction of the curriculum evaluation system must be based on science, follow the law of curriculum development, and strictly follow the steps of the evaluation standard construction to ensure the rationalization of the evaluation system [13]. At the same time, the framework of the course evaluation system should be based on facts and should not be mixed with the subjective likes and dislikes of the makers, so as not to affect the authenticity of the evaluation results.

2.2.2. The Principle of Integrity. The course evaluation system is aimed at the entire course rather than some links or aspects in the course. Therefore, it is necessary to strictly abide by the integrity principle of the evaluation system to achieve an all-round evaluation of the curriculum. Fully reflect the overall situation of the course and ensure the integrity of the index rating system constructed [14].

2.2.3. Principles of Feasibility and Development. Since the construction of indicators for the evaluation system is based on a true inspection of the curriculum. Then these indicators must have a certain degree of feasibility [15–17]. Evaluation indicators that exceed the actual scope of the classroom are not only not conducive to improving the effect of classroom teaching but even can backfire, only to ensure theory and practice. In addition, the structure of the evaluation system must be forward-looking. The research and establishment

of developmental indicators should be carried out according to the trend of educational development and the dynamic evolution of the teaching content [18–22]. It is necessary to use the status quo as the research basis, but also to evaluate the future development of the curriculum to ensure that the evaluation indicators are still consistent with the future development and are at the forefront of curriculum development.

2.3. The Main Basis for Index Design

2.3.1. Educational Evaluation Theory. The educational evaluation theory under the background of big data technology should abandon the practice of overemphasizing knowledge transfer in the past and use emotion, thought, and other aspects to evaluate and define certain responsibility indicators and performance indicators, respectively. When using big data theory and technology to design the education evaluation theory, the advantage of this theory lies in subdividing and quantifying the factors that affect the teaching quality and formulating corresponding indicators around these factors and can use data analysis and decision-making functions to analyze the most important factors. Predict the best evaluation index. And carry out evaluation activities with the business philosophy of "meta-evaluation" and pursue the reflection of evaluation indicators on education laws [23–27].

2.3.2. Deepening the Need for Teaching Reform. Deepening the teaching reform is the only way to promote the sustainable development of education in our country. One of the important purposes of establishing teaching evaluation indicators is to deepen teaching reform [28–31]. The first is to reasonably determine the proportion of each project in the evaluation template, so as to realize the overall planning of the index input. The second is to fully integrate the direction of the teaching reform in the process of standard formulation. Third, the evaluation criteria must be practical and feasible [32–34]. Such evaluation criteria can meet the needs of our deepening teaching reform. Under the background of wireless communication, various teaching equipment based on wireless communication technology can be used from the perspective of teaching equipment and the quality of teaching reform can be improved from the perspective of equipment [35–38].

2.3.3. The Actual Situation of the Students. The actual situation of students is also an issue that must be considered in the design of indicators. The actual situation of students is different, and the evaluation indicators developed should be different accordingly. The established index coefficients can only be carried out within the rated range of the actual situation of the students. Too high or too low indicators will have a negative impact on teachers' teaching. Therefore, the structure of the index system must fully respect the actual situation of the local teaching objects at that time, in order to achieve a fair and just teaching evaluation [39, 40]. Under the background of big data, the actual situation data of students can be recorded by wireless communication technology detection equipment and then fed back to the big data analysis server, which analyzes the relevant feedback and then makes decisions to improve teaching strategies according to the actual situation of students [41].

3. Investigation and Research on the Quality Evaluation System of University Courses under the Background of Wireless Communication and Big Data

3.1. Questionnaire Issuance and Recovery. The research object is the quality evaluation index system of Japanese MOOC elective courses in institutions of higher learning in M Province. In the process of distributing the questionnaire, taking into account the geographical distribution of the research objects in this article, the questionnaire is designed in a small program and distributed through the WeChat, mailbox, QQ, and other networks and the questionnaire link is sent to the survey object. After the subjects completed the questionnaire responses, the mini program automatically collected the questionnaire results and cancelled the uncompleted questionnaires. A total of 1878 questionnaires were returned in this survey, of which 1598 were valid questionnaires, with an effective rate of 85.1%.

