Research on the Evaluation Index System of College Specialty under the Background of "Double-first-class" Construction

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Keywords: Double-first-class universities; Professional evaluation of colleges and universities; Index system

Abstract: With the introduction of the "double first-class" construction scheme and implementation measures, domestic universities have made great efforts to promote reform, which objectively urgently needs a scientific and reasonable professional evaluation system as a guide, which gradually achieves "first-class" through the development of connotation and characteristics. Firstly, this paper explains the connotation of the professional evaluation index system, reviews the relevant research status, and puts forward the basic basis for the establishment of the professional evaluation index system based on the double-first-class construction. The overall framework of the evaluation index system including professional training programs, teacher level, teaching conditions, teaching management, quality of personnel training and professional characteristics was established. According to the system framework, using the Delphi method, combined with the establishment of the basis, the final construction of a professional evaluation index system including six first-level indicators, 21 second-level indicators, 50 three-level indicators, and suggestions for professional construction.

1. Research background

With the introduction of "double first-class" construction plan and implementation measures, the state has shifted its focus from supporting "engineering project" ("985 project", "211 project") universities to supporting the development of advantageous disciplines in universities. Domestic universities have made great efforts to promote reforms. This objectively urgently needs a scientific and reasonable evaluation system as a guide to stimulate the endogenous motivation of colleges and universities, and gradually achieve "first-class" through connotation and characteristic development [1].

As a national strategy, the construction of “double first-class“ has a far-reaching impact on the development pattern of higher education in China, and will also play a strong role in promoting the transformation and development of local high-level universities in the fast-growing period. Studying the scientific orientation of China's high-level university development under the construction of "double first-class", and constructing a professional evaluation and certification theory and practice system with reasonable layout and distinctive local characteristics, and taking into account comprehensive and research-oriented, has become the main task in the current professional evaluation development [2]. The purpose of this study is to explore a professional evaluation index system that meets the requirements of "two-class" development through theoretical and practical research.

Through the measurement, we try to accurately evaluate the effectiveness of the comprehensive double-top university undergraduate specialty, hoping to provide reference for the evaluation of the quality of education in Colleges and universities. It provides information, basis and suggestions for the state to evaluate the quality of undergraduate education in comprehensive double-class universities and make major educational decisions. It provides reference for promoting the discipline construction and development of high-level universities in China to "double first-class" universities.

  DOI: 10.25236/iwedss.2019.118

2. Professional Evaluation Index System

The indicator system refers to layering complex object systems to form a step-by-step structure and calculating the weight value of each element in the structure. Establishing a reasonable and effective indicator system is one of the most basic steps to ensure the smooth progress of research. Both top-ranking universities and vocational skill-based higher vocational colleges pay more attention to the cooperation between industry, university and research institutes, while professional and applied universities rarely touch this aspect. In recent years, with the development of society, various professional universities have also assumed the mission of a comprehensive talent training base. Practice teaching can make students' theoretical and practical knowledge more integrated, and it is an important means to cultivate students' innovative consciousness and solve problems scientifically [3]. Therefore, in the professional evaluation indicators, although colleges at the undergraduate level have allocated the corresponding proportion of practical teaching in the secondary indicators, higher vocational colleges have listed the practical teaching and graduate employment separately in an important position, giving more weight. This is because the combination of practical teaching inside and outside the school is an important way to train applied and fast-forming talents in Higher Vocational colleges.

3. Review of Research Status

By comparing the current situation of education evaluation in different countries horizontally, we can conclude the following common characteristics and points for reference to guide the implementation of education evaluation in China [4]:

(1) Value the value of facts and data. The evaluation of education in all countries attaches great importance to the collection of data, and it is rarely subjective judgment to judge the quality of the profession.

(2) Institutionalization and standardization of quality assessment. The government regulates the nature, functional status, methods and techniques of the evaluation institutions to varying degrees by means of legislation or administrative means.

(3) Independent and autonomous evaluation agency. Whether it is an evaluation agency established by the state's special legislation or an autonomous institution independent of the government and the university, it is not directly interfered and controlled by the government, thus ensuring the fairness and effectiveness of the results to a large extent.

