Construction of a KPI-Based Performance Appraisal System for Full-Time Teachers in Higher Vocational Colleges in Guangdong Province under the "Double-High" Construction

Tao Gao*

Business School of Guangdong Engineering Polytechnic, Guangzhou, 510520, Guangdong, China
Corresponding Author.

Abstract: To foster the development of national and provincial "double-high" vocational colleges, higher vocational institutions in Guangdong Province have actively promoted the enhancement of their core competencies. A key component of this endeavor is the establishment of a robust incentive mechanism, particularly through the construction of a key performance indicator system designed to boost the enthusiasm and proactivity of Full-Time teachers. This study constructs a KPI-Based Performance appraisal System for Full-Time Teachers in Higher Vocational Colleges of Guangdong Province and employs the Analytic Hierarchy Process (AHP) to determine the weights of various performance indicators. By conducting a pairwise comparison survey among 20 experts, this study provides a quantitative basis for the Performance appraisal of Full-Time teachers.

Keywords: Double-High; Full-Time Teachers; KPI; Performance Appraisal; Weight

1. Construction of a KPI-Based Performance Appraisal System for Full-Time Teachers in Higher Vocational Colleges

The construction of a KPI system involves breaking down the macro-level strategic objectives of higher vocational colleges into specific micro-level implementation goals for each department. By combining departmental workflows and extracting key elements, abilities, and technical requirements, a quantifiable and closed-loop management model can be achieved [1]. In line with the "Double-High" initiative and the strategic objectives of the schools, and adhering to the SMART principle, this paper divides the Performance appraisal of Full-Time teachers in Guangdong higher vocational colleges into four dimensions: basic teaching ability, professional skills, research ability, and job performance. Each dimension is further divided into four KPI. Detailed scoring criteria and point explanations for each KPI are presented in Table 1.

Table 1. KPI Classification Standard for Performance Appraisal of Full-Time Teachers in Higher Vocational Colleges in Guangdong Province
(All indicators are scored out of 100 points)

Dimensions	Key Performance Indicators (KPIs)	Detailed scoring criteria and point explanations
Basic Teaching Ability A1	Teaching Documents and Standards B1	Based on the inspection results from the academic affairs office, calculated as a percentage.
	Teaching Hours B2	Professors: Scored out of 100. For annual teaching hours less than 180, score 0. For annual teaching hours greater than or equal to 180, score: 60 + (annual teaching hours - 180) / 4. Associate Professors: Scored out of 100. For annual teaching hours less than 240, score 0. For annual teaching hours greater than or equal to 240, score: 60 + (annual teaching hours - 240) / 4. Lecturers: Scored out of 100. For annual teaching hours less than 300, score 0. For annual teaching hours greater than or equal to 300, score: 60 + (annual teaching hours - 300) / 4. Teaching Assistants: Scored out of 100. For annual teaching hours less than

