

The Construction of Teacher Evaluation System in Applied Undergraduate College Based on Modern Education Technology

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Abstract—Based on the actual situation of the application-oriented colleges and universities, this paper analyzes the existing problems of teacher evaluation work and proposes improvement measures based on the questionnaire survey. And then, it completes the theoretical construction of the teacher evaluation system. In order to comply with the development needs of current science and technology, this study takes modern educational technology as an observation point for teacher evaluation and incorporates the “development” index into the teacher evaluation system to make it more objective, scientific, fair, and comprehensive. And then, it would promote the innovation of teacher evaluation and achieve the goal of “teacher development”.

Keywords—teacher evaluation; teacher development; modern education technology; applied undergraduate college

I. INTRODUCTION

The university undertakes the historic mission of personnel training, scientific research, social services, and cultural heritage and innovation. In order to ensure the precise demand for talents in today’s economic and social development, it is imperative that applied undergraduate colleges must create a team of teachers with factors such as moral integrity, good quality, sufficient numbers, reasonable structure, and relative stability. And it would ensure the development of applied undergraduate institutions. The construction of the teaching team focuses on stimulating the enthusiasm, initiative and self-consciousness of teachers’ professional development. It should enhance teachers’ professional identity and professional ability. Teacher evaluation is one of the necessary means. Based on the actual situation of the application-oriented colleges and universities, this paper analyzes the current status and existing problems of the current teacher evaluation work, proposes targeted improvement measures, and builds the teacher evaluation system of application undergraduate college that incorporates the “development” index. And it takes modern education technology as observation points for teacher evaluation. It fully proves that the evaluation aim is to promote the development of teachers. And it provides reference for theoretical research and practice innovation for evaluation and development of teachers in applied undergraduate colleges.

II. INVESTIGATION ON THE STATUS OF TEACHERS EVALUATION IN APPLIED UNDERGRADUATE UNIVERSITIES

A. Survey on Teacher Evaluation Cognition

In order to promote the effective implementation of teacher evaluation work in applied undergraduate colleges and universities, this study conducts a questionnaire survey on the status quo of teacher evaluation in conjunction with the actual situation of applied universities. A total of 145 valid questionnaires were received. Among the 145 questionnaires received, 85 persons (58.62%) considered that teacher evaluation were very important, ranking first. 57 people (39.31%) considered that it would be more important, ranking the second. Two people (1.38%) considered that it was less important, ranking the third. One person (0.69%) considered that it wasn't important, ranking fourth. The statistical results show that everyone has a high degree of understanding of the importance of teacher evaluation in applied undergraduate colleges.

B. Survey on the Purpose of Teacher Evaluation

Aiming at the purpose of teacher evaluation in applied undergraduate colleges, we have carried on the investigation of ideal demand and actual operation. It is to understand the gap between the two. In the survey of ideal demand, the number of people who choose the evaluation purposes such as “improving the education and teaching quality”, “promoting the development of teachers”, “the basis of teachers’ appointment, promotion, reward and punishment” ranks among the top three, which is 81.72%, 66.90% and 50.69% respectively. In the practical investigation, the number of people who choose the evaluation purpose of improving the quality of education and teaching still ranks first. However, the value decreases to 66.90%. 57.93% of them chose “the basis of teacher appointment, promotion, reward and punishment”, ranking up to the second. The proportion of people who chose to “promote the development of teachers” was 40.00%. And the ranking dropped to the third. The results show that the evaluation purpose of “promoting teacher development” has not been embodied either in people’s ideology or in practical operation. In addition, the reward and punishment of teacher evaluation

plays a leading role in the actual operation. And there is a certain distance between the ideal needs and actual operation.

C. Investigations on Individualization of Evaluation Indicators

There are differences in teachers' age, teaching age, professional titles, disciplines and so on in applied undergraduate colleges and universities. In the investigation of ideal demand, the proportion of teachers' evaluation "should respect individual differences among teachers" is 79.31%, ranking first. The proportion of choosing "indifferent" and "should not" was 11.03% and 9.66%, ranking the second and third respectively. In the actual operation investigation of teacher evaluation, the proportion of "ignoring individual differences of teachers" was 48.28%, ranking first. The proportion of "fully respecting the individual differences of teachers" is only 41.38%. Obviously, in the actual operation of teacher evaluation, the degree of respecting for teachers' individual differences is not very high.