(4) Self-evaluation and his evaluation are organically combined. Overseas education evaluation mostly attaches importance to the combination of internal evaluation and external evaluation to improve the quality of education and teaching.

Our country's education evaluation has appeared a new trend of following up the development of international higher education quality evaluation monitoring, paying more attention to the discipline and specialty level. To improve the adaptability of professional training to industry and society, we should gather students' learning achievement and evaluation of users' satisfaction. Statistics on papers in some related fields can be found that the evaluation methods selected by the researchers in the evaluation process mainly involve methods for determining indicators and determining weights. The methods for determining indicators mainly include: factor analysis method (principal component analysis method), factor reconstruction analysis method, etc. [5]. The methods for determining weights mainly include: entropy method, Duffel method, analytic hierarchy process, and the like.

4. Establishment of professional evaluation index system for two-tiered universities

In any scientific research process, it should be based on the scientific basis of relevant parties, follow strict organizational principles, and make judgments based on standards, which is more scientific and practical. This research also seeks to establish an evaluation indicator system under the guidance of this concept.

4.1 Basic Basis for Establishing Index System

Theory is applied to practice, and theory guides practice. Only practice without deep theoretical support is called empiricism, while empty talk about theory and activities without practice are called armchair talk. Therefore, in the process of practical research, both theory and practice are indispensable. Each theoretical basis is also a basis for the screening of evaluation indicators, or a tool. Inevitably, they also have their own limitations. Therefore, we strive to achieve all-round, multi-angle and deep exploration.

4.2 Theoretical basis: theoretical basis of professional evaluation

4.2.1 Theoretical Basis of Educational Management

The humanistic principle, system principle, benefit principle and dynamic principle in educational management theory also provide direction guidance for our evaluation process. Educational management, especially the management of teachers, enrollment and employment, degree management, logistics management, regulation management, school leadership system and so on, which are put forward in the theory of higher education management. It provides us with reference to the content elements, evaluation rules and methods for building a two-tier university professional evaluation index system.

4.2.2 Theoretical basis based on educational sociology

According to the description of the theory of educational sociology, while the social division of work in modern society is constantly refined, the professionalism of social occupations is also constantly improving. Different forms of society face different tasks at various stages of development. Under this background, the form of professional development also changes. That is, when the number of specialties is increasing, the combination of professional knowledge (skills) and related education (training) is also developing towards closer direction.

4.2.3 Theoretical Basis Based on Educational Economics

In the process of reform and development of higher education, we should take economic thinking mode and habits to think, and use the theory and method of educational economics to study, especially under the background of rapid economic and social development, which is more explanatory and persuasive. How many professional training is far from the market demand, which leads to the surplus of some professional talent resources and the increase of training cost, which is a problem that we need to think deeply and solve urgently at present. At the same time, colleges and universities are also facing the problem of uneven distribution of higher education costs. Which majors should be supported by the school? How can the evaluation criteria be scientific, reasonable and effective? How to determine the allocation of research funding for high education?

4.2.4 Theoretical basis based on educational evaluation

One of the pioneers in the field of educational evaluation in 1966, American scholar Stafford Bimm proposed the CIPP model. There are three main characteristics: First, the evaluation is decision-oriented. The CIPP model emphasizes that evaluations provide valuable information for decision making at different levels. Here CIPP refers to Context, Input, Process, and Product. Second, focus on the evaluation of the whole process of decision-making. In CIPP mode, background evaluation, input evaluation, process evaluation and result evaluation constitute the whole process evaluation of decision-making. Thirdly, the implementation of evaluation is controlled by decision makers. In CIPP model, the implementation of evaluation is controlled by decision makers.