		360, score 0. For annual teaching hours greater than or equal to 360, score: 60 + (annual teaching hours - 360) / 4. [2]
	Student Evaluation Scores B3	Based on the average score of two-semester student evaluations, calculated as a percentage.
	Supervisory Evaluation Scores B4	Based on the average score of classroom observations by the supervisory team of the school, calculated as a percentage.
Professional Skills A2	Various Achievement Awards B5	National, provincial, and school-level teaching achievement awards, humanities and social sciences research achievement awards, and scientific research achievement awards: 50 points for each national-level award (10 points for application, 40 points for winning), 35 points for each provincial-level award (10 points for application, 25 points for winning), and 15 points for each school-level award (5 points for application, 10 points for winning). The distribution of points among the principal investigator and team members shall be determined by the principal investigator and reported.
	Construction of Teaching Teams, Brand Programs, and Professional Teaching Resource Banks B6	Teaching teams, brand programs or collaborative education centers, professional teaching resource banks, and on-campus training bases (including 1+X projects): 50 points for each national-level project (10 points for application, 20 points for project approval, 20 points for acceptance), 35 points for each provincial-level project (12 points for application, 13 points for project approval, 10 points for acceptance), and 15 points for each school-level project (5 points for application, 5 points for project approval, 5 points for acceptance). The distribution of points among the principal investigator and team members shall be determined by the principal investigator and reported [3].
	Teaching Ability Competition Results B7	National-level teaching ability competitions and young teachers' competitions: First prize: 25 points per person; Second prize: 18 points per person; Third prize: 11 points per person. Provincial-level teaching ability competitions and young teachers' competitions: First prize: 10 points per person; Second prize: 8 points per person; Third prize: 6 points per person. School-level teaching ability competitions, young teachers' competitions, and teaching demonstration competitions: First prize: 5 points per person; Second prize: 3 points per person; Third prize: 1 point per person.
	Guiding Student Competitions Results B8	Awards for Guiding Teachers in Various Competitions: For national-level competitions such as the "Challenge Cup", National Vocational Skills Competition, "Internet+" College Students' Innovation and Entrepreneurship Competition, and Career Planning Competition, the first, second, and third prizes will be awarded 30, 25, and 20 points respectively, and the excellence award will be awarded 10 points. For other national-level vocational skills competitions or cultural and sports competitions, the first, second, and third prizes will be awarded 15, 12, and 9 points respectively. For provincial-level competitions such as the "Challenge Cup" and Guangdong Provincial Vocational Skills Competition, the first, second, and third prizes will be awarded 15, 12, and 9 points respectively, and other provincial-level vocational skills competitions will be awarded 10, 8, and 6 points respectively. For the provincial-level "Internet+" College Students' Innovation and Entrepreneurship Competition, the first, second, and third prizes will be awarded 10, 7, and 5 points respectively. For school-level competitions, 5 points will be awarded. The distribution of points among the principal investigator and team members shall be determined by the principal investigator and reported [4].
Research Ability A3	Construction of Online Courses, Quality Courses, and Teaching Resource Banks B9	Additional Points for Approved Projects such as Online Courses, Quality Courses, and Teaching Resource Banks: National-level projects approved will be awarded 25 points, and 20 points for acceptance or upgrade. Provincial-level projects approved will be awarded 15 points, and 15 points for acceptance or upgrade. Projects approved by the National Education Commission will be awarded 7 points. School-level projects approved will be awarded 5 points, and 5 points for acceptance or upgrade. College-level projects approved will be awarded 3 points, and 3 points for acceptance or upgrade. For each course that has successfully piloted "curriculum ideology" and achieved good results, 4 points will be awarded. The distribution of points among the principal