D. Survey on Dimensions of Evaluation Indicators

The results showed that the number of people who chose "work process", "work performance", "basic quality" and "teacher development" were in the top four positions, accounting for 86.90%, 69.66%, 59.31% and 54.48% respectively. Other options account for 6.9%. And it may not be considered. Through practical investigation and theoretical research, "teacher development" is the key to promote the innovation of teacher evaluation and improve the quality of education and teaching. To this end, the "teacher development" would be integrated into the teacher evaluation system.

E. Others

In addition to the above-mentioned surveys, this study also carried out other research projects, including: the investigation on the degree of understanding on rewards and punishments and development of teacher evaluation; the investigation on the attribution of teacher evaluation; investigation on teachers' attitude to participating in evaluation activities; survey on teacher evaluation programmers; investigation on the selection of teacher evaluation subject; survey on teachers' understanding of current evaluation criteria; survey on teacher's satisfaction of current evaluation system or evaluation work. All the results of the survey provide a true and reliable basis for the reform and innovation of the teacher evaluation in applied undergraduate universities.

III. EXISTING PROBLEMS AND IMPROVEMENT MEASURES OF TEACHER EVALUATION

A. Major Problems in Current Teacher Evaluation

Through the investigation of the present situation, there is a certain gap between the ideal needs and the actual operation of teacher evaluation in the applied undergraduate colleges and universities. People still lack enough

understanding and attention to the evaluation purpose of promoting the "teacher development". And the evaluation system still lacks the integrity, systematicness, dynamic and impartiality. First of all, on the operational level, we pay too much attention to the evaluation of rewards and punishments, and neglect the development of teacher evaluation. Secondly, the teacher evaluation index "sweeping approach" ignores the difference between different individual and corresponding evaluation index, the selection of the evaluation items to different evaluation subjects, and the adoption of evaluation methods to different evaluation indexes. Thirdly, it pays too much attention to the performance management of evaluation results and neglects the humanistic concern and timely feedback of the evaluation process. Fourth, we can't pay one-sided attention to the evaluation of teachers. However, it ignores the teacher's self-evaluation. And the diversified dimensions of the evaluation subject are not perfect and so on.

B. Improvement Measures for Teacher Evaluation Innovation

The teacher evaluation innovation in applied undergraduate colleges should be the combination of frontier and feasibility, static and dynamic, reward and punishment, development and qualitative evaluation. Aiming at the existing problems in the current evaluation, the following measures should be taken to improve the teacher evaluation in applied undergraduate colleges based on the development of modern educational technology. Firstly, the teacher evaluation system should be established in combination with the goals of running a school, the structure of teachers, the establishment of specialties and the training scheme. In order to promote teacher development, the first-level indexes of teacher evaluation have been improved from "basic qualities—work process—work performance" to "basic qualities—work process—work performance—teacher development", which provides solid basis and guarantee for the realization of the goal of running a school and the teacher development. Second, it should take the development of modern education technology as the observation point. It should integrate the online (network), micro-teaching counseling, Q & A workload into the assessment of teacher's work process. It should integrate the teacher's courseware results, micro-curricular results and MOOC results into the assessment of teachers' performance. And then, it would adapt to the development of science and technology in the era. Third, it should make full use of modern science and technology to realize the construction of dynamic evaluation index system. Different evaluation subjects correspond to different evaluation methods and evaluation indicators. The evaluation results of different evaluation subjects have different weights. The evaluation indexes, standards and weights of different subjects should be different. These tedious and meticulous calculations can be accomplished by modern information technology, such as spss software, spreadsheet and so on. After working out the calculations program, they can respond to the change of the input condition, which greatly improves the efficiency and accuracy of the calculations. Fourth, it should strengthen the humanistic management of teacher evaluation, and formulate

a comprehensive, systematic, scientific and fair teacher evaluation program. We should do a good job in the selection, training and propaganda of the evaluation subjects. It is necessary to renew the evaluation concept, innovate the evaluation management and perfect the evaluation scheme. And the evaluation result would be more objective, fair, true and reliable.