3.2. Expert Evaluation. Industry experts have intellectual authority, but there are other factors that can affect the expert's judgment. In order to minimize the negative impact of this effect, the average calculation method was used in the study. That is, the highest and lowest scores in each index score are removed and the remaining scores are averaged as valid scores. Get the final score for a single item. At the same time, in order to eliminate the possible large differences in the evaluation results as much as possible and avoid the situation of 0 points, the efficiency factor method is used to process the evaluation data into spatial data [60.100], that is, the individual score is shown in formula (1):

$$\lambda_1 = c + \frac{q - q_{\min}}{q_{\max} - q_{\min}} d, \quad c = 60, d = 40. \tag{1}$$

Among them, e max and e min are the maximum and minimum scores of a certain individual item in all courses.

Take the linear function of extremely large evaluation indexes $\lambda_1, \lambda_2, \cdots, \lambda_m$ as shown in formula (2):

$$f = \theta_1 \lambda_1 + \theta_2 \lambda_2 + \theta_m \lambda_m = \theta^T \lambda. \tag{2}$$

As a comprehensive evaluation function of the evaluated object, $\lambda = (\lambda_1, \lambda_2, \cdots, \lambda_m) T$ is the state vector of the evaluated object. Expert evaluation obtains the evaluation result by weighting twice in the calculation process. The first weighting reflects subjective factors, and the second weighting increases the degree of discrimination. The evaluation result obtained by the second weighting is shown in formula (3):

$$f(i) = \sum_{j=1}^{m} \theta_j^* \lambda_{ij}^*, \quad i = 1, 2, \cdots, n. \tag{3}$$

4. Analysis and Research on the Quality Evaluation System of University Courses under the Background of Wireless Communication and Big Data

4.1. Curriculum Quality Evaluation Index System. Among the 10 colleges and universities surveyed that offer Japanese MOOC elective courses, there will be certain differences due to different schools. In terms of course length, most schools in Japan offer 45-minute elective courses, with 6 colleges, followed by 3 colleges offering 40-minute courses, and 1 college offering courses. But none of the colleges and universities has a course duration of 50 minutes from the perspective of the number of applied class hours; the colleges with 35 class hours have the most class hours, followed by 6 colleges and universities, with 2 to 31 hours of applied course teaching. Among all colleges, there are 38 and 33 applied teaching hours, 1 college, as shown in Table 1. From the perspective of theoretical teaching hours, there are 4 colleges with the most teaching hours, which shows that most colleges and universities will participate in the teaching of Japanese in applied courses, but the level of explanation is relatively shallow. The courses are 4 class hours, 6 class hours, and 8 class hours. The number of universities opened is 3, 2, and 1.

Determining the number of Japanese elective courses for higher education institutions in province M can meet actual teaching needs. As we all know, there are not many class hours that can meet the actual needs of teaching. This shows that the current Japanese MOOC elective courses in province M need to be tailored to meet the daily teaching needs of universities. This also shows from another angle that the current Japanese MOOC elective courses are also more popular with students, as shown in Figure 1. To sum up, as an elective course, Japanese is different in class time, technical class, and theory class time. However, most colleges and universities focus on technical guidance, supplemented by theoretical guidance and applied teaching. The courses offered by universities are up to 36 hours. The number of hours is an important part of the curriculum. Whether the number of hours of Japanese technology and theory elective courses is reasonably defined will directly affect the weight of the quality evaluation system for the next lesson.

Teaching materials are one of the main factors that affect classroom teaching and are an important link and part of teaching. The quality of the textbook content directly affects whether students can obtain scientific and valuable theoretical knowledge and professional skill training methods. Generally speaking, according to different subjects, requirements, and teaching environments, teachers in different universities have different choices of teaching materials. According to the statistics in the above table, among the 10 colleges and universities that participated in the survey in province M, 5 colleges and universities used a single Japanese election manual, corresponding to 50%, and 5 colleges did not use the Japanese election manual. He learned that the five colleges and universities that did not have unified Japanese elective course materials all expressed their desire to use unified Japanese elective course materials. With the continuous development of higher education in our country, the use of Japanese teaching materials is gradually consolidating. However, since our country has not established a relatively mature and complete teaching material system for Japanese elective courses, there are big differences in the use of Japanese elective course materials in universities in province M. Five colleges and universities use Japanese textbooks compiled across the country as elective courses. There is also a university that uses Japanese textbooks from other universities, and the ratio reaches 10% as shown in Table 2.