		investigator and team members shall be determined by the principal investigator and reported.
	Textbook Publication B10	Textbooks: Each publicly published textbook or teaching aid that complies with school regulations will be awarded 6 points (8 points for school-enterprise cooperative textbooks). Each school-based handout that complies with school regulations and is favored by students will be awarded 5 points. The distribution of points among the chief editor and team members shall be determined by the chief editor and reported [5].
	Application for Various Vertical and Horizontal Research Projects, Publication of Papers B11	Each national-level project will be awarded 40 points, each provincial-level project 20 points, each municipal-level project 10 points, and each school-level project 5 points. The distribution of points among the principal investigator and team members shall be determined by the principal investigator and reported. Core journals will be awarded 5 points, general journals 2 points, and internal school journals 1 point (no duplicate points for the same article). The first author is responsible for distributing the points.
	Invention Patent B12	Each appearance design patent, software copyright will be awarded 1 point, utility model patent 3 points, and invention patent 5 points.
Job Performance A4	Sino-foreign Joint Programs, Articulation with Undergraduate Programs and Higher Vocational Programs B13	Enrollment Types: For this year, each program involved in Sino-foreign cooperative education will be awarded 12 points; each program involved in 3+2 articulation with undergraduate programs will be awarded 10 points; each program involved in higher vocational professional colleges will be awarded 8 points; each program involved in 3+2 articulation between higher vocational and secondary vocational programs will be awarded 6 points; each program involved in the modern apprenticeship system will be awarded 5 points; and each program involved in the expansion of enrollment for higher vocational education will be awarded 4 points. The distribution of points among the principal investigator and team members of all the above categories shall be determined by the principal investigator and reported [6].
	Industry-University Cooperation B14	1. For each industry-university cooperation project, inviting high-quality enterprises to negotiate with the college will be awarded 1-point, successful cooperation will be awarded 4 points, and annual follow-up and maintenance will be awarded 4 points. 2. For professional lectures, inviting technical, operational, and management personnel from cooperating enterprises to give career development lectures to students on a regular basis and obtaining prior approval from the college will be awarded 2 points for each lecture, with a total of no more than 6 points. 3. Encouraging enterprises to participate in talent cultivation through scholarships and other forms of financial aid, formulating management regulations for enterprise-funded scholarships and financial aid, signing agreements for regular implementation, and establishing a series of systems and selection procedures will be awarded 10 points each time. 4. For various services provided by technology special envoys or enterprise management consultants, 5 points will be awarded for project initiation and 5 points for project completion. 5. Construction of off-campus internship bases: (1) Submitting the school-enterprise cooperation internship base agreement signed in the current year (1 point for each agreement, with a total of no more than 5 points); (2) Cooperating with enterprises to build internship bases, with enterprises participating in the construction of training labs in the form of funds and equipment (2 points for every 50,000 yuan, with a total of no more than 6 points); (3) Arranging internships for at least 50% of the students in each major every year (4 points for meeting the requirements). 6. Introducing production workshops or social service institutions, and making the internship base a venue for vocational skills competitions or skills assessment will be awarded 5 points. 7. Research and development of on-campus training equipment, platforms, and software, as evidenced by project proposals or other supporting documents (5 points for each project, with a total of no more than 10 points).
	Construction of a	Construction of teaching master teams, teaching master studios, and backbone

Teaching Master Team and Teaching Master Workshops B15	tutor studios: 30 points for each national-level team or studio, 15 points for each provincial-level team or studio, and 6 points for each school-level team or studio.
Social Services B16	Initiating a social service training program, including pre-publicity, contract signing, etc. Successful contract signing will be awarded 5 points, and the completion of a social service training project will be awarded 5 points.

2. Scientifically Establish a Hierarchical Structure Chart and Construct a Judgment Matrix

When using AHP to set key performance indicator weights, we should first clarify the evaluation quantification scale [7]. In this case, we use a 9-point scale, as shown in Table 2.

Table 2. 1-9-Point Scale

Scale	Meaning
1	It indicates both are equally important
3	It indicates that the former is slightly more important than the latter
5	It indicates that the former is significantly more important than the latter.
7	It indicates that the former is much more important than the latter.
9	Indicates that the former is extremely more important than the latter.
2, 4, 6, 8	It indicates an intermediate value
The reciprocals of numbers from 1 to 9	If the importance of the former relative to the latter is a, then the importance of the latter relative to the former is the reciprocal of a.