IV. SCIENTIFIC CONSTRUCTION OF TEACHER EVALUATION SYSTEM

A. Chromatographic Structure of the Evaluation System

The composition of the teacher evaluation system in applied undergraduate colleges is multi-faceted, which consists of the evaluation subject, the evaluation object, the evaluation index system and the evaluation management. The factors are infiltrated and intermingled with each other. The hierarchy is shown in "Fig. 1".

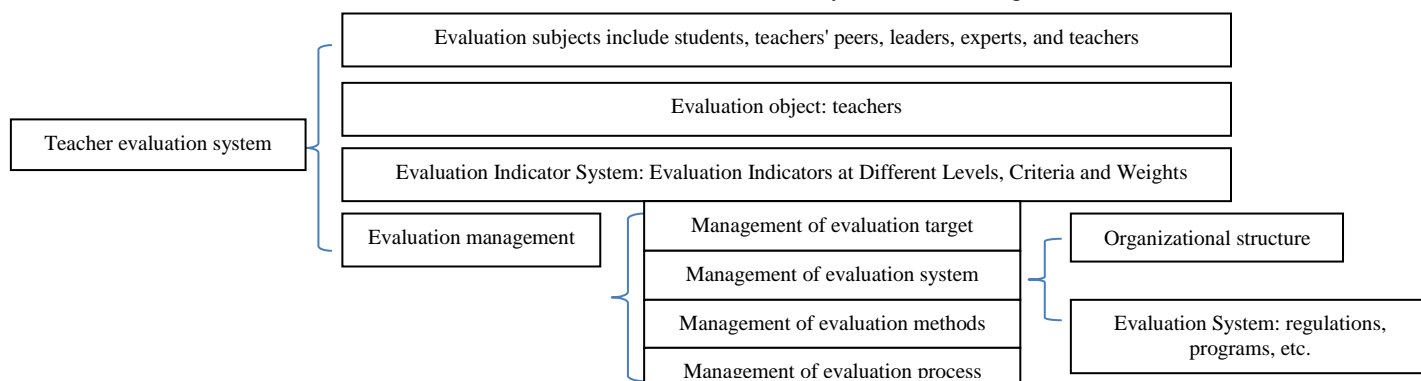


Fig. 1. Chromatographic structure of teacher evaluation system in applied undergraduate colleges and universities.

B. The Confirmation of Evaluation Subjects and Their Weights

Through questionnaires and theoretical research, it determines that the main body of teacher evaluation should consist of five parts such as students, teachers' peers, leaders, experts (supervisors) and teachers. In order to calculate the weight of each subject, the author invites four education experts and six front-line teachers to sort the importance of the above five evaluation subjects. According to the order,

the evaluation subject in the first place is assigned to 1. And the evaluation subject in the second place is assigned to 2. With the same principle, the evaluation subject in the third, the fourth and the fifth respectively is assigned to 3, 4, 5. If the order of importance is same, for example, "front-line teacher 2" considers that leaders, experts, teachers and students are equally important, the number of the above four evaluation subjects is $(1 + 2 + 3 + 4)/4 = 2.5$. The judgement results of 4 experts and 6 teachers are shown in "Table I".

TABLE I. THE JUDGEMENT RESULTS OF EVALUATION SUBJECT'S IMPORTANCE

Surveyed people	The Assignment of Importance of Evaluation Subject				
	1 Leaders	2 Experts	3 Peers	4 Teachers	5 Students
Expert 1	4	1	2	5	3
Expert 2	2	3	4	5	1
Expert 3	2.5	2.5	2.5	5	2.5
Expert 4	1	2	3	5	4
Teacher 1	3	1	5	4	2
Teacher 2	2.5	2.5	2.5	5	2.5
Teacher 3	3	2	4	5	1
Teacher 4	2	1	3	5	4
Teacher 5	3	3	3	3	3
Teacher 6	3	2	1	4.5	4.5
rank sum (Ri)	26	20	30	46.5	27.5
weight (Wi)	26	20	30	46.5	27.5

First, we should use X^2 check. And the consistency of the judgement results is significantly tested by the "test" method.

$$X^2 = \frac{\sum R_i^2 - (\sum R_i)^2 / m}{1/12 mn(m+1)}$$

$$= \frac{26^2 + 20^2 + 30^2 + 46.5^2 + 27.5^2 - (26 + 20 + 30 + 46.5 + 27.5)^2 / 5}{1/12 \times 5 \times 10 \times (5 + 1)} = 15.78$$