4.3 Policy basis: relevant national policy provisions

The Ministry of Education emphasizes that it is necessary to guide colleges and universities to make good use of professional autonomy and strengthen the construction of professional connotation. Colleges and universities should actively adapt to the needs of economic and social

development. We will optimize the discipline professional structure as an important measure to improve macro quality, and require universities to formulate professional construction plans according to the principle of demand orientation, conditional guarantee, moderate scale, and continuous construction, and improve the quality of personnel training. The government, the society and the employing units will set up the supervision and evaluation mechanism for the professional quality. According to the social reputation of the school profession, the employment situation of graduates and the feedback of the employing units, the supervision and monitoring system for the professional construction of colleges and universities and the early warning mechanism for the professional establishment will be formed. All these provide policy basis for our research.

4.4 Results of Establishment of Evaluation Index System

According to the evaluation principles and theoretical basis mentioned above, after screening, we have established the overall framework of the evaluation index system. According to the evaluation objectives, we give six basic modules of the evaluation index system, each of which has the following specific connotations.

4.4.1 Professional Training Program

The curricula of two-class universities should have their own characteristics of scientific research. The evaluation index of the curriculum system is set as the systematicness, scientificity and integration of the curriculum system. Systematically inspect whether the overall structure of the curriculum is reasonable, system design experiments, practical training, internship links, whether the curriculum system and practical teaching system have been formed. Scientificity mainly has a basis for the classification of various courses, and the level is clear, which meets the needs of research university talent training goals. Integration is used to assess whether the courses offered are for student employment, entrepreneurship and career development. The development of the comprehensive qualities required by relevant industries runs through the whole process of talent development.

4.4.2 Teacher level

The specific measurement indicators include the number and structure of teachers, teaching results, teaching methods, and the level of science (teaching) research. The number and structure of teachers are measured by the number of highly qualified teachers, the ratio of students to teachers, the proportion of doctoral degrees of full-time teachers, the teaching of associate professors to undergraduates, and the level of internationalization of teachers. The teaching method is measured by the innovation of teachers' methods. Specifically speaking, it is the proportion of teaching hours in compulsory classes when teachers apply the teaching methods of Siminar, Mu class, micro class and flip class. In this study, the level of science (education) and research mainly refers to the award of scientific research results, the status of patents granted, the situation of project hosting and the influence of publishing results.

4.4.3 Teaching conditions

Teaching conditions refer to the necessary conditions to meet the needs of teaching, scientific research, personnel training and other work in Colleges and universities. In this study, hardware conditions are mainly referred to. High-quality teaching conditions create a good atmosphere and environment for the further development of universities, disciplines and specialties in the direction of school-running quality. The conditions should cover clear ideas, constructive and effective practice and laboratory construction ideas, and be equipped with experimental platforms and scientific research institutions that are conducive to the development of students' innovative spirit and practical ability. And to have a wealth of collections and network literature, easy for teachers and students to consult. Have a perceptual understanding of practice and develop a style of connection between theory and practice.

4.4.4 Teaching management

The quality of teaching management is measured by examining the management team, management system and documents, management operations, and management effectiveness. The management team refers to whether the management personnel's academic qualifications are up to standard, whether the team is sTable, whether there is reasonable planning for personnel training and improvement, and can be well implemented, and the effect is good. The management operation includes the implementation of daily teaching plan and the monitoring mechanism of teaching quality. Can we maintain the teaching operation, deal with the suspension and transfer of classes in time, and make reasonable arrangements? Whether it is in harmony with the overall teaching arrangement of the college, whether the evaluation mechanism of teaching quality is sound, whether it covers all aspects of teaching, and whether it has multi-angle evaluation.

4.4.5 Quality of Talents Training

Indicators mainly include students' basic knowledge and skills, social reputation and comprehensive quality. Basic knowledge and skills are measured by the actual level of students' basic theory and skills, their scientific research situation, graduation rate and degree awarding rate. The social reputation mainly includes the professional enrollment situation, the employment rate of the graduates and the satisfaction of the employment units. The comprehensive quality mainly considers the students' morality and physique.