2.1 Scientific Establishment of Hierarchical Structure Chart

In this study, a hierarchical structure chart was developed based on the four dimensions and 16 key performance indicators set in Figure 1.
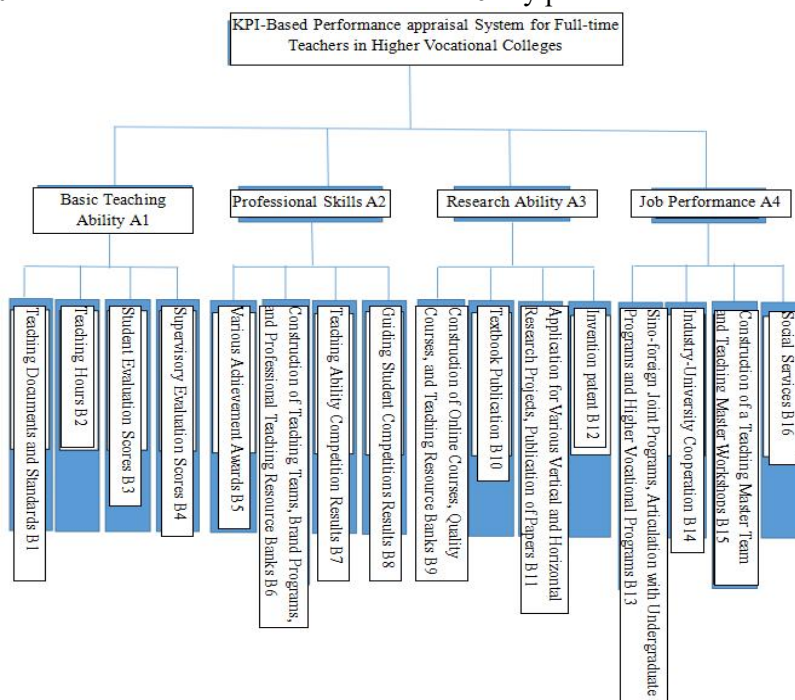

Figure 1. The Hierarchical Structure of the KPI System of Full-Time Teachers' Performance Appraisal in Higher Vocational Colleges

2.2 Scientific Construction of Judgment Matrix

In this study, 20 representatives from Guangdong provincial Higher Vocational Colleges, including associate professors, evaluators, and Full-Time teachers, were invited to participate in a questionnaire survey using Questionnaire Star. Based on the 9-point scale in Table 2, pairwise comparisons were made among the indicators in the above structure [8]. SPSS software was used to analyze the scoring results, and the judgment matrices for key performance indicator were

obtained as shown in Tables 3-7.

Table 3. Judgment Matrix of A1, A2, A3 and A4 Relative to KPI System

	AHP Date			
	A1	A2	A3	A4
A1	1.000	0.380	0.575	0.680
A2	2.630	1.000	0.483	0.909
A3	1.740	2.070	1.000	0.680
A4	1.470	1.100	1.470	1.000

Table 4. Judgment Matrix of B1, B2, B3 and B4 Relative to A1

	AHP Date			
	B1	B2	B3	B4
B1	1.000	0.418	0.427	0.485
B2	2.390	1.000	0.437	0.662
B3	2.340	2.290	1.000	0.394
B4	2.060	1.510	2.540	1.000

Table 5. Judgment Matrix of B5, B6, B7 and B8 Relative to A2

	AHP Date			
	B5	B6	B7	B8
B5	1.000	0.299	0.433	0.391
B6	3.350	1.000	0.662	0.465
B7	2.310	1.510	1.000	0.373
B8	2.560	2.150	2.680	1.000

Table 6. Judgment Matrix of B9, B10, B11 and B12 Relative to A3

	AHP Date			
	B9	B10	B11	B12
B9	1.000	0.625	0.508	0.855
B10	1.600	1.000	0.348	0.855
B11	1.970	2.870	1.000	0.909
B12	1.170	1.170	1.100	1.000

Table 7. Judgment Matrix of B13, B14, B15 and B16 Relative to A4

	AHP Date			
	B13	B14	B15	B16
B13	1.000	0.379	0.322	0.476
B14	2.640	1.000	0.704	0.535
B15	3.110	1.420	1.000	0.488
B16	2.100	1.870	2.050	1.000

2.3 Scientific Consistency Test

Before using the Analytic Hierarchy Process to allocate indicator weights reasonably, a matrix consistency test is required [9]. The author used the built-in software of Questionnaire Star to calculate the consistency ratio CR_j of A1, A2, A3, and A4 relative to J's judgment matrix, which is 0.074. The CR_{A1} of B1, B2, B3, and B4 relative to A1's judgment matrix is 0.096. The CR_{A2} of B5, B6, B7, and B8 relative to A2's judgment matrix is 0.069. The CR_{A3} of B9, B10, B11, and B12 relative to A3 is 0.055, and the CR_{A4} of B13, B14, B15, and B16 relative to A4's judgment matrix is 0.053. All consistency ratios are less than 0.1, so the matrix passes the consistency test [10].

