

Research on the Performance Evaluation System of Teachers in X University based on Analytic Hierarchy Process

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Abstract: In 2019, the gross enrollment rate of higher education in China was 51.6 %, and higher education has entered a period of universalization. the gross enrollment rate of higher education in China has reached 60.2 % by 2023. The change in education methods has caused problems such as declining teaching quality and shortage of school resources in colleges and universities. College teachers are the disseminators of culture, the backbone of teaching and educating people, and a group of high-quality talents in society and colleges and universities. They are the key to improving the quantity and quality of talent training in colleges and universities [1]. In this context, the performance evaluation of college teachers is particularly important, and the performance evaluation system of college teachers is a weather vane of teacher behavior. A scientific and reasonable performance evaluation system for college teachers can effectively motivate teachers to improve their teaching ability, education ability, scientific research ability, social service ability, etc. This paper uses the Delphi method to screen and determine the evaluation indicators initially extracted, and establishes a local university performance evaluation index system that includes the first-level indicators of teacher ethics, teaching level, scientific research ability and social service, 11 second-level indicators and 29 third-level indicators. In order to verify the effectiveness of the index system, a combination of qualitative and quantitative methods is used to take X University as an example. On the premise of understanding the current status of teacher performance management in X University, the performance of teachers in X University is evaluated. Finally, the performance evaluation results of X University are analyzed, and according to the actual situation of X University, suggestions are put forward for the performance evaluation of teachers in X University from three aspects: strengthening teacher workload management, improving performance evaluation feedback mechanism, establishing teacher performance incentive mechanism, strengthening teacher social service, and improving teacher scientific research ability.

Keywords: Analytic Hierarchy Process, University Teachers, Performance Evaluation.

1. The Current Status and Existing Problems of Performance Evaluation in X University

1.1 Current Status of Teacher Performance Evaluation in X University

X University mainly conducts performance appraisal on teachers from five aspects: morality, ability, diligence, performance, and integrity. Morality mainly includes ideological and political morality, personal morality, professional ethics, social morality, etc.; ability mainly considers the professional quality and ability to perform job duties and the education and training received; diligence mainly considers the attendance rate; performance refers to the quantity and quality of the prescribed work completed by the teacher during his tenure, as well as the economic and social benefits achieved. Integrity refers to the integrity and self-discipline of the teacher.

The assessment grade is determined by combining the score (percentage system) and ranking. A comprehensive assessment score of 85-100 points and a ranking within 15% of the number of participants is excellent, 70-84 points are qualified, 60-69 points are basically qualified, and 0-59 points are unqualified. X University's assessment of teacher ethics is a one-vote veto system. When a teacher fails the teacher ethics assessment, his/her assessment grade is directly determined to be unqualified.

The performance level of teaching workload is relatively low, mainly because there is less guidance for students' social practice activities. The teaching work of X University focuses on cultivating students' professional knowledge, so the performance of scientific research ability is relatively low, and teachers have fewer scientific research awards. In terms of teachers' service to the society, there is a lack of awareness of social service.

1.2 Problems in the Performance Evaluation of Teachers in X University

1.2.1 Workload measurement is not scientific

At present, there are clear regulations on the workload of teachers in X University, which are divided into two parts: theoretical teaching and practical teaching, mainly quantitative evaluation based on teaching hours and number of people, but there are no clear coefficients and weight regulations for the effectiveness of guidance. In the teaching and research activities of the department, the form of unpaid teacher performance management is adopted, which greatly reduces the enthusiasm of teachers' work and the intensity of workload management of the department's teachers is low. At the same time, when measuring the teaching workload of teachers, class hours are used as the measurement standard, lacking the description of the implicit workload of teachers and the establishment of their weights.

1.2.2 Insufficient attention paid to the evaluation of teachers'

scientific research performance

When evaluating the scientific research performance of teachers, X University only used the single indicator of "completion of scientific research work" to measure the scientific research performance of teachers. This shows that no corresponding specific evaluation indicators and weight coefficients were given in the evaluation of teachers' scientific research performance. It is more subjective and lacks scientific and objective quantitative standards.

1.2.3 Lack of assessment mechanism for teachers' social services

In addition to teaching and educating students, completing on-campus teaching and scientific research, university teachers also have the responsibility to serve the society. When evaluating teachers' social services, X University only mentioned the social benefits of teachers' work, and did not establish a specific evaluation index set to determine the importance of the evaluation system. Teachers' teaching and scientific research have not been well combined with social practice activities, government services, and enterprises.

