

Construction of a Measurement Model for High-quality Development of Higher Vocational Education

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ABSTRACT

The students trained by vocational colleges are the main source of national technical and skilled talents, playing an important role in improving talent quality, optimizing industrial structure, and achieving high-quality economic development. Starting from the connotation of high-quality development of vocational education, the article constructs an evaluation index system and measurement model for high-quality development of vocational education. Taking five vocational colleges in CZ city as examples, the model is used to measure the results. From three aspects: integration of industry and education, connotation of education, and construction of teaching staff, it provides a path reference for high-quality development of vocational education.

Keywords: Vocational education, High-quality development, Measurement model.

1. INTRODUCTION

To June 15, 2023, China has 1545 vocational colleges. As a key position for cultivating high-quality technical and skilled talents in the country, vocational colleges need to further establish a linkage system between vocational education and high-quality economic development, accurately predict labour market demand, improve professional dynamic adjustment mechanisms, innovate college enterprise cooperation methods, and adhere to deep integration of industry and education while facing development opportunities, Improve the matching degree between professional and high-quality economic development needs, enhance the quality of technical and skilled talent training and high-quality labour training, achieve high-quality education development, and also provide effective supply of human resources required for high-quality economic development.[1]

2. THE CONNOTATION OF HIGH-QUALITY DEVELOPMENT OF VOCATIONAL EDUCATION

Promoting high-quality development in vocational colleges is an important decision

proposed in the National Vocational Education Reform Implementation Plan. High-quality refers to an excellent level higher than the qualified standard, and is also an advanced stage of connotative development, mainly reflected in the cultivation of high-level talents, high-level speciality construction, high-quality integration of industry and education, and the formation of high-level and structured teacher teams.[2]

2.1 High Standard Talent Cultivation Refers to the High Standard of Talent Cultivation Quality

In order to meet the development needs of China's economic construction, vocational colleges cultivate high-quality high-end technical and skilled talents that meet the needs of enterprise positions, and achieve the transformation from scale expansion to connotation construction [3]. High standard talent cultivation places higher demands on the quality of talent cultivation, emphasizing the comprehensive development of students, including the cultivation of professional abilities such as on-the-job ability, job transfer ability, and personal sustainable development ability, as well as the cultivation of students' core values, professional ethics, and other quality abilities.

2.2 The Construction of High-level Majors Should be Oriented Towards High-end Industries and High-end Industries

Speciality construction should align with the development trends and needs of the industry, making talent cultivation more forward-looking and targeted. Speciality construction is the carrier for vocational colleges to serve society and directly affects the quality of talent cultivation. According to the laws of China's economic and industrial development in recent years, it has been found that the social career structure is constantly updating, giving birth to many new positions. Therefore, in order to improve students' ability to transfer their careers, it is necessary to strengthen the construction of high-level majors, emphasize the construction of professional clusters, closely connect the professional settings with the needs of regional industrial development, provide skilled talents with strong adaptability for regional economic development, and unleash the social value of vocational education.

2.3 High-quality Integration of Industry and Education Aims to Strengthen the Dual Role of Colleges and Enterprises

The college needs to adhere to the unity of knowledge and action, and the combination of engineering and learning, to promote deep cooperation between schools and enterprises. Interests are the foundation of college enterprise relations, therefore, when formulating a mechanism for college enterprise cooperation, it is necessary to fully consider multi-level relationships to mobilize enthusiasm, balance multiple interests, and strengthen mutual benefit and exchange between enterprises and colleges. In terms of talent cultivation, skill training, cultural integration, and other aspects, colleges and enterprises should promote joint planning, participation, and communication, to achieve collaborative education among the government, industry, enterprises, and universities [4]. Learn cutting-edge skills and technologies in the industry, improve students' competitiveness in employment, and achieve true integration of industry and education.

2.4 The High-quality Development of Vocational Colleges Cannot Be Achieved Without the Construction of High-level Teaching Staff.

According to the "Opinions of the Central Committee of the Communist Party of China and the State Council on Comprehensively Deepening the Reform of Teacher Team Construction in the New Era" and the requirements of the "14th Five Year Plan" for teacher team construction by the national education regulatory department, specific requirements have been put forward for the goal of teacher team construction: to improve the system of teacher team construction, optimize academic qualifications, professional titles, and professional structures, strengthen the construction of teacher ethics and style, and enhance the quality of vocational college teachers, Leading and driving the establishment of a skilled and specialized "dual teacher" teaching team in various regions.

3. EVALUATION INDEX SYSTEM AND MEASUREMENT MODEL FOR HIGH-QUALITY DEVELOPMENT OF VOCATIONAL EDUCATION

The assessment of high-quality development in higher vocational colleges requires the comprehensive implementation of the national educational policy, and the full play of the guiding, motivating, promoting and constraining role of the assessment.