X^2 Among them, m is the number of evaluation subject. It is 5. n is the number of judges who took part in the questionnaire. It is 10. R_i is the assignment sum (rank sum) corresponding to the evaluation subject of i . We could check $X_{0.01}^2(3) = 11.34$, $X^2 \geq X_{0.01}^2(3)$, the results are consistent and significant. On the basis of this conclusion, the weight of each evaluation subject can be calculated by the method of "rank sum operation". The formula is as follows:

$$W_i = \frac{2[(m+1)n - R_i]}{mn(m+1)} \quad (i = 1, 2, 3, \dots, m)$$

Among them, W_i is the weight of evaluation subject of i . R_i is rank sum of evaluation of i . And the weight of each evaluation subject is calculated as shown in "Table II".

TABLE II. LIST OF WEIGHTS OF DIFFERENT EVALUATION SUBJECTS

Evaluation subject Weight	The category of evaluation subject				
	1 Leaders	2 Experts	3 Peers	4 Teachers	5 Students
weight (W_i)	0.227	0.267	0.200	0.090	0.216

C. Evaluation Objects

The evaluation object is the teacher. In the traditional sense, the teacher is the passive people who are evaluated by the others. With the continuous progress of modern educational thought, teachers' position has also risen from passivity to initiative. Their role in the process of teacher evaluation is multi-dimensional. First, they are evaluated by the others, namely the evaluation object. Secondly, in the peers' evaluation of teachers, they are the subject of evaluation. Third, in self-evaluation, they are both evaluators and people who are evaluated by the others. With the continuous improvement of teacher evaluation organizations, some teachers' representatives have to participate in the formulation, revision and improvement of the evaluation system. With the continuous reform and innovation of teacher evaluation, teachers' potential enthusiasm will be aroused. And their role in teacher evaluation will become more and more obvious.

D. Teacher Evaluation Index System

According to the basic principle of tree index system, and the basis of "basic quality", "work process", "work performance" and "teacher development", 19 secondary indexes and 56 tertiary indexes have been formed according to the method of decomposition and expert selection. The common methods for calculating the weight of evaluation indexes are expert opinion averaging method, Delphi method, rank sum operation method, analytic hierarchy process (AHP), logarithmic weighting method and so on. In this study, it uses the method of "rank sum". And the formula is shown in the following:

$$W_i = \frac{2[(m+1)n - R_i]}{mn(m+1)} \quad (i = 1, 2, 3, \dots, m)$$

Among them, W_i is the weight of i index. R_i is the rank sum of i index. m is the number of index. n is the number of experts. We could calculate the weights of four first-grade index. And then, we could get $W_1 = 0.240$, $W_2 = 0.390$, $W_3 = 0.260$, $W_4 = 0.110$. With the same principle, we could calculate the weight of second-grade index, third-grade index. And in the end, we would get synthetic weight. The evaluation index system of applied undergraduate colleges and universities is shown in "Table 3".

TABLE III. EVALUATION INDEX SYSTEM OF TEACHERS IN APPLIED UNDERGRADUATE COLLEGES

First-grade indexes	Second-grade index	synthetic weight	Third-grade index	synthetic weight
1 basic quality 0.240	11 ideological and ethical standards 0.310	0.074	111 political thought 0.157	0.038
			112 professional ethics 0.483	0.036
	12 knowledge structure 0.350	0.084	121 subject-involved knowledge 0.370	0.031
			122 conditional knowledge 0.290	0.023
			123 practical knowledge 0.190	0.016
			124 scientific and cultural knowledge 0.150	0.013
	13 capability and quality 0.220	0.053	131 teaching ability 0.281	0.015
			132 capacity for scientific research 0.205	0.011
			133 ability to organize and manage 0.114	0.006
			134 Practical guidance 0.190	0.010
			135 modern educational skill 0.105	0.006
			136 innovation ability 0.105	0.006
	14 physical and mental quality 0.120	0.029	141 physical quality 0.567	0.016
			142 psychological traits 0.433	0.013
2 work process 0.390	21 Classroom teaching 0.276	0.108	211 teaching contents 0.290	0.031
			212 teaching methods 0.230	0.025
			213 teaching method 0.150	0.016
			214 teaching effect 0.330	0.036
	22 research work 0.233	0.091	221 scientific research attitude 0.450	0.041
			222 research investment 0.317	0.029
			223 research features 0.233	0.021
	23 Preparation before class 0.195	0.076	231 preparation for courseware 0.442	0.034
			232 Facility preparation 0.308	0.023
			233 Relevant information reserve 0.250	0.019
	24 guidance and Q&A (network) 0.129	0.050	241 work correction and registration 0.350	0.018
			242 guidance and Q&A (network) 0.330	0.016
			243 thesis guidance 0.330	0.016
	25 examination work 0.105	0.041	251 test paper quality 0.467	0.019
			252 overall appearance on the paper 0.300	0.012
			253 Reading and Appraisal of paper 0.233	0.010
	26 Social service work 0.062	0.024	261 Social service attitude 0.500	0.012
			262 Social service process 0.500	0.012