4.4.6 Professional Features

Professional features refer to the professional characteristics and effects descriptions cultivated and condensed in practice. Professional features, implementation processes and effects can be reflected as professional features. Each major should focus on developing and nurturing its core expertise. This core expertise can be reflected in many aspects: advanced school philosophy, scientific work ideas and so on. High-quality and unique personnel training mode and characteristics, outstanding features in curriculum system, teaching methods, teaching research, scientific and efficient teaching management system, operation mechanism, etc. Teachers' construction, quality engineering, research base construction, students' innovative ability training, style of study construction and other aspects have unique construction ideas and development strategies, and have made significant achievements or breakthroughs.

5. The Index Content Components of the Professional Evaluation Index System of Two-class Universities

In the process of research, this study uses Delphi method to construct the evaluation index elements system. Each first-level index has several secondary indicators, and each second-level index has several main observation points. The author believes that the professional evaluation of two-level universities should be carried out in six aspects: professional training program, teacher level, teaching conditions, teaching management, quality of personnel training, and professional characteristics. These six aspects are the first-level evaluation indicators of this system. It:

First, the professional training program refers to the programmatic document on the talent training model. This study considers that the evaluation of professional training program can be carried out from four aspects: program framework, professional orientation, training objectives and curriculum system. These four aspects are secondary indicators of the evaluation content, and each secondary indicator contains different observation points. As shown in Table 1, the assessment of the area of professional training programmes includes four secondary indicators and 10 major observation points.

Table 1 Composition of Indicators for Professional Training Program

First level index	Two level index	Three level index
1. Professional Training Program	1.1 Solution framework	1.1.1 The scheme is instructive
		1.1.2 The scheme has integrity
		1.1.3 The scheme has applicability
	1.2 Professional positioning	1.2.1 Professional orientation has orientation and pertinence
	1.3 Training objectives	1.3.1 Develop the professionalism of goal setting
		1.3.2 The clarity of training goal setting
		1.3.3 Developability of Training Goal Setting
	1.4 Curriculum system	1.4.1 Systematization of curriculum system
		1.4.2 The Scientificality of Curriculum System
		1.4.3 Integration of curriculum system

Second, the level of teachers refers to the standards that teachers achieve in terms of quantity and quality. Under the teacher level indicators of this study, we set four secondary indicators, namely the number and structure of teachers, teaching results, teaching methods, and the level of science (teaching) research. Specific indicators and their observation points are shown in Table 2.

Table 2 Composition of teacher level indicators

First level index	Two level index	Three level index
2. Teachers' level	2.1 Number and Structure of Teachers	2.1.1 Number of highly qualified teachers
		2.1.2 Teacher student ratio
		2.1.3 Doctoral Degree Ratio of Full-time Teachers
		2.1.4 Professor's Assistant Professor's Teaching Situation
		2.1.5 Teachers' Internationalization Level
		2.1.6 Teachers' level
	2.2 Teaching achievement	2.2.1 Teaching Achievement Award
	2.3 Teaching method	2.3.1 Method innovation
	2.4 The Level of Science (Teaching) and Research	2.4.1 Rewards for Scientific Research Achievements
		2.4.2 Presiding over Scientific Research Projects
		2.4.3 Publication and influence of educational (scientific) research results
		2.4.4 Authorized patent

Third, the teaching conditions refer to the necessary conditions for meeting the needs of teaching, scientific research, and personnel training within the university. This study mainly refers to the hardware conditions used in teaching. Teaching conditions we decompose it into five secondary indicators, namely, experiment and teaching, practical teaching, data room status, teaching documents, scientific research institutions. The details of the nine observation points are shown in Table 3.

Table 3 Composition of teaching conditions

First level index	Two level index	Three level index
3. Teaching Conditions	3.1 Experiments and Teaching	3.1.1 The Rate of Experiments for Basic and Specialized Courses
		3.1.2 Laboratory construction
		3.1.3 Openness of laboratories
	3.2 Practice Teaching	3.2.1 Construction of Bases inside and outside the School
		3.2.2 Student Practice
	3.3 Reference room status	3.3.1 The Type and Quantity of Professional Books and Materials
		3.3.2 Open use to undergraduates
	3.4 Teaching documents	3.4.1 The Completeness of Teaching Documents
	3.5 scientific research institution	3.5.1 Construction and Opening of Scientific Research Institutions

Fourth, teaching management mainly refers to the process in which professional administrative personnel ensure that the teaching within the profession is planned, step-by-step, and orderly, and timely evaluated and improved. In this study, we consider the quality of teaching management from four aspects: management team, management system and documentation, management operation, and management effectiveness. The indicators and observation point settings are shown in Table 4.