1.2.4 Lack of feedback system protection

According to the investigation, X University uses the results of teacher performance appraisals for the purpose of supervising teachers, and strictly supervises teachers' appointments, promotions, and salaries based on the results of the appraisals. The reward and punishment system is placed at the top of the teacher evaluation, and insufficient attention is paid to the professional development of teachers. Faced with the reward and punishment mechanism, many teachers can only complete their work tasks in a "non-aggressive" manner in accordance with the requirements of the university. The form of the reward and punishment mechanism alone lacks the incentive effect on teachers, is not conducive to stimulating teachers' work enthusiasm, and quenches teachers' desire to realize their self-worth.

2. Establishing a Performance Evaluation System for Teachers in X University

In the local university teacher performance evaluation system, the meaning of each indicator and its evaluation content, as well as the emphasis on teacher evaluation are different. Therefore, the importance of each lower-level indicator corresponding to the upper-level indicator is also different. We distinguish the importance of indicators through their weights.

2.1 Determination of the Evaluation Index Hierarchy

Through multiple visits and surveys to X University, combined with the collection and analysis of basic information of X University on the university's official website, we finally set a set of indicators for the performance evaluation of teachers in X University based on the nature of X University and the work focus of each teacher.

The target layer of the performance evaluation index set of teachers in X University has four first-level indicators, which

are expressed as:

$X = \{A, B, C, D\} = \{\text{teacher ethics, teaching level, research ability, social service}\}$

D. There are 11 secondary indicators, teachers' ethics are expressed as: $A = \{A1, A2\} = \{\text{teaching and educating, moral quality}\}$; teaching level is expressed as $B = \{B1, B2, B3, B4\} = \{\text{teaching workload, teaching quality, teaching achievements, teaching innovation}\}$; research ability is expressed as $C = \{C1, C2, C3\} = \{\text{scientific research achievements, scientific research projects, scientific research awards}\}$; social service is expressed as $D = \{D1, D2\} = \{\text{social service activities, social service awareness}\}$.

29 third-level indicators, teaching and educating is represented by $A1 = \{A11, A12, A13\} = \{\text{love students, love teaching career, subject expertise}\}$; moral quality is represented by $A2 = \{A21, A22\} = \{\text{social morality, professional ethics}\}$;

The teaching workload is expressed as $B1 = \{B11, B12, B13, B14\} = \{\text{total teaching hours, guiding graduation thesis and graduation design, guiding social practice, and academic lectures}\}$; the teaching quality is expressed as $B2 = \{B21, B22, B23\} = \{\text{student evaluation, peer evaluation, and supervision evaluation}\}$; the teaching achievement is expressed as $B3 = \{B31, B32\} = \{\text{teacher teaching award, guided students to win awards}\}$; the teaching innovation is expressed as $B4 = \{B41, B42, B43\} = \{\text{teaching reform achievements, teaching models and methods, and the formation high-quality courses}\}$;

Scientific research results are expressed as $C1 = \{C11, C12\} = \{\text{papers, books}\}$; scientific research projects are expressed as $C2 = \{C21, C22, C23\} = \{\text{number of national projects, number of provincial and ministerial projects, number of provincial and ministerial level projects}\}$; scientific research awards are expressed as $C3 = \{C31, C32, C33\} = \{\text{national awards, provincial and ministerial awards, awards below the provincial and ministerial level}\}$; social service activities are expressed as $D1 = \{D11, D12\} = \{\text{enterprise development consulting services, high-skilled talent training services}\}$; social service awareness is expressed as $D2 = \{D21, D22\} = \{\text{service attitude, desire to serve}\}$.

2.2 Determination of Evaluation Index Weights

Table 1: AD Judgment Matrix

index	A	B	C	D	w^p	Weights w	λ_{mi}
Teachers' ethics	1	2	3	3	2.0598	0.4478	1.8183
teaching level	1/2	1	3	2	1.3161	0.2861	1.1914
research ability	1/3	1/3	1	2	0.6866	0.1493	0.6275
social service	1/3	1/2	1/2	1	0.5373	0.1168	0.4838

In order to determine the weights of indicators at each level, a performance evaluation questionnaire for teachers in University X was designed during the research process of this

paper. The weights of various indicators were calculated based on the performance evaluation results of teachers in University X by experts, and a consistency test was conducted. Finally, the weights of the first-level indicators were calculated. The calculation results of the first-level indicators are shown in Table 1.

The consistency ratio of the first-level indicators $CR=0 < 0.10$ meets the consistency requirements [1].