3.1 High-quality Development Assessment Model for High-level Vocational Colleges

In the 2023 annual assessment indicators for the high-quality development of high-level higher vocational colleges, 15 evaluation indexes are respectively high-level college construction, enrolment and employment, specialty construction, integration of industry and education and social services, teaching resource construction, vocational skills and innovation ability, teaching ability, student development, teaching team, scientific and technological cultural services, high display results, international exchange and cooperation, fund and asset performance, satisfaction with talent cultivation and comprehensive quality and efficiency. Compared with 2022, the main performance is reflected in the revision of

"curriculum and textbook construction" to "teaching resource construction", "modern vocational education system" to "integration of

industry and education and social services", and "social support and services" to "high display results", as shown in "Table 1" below.

Table 1. Assessment Indicators for High-quality Development of Local Ordinary Universities in 2023

Serial Number	Index	Presentation form	Weight ratio (%)
1	High-level college construction	Comprehensive value	8
2	Enrolment and employment	Absolute value	6
3	Specialty construction	Comprehensive value	5
4	Integration of industry and education and social services	Absolute value	8
5	Teaching resource construction	Comprehensive value	5.5
6	Vocational skills and innovation ability	Absolute value	6
7	Teaching ability	Absolute value	6.5
8	Student development	Comprehensive value	4
9	Teaching team	Amplitude, absolute value	7
10	Scientific and technological cultural services	Absolute value, increase ratio	6
11	High display results	Absolute value, increase ratio	3
12	International exchange and cooperation	Comprehensive value	5
13	Fund and asset performance	Comprehensive value	4
14	Satisfaction with talent cultivation	Comprehensive value	6
15	Comprehensive quality and efficiency	Comprehensive value	20

In terms of the evaluation index system, separate evaluation indicators are formulated for vocational colleges. On the basis of retaining commonalities, individual indicators are formulated based on their positioning and differentiation. At the same time, quantitative data monitoring and qualitative content expert evaluation will be implemented for "double verification" evaluation. Quantitative data is collected, calculated, and ranked by the assessment department through regular monitoring of existing data. The qualitative content is evaluated separately by the on-site assessment team and the expert group formed by

the assessment department. The results of the two aspects complement each other, jointly confirm and comprehensively evaluate, and determine the assessment results.

Quantitative indicators are selected as core indicators that are leading, non-self-testing, easy to quantify, verifiable, and comparable. According to the scoring method of each indicator, scores are calculated according to the actual situation.

3.2 A High-quality Development Evaluation Index System and Measurement Model Based on College Status Data

By utilizing the status data of vocational colleges to construct an evaluation index system and measurement model, it is possible to analyze the high-quality development level of the colleges from multiple perspectives.

3.2.1 Construction of High-quality Development Assessment Indicators

The evaluation index system for high-quality development is mainly based on the platform data of Jiangsu higher vocational colleges in the "Data Collection and Management Platform for Talent Training Work Status of Higher Vocational Colleges" from September 1, 2020 to August 31, 2023, as well as the data in the "Scorecard", "Resource Table", "Student Feedback Table", "International Impact Table", "Service Contribution Table", and "Implementation Policy Table", combined with the annual quality reports of various higher vocational colleges (2023). Based on college status data, statistical analysis was used to qualitatively and quantitatively analyze the input quality, process quality, and outcome quality of higher vocational education. The overall quality and development level of higher vocational education were comprehensively measured from aspects such as basic situation, student development, education and teaching, international cooperation, and service contribution. [5]

3.2.2 Construction of a Measurement Model for High-quality Development of Higher Vocational Colleges

AHP mathematizes human thinking in the process of scheme decision-making, quantifies qualitative evaluation indicators, and becomes a model for selecting the best decision or optimal scheme [6]. The introduction of RAGA in the Analytic Hierarchy Process (AHP) solves the problem of insufficient accuracy and consistency in calculating the weights of evaluation indicators. RAGA is applied in AHP to transform the consistency problem of the judgment matrix into an optimization problem of nonlinear indicator weights, thereby obtaining the optimal weights of various evaluation indicators while ensuring the consistency of the evaluation matrix.

The author uses the RAGA-AHP model to calculate the indicator weights and consistency of the judgment matrix for the high-quality development of higher vocational colleges. In the process of research, relevant experts from many higher vocational colleges, government education departments and employers were investigated to rank and assign points to the evaluation indicators, construct a judgment matrix based on the ranking and scoring results, and use RAGA to calculate the weight of each evaluation index, as shown in "Table 2" below.