First-grade indexes	Second-grade index	synthetic weight	Third-grade index	synthetic weight
3 work performance 0.260	31 classroom teaching performance 0.278	0.072	311 Teaching workload 0.317	0.023
			312 teaching results 0.317	0.023
			313 teaching features 0.366	0.026
	32 Scientific research performance 0.218	0.057	321 undertaking project 0.227	0.013
			322 publish papers 0.213	0.012
			323 publish works 0.173	0.010
			324 academic exchanges 0.260	0.015
			325 social impact 0.127	0.007
	33 Preparation performance before class 0.195	0.051	331 Teaching document workload 0.467	0.024
			332 courseware results 0.533	0.027
	34 coaching performance (network) 0.128	0.033	341 coaching workload 0.045	0.015
			342 coaching results 0.055	0.018
	35 Test performance 0.105	0.027	351 workload of setting a theme 0.342	0.009
			352 Marking workload 0.317	0.009
			353 test results 0.342	0.009
	36 Social service performance 0.080	0.02	361 Participation in social services 0.500	0.010
			362 Social service effect 0.500	0.010
4 teacher development 0.110	41 lifelong learning 0.483	0.053	411 lifelong learning consciousness 0.533	0.028
			412 Lifelong learning habit 0.467	0.025
	42 continues education 0.183	0.020	421 Degree courses 0.316	0.006
			422 Scientific research activities 0.342	0.007
			423 business refresher training 0.342	0.007
	43 exchange and reflection 0.334	0.037	431 communication 0.483	0.018
			432 teaching reflection 0.517	0.019

For the above 56 three-level evaluation indicators, we can use the collective method to determine its applicable evaluation subjects by voting. For example, with item 112 "Professional Ethics", the evaluation subjects determined by voting are leaders, experts, peers and students. With item 322 "Publishing the paper", the determined evaluation subjects are leaders, experts, peers and teachers. In addition, the evaluation methods applicable to each evaluation indicator are not identical. And the evaluation should be flexible according to the actual situation.

E. Evaluation Management

Management depends on people, and the core of teacher evaluation management is evaluation organization. The organizational structure of current evaluation should be multi-level. And its functions are no longer carried out independently by a certain functional department of the college as in the past. The scientific and technological content of current evaluation activities is becoming more advanced. The object of evaluation is becoming more and more targeted. The fitness of evaluation index system is more and more flexible. The data processing workload is more and more heavy. Therefore, the evaluation organization needs to have a batch of professional staff. They can understand the business and do the management well. They can deal with the coordination and changes. Also, they should understand the orientation of the college, the training

goal and the development of the discipline specialty at all times. On the basis, it should carry out the evaluation activities of teachers at all stages. Evaluation organizations should complete the development of evaluation systems including evaluation implementation programs and evaluation management regulations. And they also should provide evaluation training, publicity, education and psychological counseling to evaluators at the appropriate time.

V. CONCLUSION

To sum up, based on "teacher development", modern education technology and advanced science and technology, the dynamic teacher evaluation system can make the evaluation result be more objective, truthful, comprehensive and fair. This is of great significance for arousing teachers' enthusiasm. And it would promote their professional development. Also, it is of great significance for strengthening the construction of teachers' ranks and implementing the strategic goal of "strengthening schools with talents".

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