Using the same calculation method, we established a pairwise comparison judgment matrix for each secondary and tertiary indicator and calculated the weight. After sorting, we finally determined the weights of the performance evaluation indicators for local college teachers, as shown in Table 2.

Table 2: Weights of Evaluation Indicators for Teachers' Performance at All Levels in Local Universities

First level indicator	Secondary indicators	Level 3 indicators	
A Teacher's ethics (0.4478)	A1 Teaching and educating (0.3333)	A11 Loves students (0.1897)	
		A12 Love teaching career (0.2631)	
		A13 Subject expertise (0.5472)	
B Teaching Level (0.2861)	A2 Moral Quality (0.6667)	A21 Social morality (0.25)	
		A22 Professional ethics (0.75)	
	B1 Teaching workload (0.1105)	B2 Teaching Quality (0.4237)	B11 Total teaching hours (0.4133)
			B12 Guiding graduation thesis and graduation design (0.2922)
			B13 Guiding social practice (0.1078)
			B14 Conduct academic lectures (0.1867)
	B3 Teaching Achievements (0.2447)	B4 Teaching Innovation (0.2211)	B21 Student evaluation of teaching (0.5396)
			B22 Peer evaluation (0.1634)
			B23 Supervision and evaluation (0.2670)
	C1 Scientific Research Achievements (0.5278)	C2 Scientific Research Projects (0.3325)	B31 Teacher Teaching Award (0.6667)
			B32 Guided students to win awards (0.3333)
			B41 Teaching reform achievements (0.4)
	C. Research Ability (0.1493)	C3 Scientific Research Awards (0.1396)	B42 Teaching Models and Methods (0.4)
			B43 Forming high-quality courses (0.2)
C11 Papers (0.75)			
D1 Social service activities (0.6667)		C21 Number of national projects (0.6250)	C12 Works (0.25)
			C22 Number of provincial and ministerial projects (0.2385)
			C23 Number of provincial and ministerial level projects (0.1365)
D2 Social service awareness (0.3333)	C3 Scientific Research Awards (0.1396)	C31 National award (0.4594)	
		C32 Provincial and ministerial awards (0.4014)	
		C33 Awards below the provincial and ministerial level (0.1392)	
		D11 Enterprise Development Consulting Services (0.25)	
D. Social Service (0.1168)	D2 Social service awareness (0.3333)	D12 High-skilled talent training services (0.75)	
		D21 Service attitude (0.3333)	
		D22 Desire to serve (0.6667)	

According to the weights of each indicator determined by the AHP method, among the first-level indicators, local universities focus on the construction of teachers' ethics and style, followed by teachers' teaching level. Among the

second-level indicators, universities pay more attention to teachers' moral quality, teaching quality, scientific research results and social service activities. Among the third-level indicators, universities pay more attention to teachers' subject expertise, professional ethics, students' evaluation of teachers, teachers' teaching awards, the level and number of published papers, the number of national projects, and the desire for social service.

3. Suggestions on the Implementation of the Performance Evaluation System for Teachers in X University

Based on the analysis of the performance evaluation results of teachers in X University, this paper proposes suggestions on how to improve the performance level of teachers in combination with the specific situation of X University, in order to improve the scientific research ability of teachers in X University, promote the transformation of scientific research results into products that have practical effects on society, strengthen the management of teachers' workload, and better promote the development of local science and technology and economy.

3.1 Scientifically Formulate Teaching Workload Evaluation Principles and Strengthen Teacher Workload Management

The profession of university teachers has both general and specific characteristics. The general characteristics refer to performance evaluation, which, like other professions, is aimed at improving personal ability and increasing work efficiency, so as to achieve the goal of creating more value for the unit or enterprise. However, given the particularity of the teaching profession, the content of higher education teacher evaluation focuses on teachers' teaching workload, teaching quality and scientific research results. In the face of the multidimensional and complex characteristics of teacher performance evaluation, when conducting performance evaluation on their teaching workload, universities should establish an effective dynamic management model based on the school's own development strategy and combined with teachers' personal career planning.

College teachers are mainly responsible for teaching and educating students. Teaching is the most basic part of teachers' work, and teachers' teaching workload is a prerequisite for college students to successfully acquire subject knowledge in a short period of time. To a certain extent, the higher the teaching hours of teachers, the greater the amount of knowledge students master. However, when conducting performance evaluation of teaching workload, we cannot simply use the class hours as the standard for measuring teachers' teaching workload. We must flexibly formulate performance evaluation standards for teachers' teaching workload based on the country's education policies and guidelines, the overall development needs and plans of the school, and the career development plans of college teachers.