Table 1: Analysis of the number of applied class hours.

Application hours	Number of colleges and universities	Percentage
38	1	10%
31	2	20%
33	1	10%
35	6	60%

Research on whether Japanese optional textbooks can meet the daily actual teaching needs shows that the inconsistency of Japanese optional textbooks used by higher education institutions in province M indirectly leads to a huge gap in the satisfaction of the Japanese optional textbooks among universities. The research results show that there are only 4 colleges and universities that can meet the daily teaching needs, accounting for only 40%, and 6 colleges and universities that cannot meet the needs, corresponding to 60%. It can be seen that in not only the universities in province M but also the universities that offer Japanese elective courses across the country, there is a lot of room for the construction and development of Japanese textbooks.

4.2. Checking the Rationality of the Index System. In order to strengthen the scientificity of the indicator design, this research classifies and refines the designed indicators level by level. The first-level indicators are divided into two categories, namely, the degree of subjective work commitment and the objective effect of work. The former formulates secondary indicators such as "preclass preparation," "implementation in class," and "after-class guidance and homework correction" in accordance with the teacher's teaching process. When setting the secondary indicators, they mainly consider the teacher's subjective effort in the teaching process and measure them from a multidimensional perspective, so that the secondary indicators can cover as much as possible all the key factors affecting the quality of teaching. The connotation of the grade index is extremely rich. It is mainly reflected from the scores of teaching tasks, teaching content, teaching organization, basic teaching skills, teaching methods, teaching efficiency, teaching effects, the ability structure, and quality of teachers. The latter include "ideological and moral development," "academic performance," and "learning habits and intellectual development." It is difficult to evaluate the teaching effects of teachers directly. It can only be reflected indirectly by evaluating the students' academic performance, academic ability, morality, and personality formation. Of course, the classification of

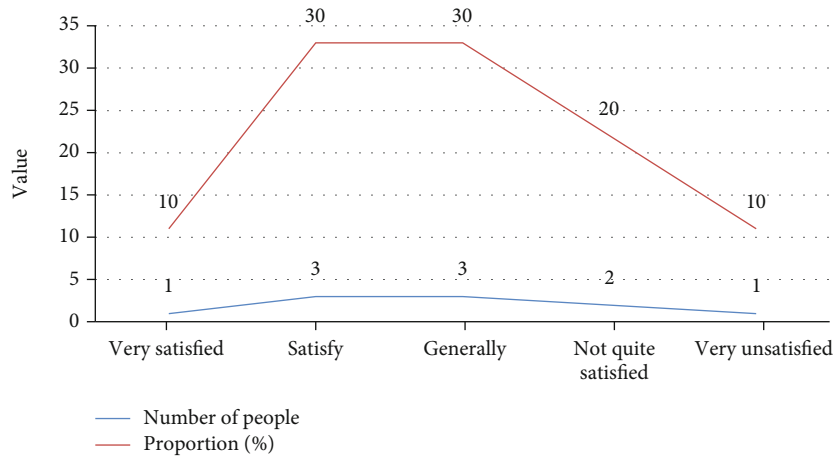

Figure 1: Satisfaction of the actual teaching of a Japanese class setting in colleges and universities.

Table 2: Statistics of types of Japanese elective courses in each school.

Type	Nationally compiled textbooks	Self-edited textbooks	Optional textbooks	Textbooks for Japanese majors in other universities
Quantity	5	2	2	1
Percentage	50%	20%	20%	10%