Table 4 Composition of teaching management indicators

First level index	Two level index	Three level index
4. Teaching management	4.1 Management team	4.1.1 Quantity and Structure
		4.1.2 Cultivation and Improvement
	4.2 Management System and Documentation	4.2.1 Management document
		4.2.2 Management system
	4.3 Management operation	4.3.1 Implementation of teaching plan
		4.3.2 Monitoring mechanism of teaching quality
	4.4 Management effect	4.4.1 Feedback and Effect of Teaching Quality

Fifth, the quality of personnel training is the consideration of the basic quality of personnel training. To define the quality of personnel training, we divide it into three secondary indicators, namely, basic knowledge and skills, social reputation and comprehensive quality. There are 10 observation points under the secondary index, see Table 5.

Table 5 Composition of Quality Indicators for Talents Training

First level index	Two level index	Three level index
5. Quality of Talents Training	5.1 Basic knowledge and skills	5.1.1 Basic Theory and Practical Level of Basic Skills
		5.1.2 Student's Scientific Research Situation
		5.1.3 Graduation rate and degree award rate
	5.2 Social reputation	5.2.1 Professional Enrollment
		5.2.2 Satisfaction of Employment Units
		5.2.3 Employment Rate of Graduates of this Major in the Year
		5.2.4 Brief Introduction of Famous Alumni in the Professional Field
	5.3 Comprehensive quality	5.3.1 Moral character of students
		5.3.2 Students' physique
		5.3.3 Brief introduction of outstanding students

Sixthly, professional characteristics refer to the professional characteristics and their effects which are cultivated and condensed in practice. Professional characteristics, implementation process and effects can all be taken as the embodiment of professional characteristics. This study specifically refers to the professional advantages of each specialty, so there is only one secondary indicator of professional advantages under the professional characteristics. The professional advantages are refined into observation points to reflect the direction of professional characteristics and training characteristics.

Table 6 Composition of Professional Characteristic Indicators

First level index	Two level index	Three level index
6. Professional features	6.1 Professional advantages	6.1.1 Characteristic direction
		6.1.2 Cultivating Characteristics

6. Conclusion

The construction of "double first-class" focuses on quality and characteristics, which are compared. Under the background of "double first-class" construction, the evaluation of disciplines and specialties must be based on China's position and the world's vision. We should not only refer to the evaluation methods of developed countries in Higher Education in the world, but also pay

attention to the development process of foreign evaluation system. Therefore, under the background of "double first-class" construction, China's subject professional assessment should go beyond instrumental rationality, get rid of the administrative management perspective, establish a mechanism for evaluating the negotiation and dialogue between the two sides, and provide services for the "double first-class" construction of colleges and universities.

Subject professional evaluation should return to the main value of students in practice, and examine the effectiveness of discipline construction from the perspective of satisfying students' needs. In the past, the division of the discipline was too fine, the results were more indicators, the process indicators were less, the evaluation indicators became the same ills, and the integration of disciplines and professional evaluations was gradually established, and the evaluation index system of emphasis on teaching, emphasis on courses, heavy processes, and characteristics was emphasized. According to the concept of classification of universities, we should guide our universities to construct a distinctive ecosystem of disciplines and specialties, and optimize and reconstruct the internal relations among teaching, talents and scientific research. To scientifically judge the current growth trend, development trend and future development potential of the discipline, and constantly diagnose, discover and rectify the problems in the development of the discipline. Make good use of its own characteristics and advantages of backwardness, and point out the direction for the connotation development and quality improvement of Chinese universities.

Acknowledgement

This paper is one of the research results of the university-level teaching and research reform project of South China University of Technology (No. N2JW/Y1171260) in 2017.

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