Generally, it is difficult to quantify teaching quality and teaching effectiveness. In order to improve the efficiency of teacher performance management, the level of the

performance evaluation execution department can be appropriately lowered, and an evaluation management mechanism based on small units such as colleges, departments, and research groups can be selected. This is because leaders, teachers, and students in a small range have a better understanding of the objects being evaluated, which allows the implicit workload of teaching to be reflected, avoiding the one-sided drawbacks of focusing on using teaching hours as the evaluation basis for teachers' teaching workload, and making the evaluation of teaching workload more objective and effective.

When measuring the teaching workload of teachers, we can reasonably arrange the teaching hours according to the age of teachers, and determine the proportion of teaching hours according to the age. For example, young teachers can arrange teaching hours appropriately, and the teaching hours arranged for older teachers should be less. At the same time, teachers' lesson preparation, teaching effectiveness, teaching quality, and teaching achievements can be added to the workload evaluation of college teachers.

3.2 Improve the Feedback Mechanism of Performance Evaluation Results and establish an Incentive Mechanism for Performance Evaluation

While the performance evaluation of college teachers plays a supervisory role for teachers, it is also of great significance to promote the improvement of teachers' teaching level, professional quality, scientific research ability, etc. After the performance evaluation of teachers, the school leaders, the assessment team and the teachers being assessed should reasonably interpret and use the assessment results on the premise of meeting the individual needs of the assesseees and respecting their humanity. The school leaders and the assessment team can make humanized modifications to the constructed teacher performance evaluation index system based on the assesseees' assessment content, focus, personal feelings, etc. The assesseees can summarize their own shortcomings based on the assessment results, adjust the teaching plan in a timely manner, and solve their own shortcomings in a targeted manner.

School management can use modern computer technology and tools to establish a teacher performance evaluation feedback platform, collect teacher feedback information on performance evaluation activities anonymously, using real names, or a combination of multiple forms, and give timely and positive responses.

In addition to the evaluation of "terminal results", the evaluation of teaching performance of college teachers should also include the evaluation of "formational results". The long-term, purposeful and planned tracking of teachers' teaching process and results should be carried out to comprehensively reflect the teaching status and quality of teachers [3].

3.3 Strengthening Teachers' Social Services and Improving Their Scientific Research Capabilities

College teachers are an important part of social services. They have professional knowledge and ability to transform and

disseminate the superior resources of colleges and universities [5]. And social services are an indispensable part of their professional career. Teachers can verify the theories they have learned in social services, increase their practical experience, meet the psychological needs of self-realization, and combine social practice content with scientific research to continuously improve their scientific research capabilities.

3.3.1 Improve social service capabilities

The strong professional knowledge of college teachers is an important guarantee for the quality of their social services. In order to improve the social service capabilities of teachers, the first thing to do is to improve the professional level of teachers and scientific research capabilities. Teachers' social service activities can also improve their adaptability and ability to apply knowledge. By providing knowledge and technical services to enterprises, entrepreneurial teams or individuals, they can also discover loopholes in their knowledge framework, make up for them in time, and further expand their professional frontier knowledge.

When establishing a social service system for teachers, colleges and universities should take into account the differences in teachers' disciplines, career development and even age, and reasonably establish a social service system for colleges and universities. Establish channels for teacher services, form a team of teacher researchers in combination with the strategic planning of colleges and universities, and build a good cooperation platform with enterprises and governments on the premise of conducting research on the service needs of enterprises and governments.

3.3.2 College teachers should establish a correct social service concept and improve their scientific research ability

The evaluation of teachers' scientific research performance is a weather vane of their scientific research work, and it is related to the full play of their scientific research functions of educating people and serving society [4]. Colleges and universities are the gathering place of high-quality talents and the main source of social knowledge. Colleges and universities should strengthen teachers' sense of social service responsibility, closely link teachers' teaching work, scientific research and social service, and encourage teachers to consciously fulfill their social service responsibilities. In social service, teachers should be clear about their role positioning and establish correct social service concepts. College teachers are the carriers of high-tech and high-knowledge stocks. They should take the initiative to understand the knowledge and technology needs of enterprises around the school, bring scientific research into enterprises, and cooperate with enterprises in vertical research projects to promote each other.

In summary, social service is the "second classroom" for teachers. The rational use of social service resources is of great significance to improving teachers' teaching level and scientific research ability. Colleges and universities incorporate teachers' social services into the content of teachers' performance evaluation, and establish a reasonable connection between teachers' contribution to society and teachers' promotion and award evaluation, which can

effectively motivate teachers to provide social services.

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