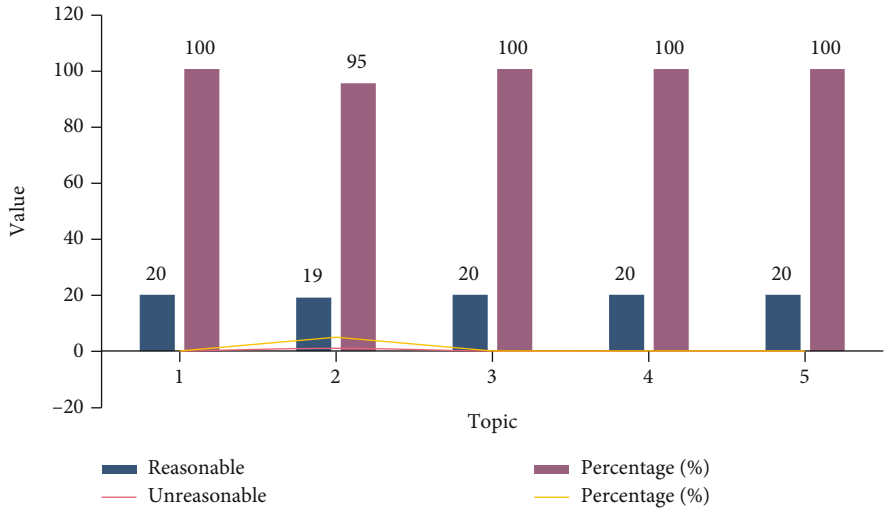

Figure 2: Expert evaluation results.

these indicators is not absolute. For example, "attitude and attitude," "teaching trial," "teaching manner," etc. can also be classified as political quality, "writing teaching plan," "course content," "methods and means," etc. Professional quality, "classroom organization," "teaching language," and "blackboard design" belong to the quality of teaching ability, and "teaching attitude" and "being a teacher" belong to the quality of sustainable development. The detailed analysis of the three-level indicator scoring rules is given.

In order to ensure the rationality and scientificity of the construction of the curriculum quality evaluation index system, after experts have scored the index system, scholars and experts with in-depth research in the field of Japanese language and teaching management will continue to be selected to check the rationality of the index system.

It is not difficult to see in Figure 2 that 20 experts only put forward different suggestions on the first-level "teaching" indicators of the second question. An expert believes that teaching should include the writing of lesson plans. After repeated tests and consultations, I believe that the teaching plan is already in the teachers and finally did not adopt the expert's advice. The other three first-level indicators and second-level indicators and their descriptions also show that this research has carried out Japanese

elective courses. The idea of summarizing and refining the current situation and then constructing the Japanese curriculum quality evaluation system has greater advantages. It conforms to the general rules of the construction of the index system and has been recognized by experts, as shown in Figure 2.

5. Conclusions

Based on the comparative analysis and practical research of evaluation indicators, I think that the general curriculum quality standard includes the following five aspects: (1) teaching objectives: the course teaching should support the achievement of graduation requirements, especially the achievement of multidimensional objectives. The course goes beyond the shallow teaching goal of "understanding + memory" and brings deep learning into the teaching goal, especially covering multiple dimensions such as knowledge, ability, personality, and value; (2) teaching content and teaching strategy: support the achievement of teaching objectives and establish a deep learning environment for students. The teaching content of the course corresponds to the teaching objectives, with appropriate depth and breadth and can reflect the latest development of relevant disciplines. The knowledge points of the course are clear, and there is a clear logical structure between the knowledge points. Stimulate students' learning potential, guide students to enter deep learning, and effectively achieve teaching objectives; (3) performance evaluation and feedback: to guide students into deep learning, the teaching objectives should correspond to the assessment links and the course performance evaluation should be able to continuously and effectively promote students' learning, especially to guide students into deep learning. For the assessment included in the results, we should ensure the scientificity and impartiality of the assessment results and timely feed back the assessment results to students, so as to help students learn better; (4) learning outcomes: achieve the teaching objectives and create meaningful learning experience for students. According to the teaching objectives, through the implementation of the teaching process, the curriculum has a positive and far-reaching impact on students' growth and development in the four dimensions of value shaping, personality cultivation, ability training, and knowledge exploration; and (5) teaching resources and learning support: help as many students as possible to achieve teaching objectives. The course provides students with rich and effective extracurricular learning resources and guides students on how to efficiently obtain and use learning resources. Provide sufficient support and guidance for students' learning, including learning method guidance and course Q & A. Pay attention to collecting data related to students' learning, carry out research on curriculum learning, and constantly improve teaching through summary and reflection. The final effect of any education depends on the process of curriculum construction and implementation directly facing students. Curriculum is the core of forming the teaching quality and the core element of cultivating talents. Curriculum evaluation is an important means to detect and diagnose the teaching quality of schools and the source of talent training quality. Through evaluation, on the one hand, ensure that all courses meet the minimum quality standards. On the other hand, find good teaching practice to guide all teachers to pursue teaching excellence.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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