3. Conclusions and Limitations

The weights of each key performance indicator were calculated using SPSSAU software, as shown in Table 8.

Table 8. Weight of Key Performance Indicators

Serial No.	Key Performance Indicators	Weight
1	B1 Teaching Documents and Standards	0.0186
2	B2 Teaching Hours	0.0322
3	B3 Student Evaluation Scores	0.0421

4	B4 Supervisory Evaluation Scores	0.0572
5	B5 Various Achievement Awards	0.0277
6	B6 Construction of Teaching Teams, Brand Programs, and Professional Teaching Resource Banks	0.0581
7	B7 Teaching Ability Competition Results	0.0594
8	B8 Guiding Student Competitions Results	0.1096
9	B9 Construction of Online Courses, Quality Courses, and Teaching Resource Banks	0.0520
10	B10 Textbook Publication	0.0607
11	B11 Application for Various Vertical and Horizontal Research Projects, Publication of Papers	0.1080
12	B12 Invention patent	0.0795
13	B13 Sino-foreign Joint Programs, Articulation with Undergraduate Programs and Higher Vocational Programs	0.0342
14	B14 Industry-University Cooperation	0.0663
15	B15 Construction of a Teaching Master Team and Teaching Master Workshops	0.0808
16	B16 Social Services	0.1136

Due to the limitations of the researcher's capabilities and a less than comprehensive understanding of Performance appraisal theories, this study still has many shortcomings.

For example, some respondents reported that the construction of the 16 KPIs was unreasonable, with unclear boundaries between some indicators. Others believed that the assessment criteria and scoring instructions needed further refinement. The researcher hopes to improve upon these in future research.

Reference
[1] Zhang Quan, Dai Xiaoyun. Construction of Key Performance Indicator Target Management under the Background of "Double High" Construction. Light Industry Technology, 2021 (5): 138-139

[2] Li Ruoxi. Research on Performance Evaluation of Teachers at CF Industrial Vocational and Technical College. Inner Mongolia Normal University, 2020.

[3] Yang Ran, A Study on the Performance Appraisal Strategies of Teachers in Higher Vocational Colleges Based on Competence. Journal of Science and Education, 2024, (01):137-141.

[4] Gao Lin, Lin Zhibin, Application Research on Teacher Performance Appraisal in Higher Vocational Colleges. Journal of Science and Education (Mid-Day), 2015, (35):20-21.

[5] Li Na, Exploration and Research on Teacher Performance Appraisal System of Private Higher Vocational Colleges. Modern Vocational Education, 2017, (01):106.

[6] Yu Hong, Research on Teacher Performance Appraisal and Incentive Mechanism in Higher Vocational Colleges from the Perspective of Total Quality Management Theory. Journal of Yangzhou Education Institute, 2022, 40(03):87-90.

[7] Zheng Qinyan, Analysis on the performance Appraisal Strategy of "Double-Qualified" Teachers in Colleges and Universities. Journal of Yanbian College of Education, 2021, 35(02):56-58. (in Chinese)

[8] Li Qin, Review and Prospect of Teacher Performance Appraisal Research in Higher Vocational Colleges. Journal of Guangdong Polytechnic of Light Industry, 2021, 20(02):19-23. (in Chinese)

[9] Pei Hongyan, Research on the Construction of Performance Evaluation System for Full-Time Teachers in Higher Vocational Colleges. Employment and Security, 2020, (01):118-119.

[10] Li Na, The Problems Existing in the Performance Appraisal of Higher Vocational Teachers. Inner Mongolia Science and Technology and Economy, 2020, (15):43-45.