Table 2. High-quality development assessment index system based on college status data

Primary indicators	Secondary indicators	Student development 0.1963	Education and teaching 0.2656	Social services 0.3521	International cooperation 0.186	CIF _(n)
Student development	Establishing Virtue and Cultivating Talents	0.0589				0.0001
	Enrollment situation	0.0294				
	Employment quality	0.0785				
	Campus experience	0.0294				
Education and teaching	Teaching resources		0.0266			0.0002
	Specialty construction		0.0797			
	Teaching team		0.0398			
	Integration of industry and education		0.1062			
	College governance		0.0133			
Social services	Serve regional economic development			0.0528		0.0002
	Technical research and development			0.1937		
	Social training			0.1056		
International cooperation	International repercussions				0.0093	0.0004
	Cooperation and exchange				0.0651	
	International Student Training				0.0651	
	The Belt and Road Initiative				0.0465	

4. MEASUREMENT RESULTS OF HIGH-QUALITY DEVELOPMENT LEVEL IN VOCATIONAL COLLEGES

Taking the relevant data of five vocational colleges in the Science and Education Town of CZ City as an example, the evaluation results of each vocational college can be determined by weighted summation based on the weights of various evaluation indicators and the standardized values of the participating vocational colleges. The measurement results are shown in “Table 3” below.

Table 3. Measurement results of high-quality development of 5 vocational colleges in science and education town of CZ city

Index	Weight ratio	College A	College B	College C	College D	College E
Establishing Virtue and Cultivating Talents	0.0589	5.39	5.59	5.89	5.83	5.48
Enrollment situation	0.0294	2.74	1.99	2.94	2.74	2.69
Employment quality	0.0785	7.54	6.57	6.89	7.85	7.70
Campus experience	0.0294	2.94	2.78	2.92	2.87	2.76
Teaching resources	0.0266	1.74	1.98	2.40	1.59	2.66
Specialty construction	0.0797	5.98	2.44	6.86	4.87	7.97
Teaching team	0.0398	3.88	3.26	3.69	3.71	3.98
Integration of industry and education	0.1062	8.50	6.37	6.37	8.50	10.62
College governance	0.0133	1.29	1.23	1.29	1.33	1.28
Serve regional economic development	0.0528	5.28	1.51	3.80	4.05	3.25
Technical research and development	0.1937	5.97	3.52	7.78	10.63	19.37
Social training	0.1056	4.96	2.82	10.56	6.11	4.51
International repercussions	0.0093	0.65	0.31	0.93	0.67	0.63
Cooperation and exchange	0.0651	6.51	3.55	4.14	2.37	1.78
International Student Training	0.0651	2.03	1.61	6.51	4.31	3.13
The Belt and Road Initiative	0.0465	3.51	1.58	4.65	3.42	3.38
Total score		68.90	47.11	77.61	70.85	81.18

5. SUGGESTIONS FOR THE PATH OF HIGH-QUALITY DEVELOPMENT OF VOCATIONAL EDUCATION

The high-quality development of vocational colleges requires a higher level of integration between industry and education, educational connotation, and teaching staff.

5.1 Deep Integration of Industry and Education Is the Only Way for High-quality Development of Vocational Education

The first is to establish a vocational education group to promote collaborative education between professional groups and industrial chains. Vocational colleges can effectively promote the

organic connection of education chain, talent chain, industry chain, and innovation chain within the region by creating vocational education groups and industry alliances [7]. The alliance can play a role in the reform of professional system, curriculum system, talent cultivation mode, and teaching resource construction, promote the integration of professional construction and industrial development, and promote the integration of vocational college talent cultivation and the development of the real economy.

The second is to jointly build an industrial college between colleges and enterprises, and create a technical skills service platform.

Vocational colleges strengthen cooperation with regional enterprises through the integration of platform functions such as college enterprise co construction of dual subject colleges, industrial parks, technology application and service centres, and through technology development, technology transfer, technology consulting, and technology services [8]. By establishing an Industrial Innovation Research Institute, cultivating and training specialized personnel in the industry, organizing experts and teams to provide technical consultation and services, promoting product, technology, and application innovation, and providing data, case support, and thematic research for scientific decision-making of government departments at all levels to promote industrial chain development.

The third is to build a carrier for college enterprise cooperation and promote collaborative education between colleges and enterprises.

Vocational colleges can jointly build practical carriers through college enterprise cooperation to create a group of high-level professional training bases that integrate curriculum teaching, experimental training, employee training, and social services. By strengthening cooperation with key enterprises and large enterprises at the provincial and municipal levels, a multi-party linkage mechanism between colleges, governments, businesses, and enterprises can be formed. At the same time, we will gradually deepen the collaborative talent cultivation methods such as work-study alternation, naming classes/elite classes/innovation classes, modern apprenticeship systems, on-the-job internships, and student employment.

5.2 Improving the Connotation and Quality of Vocational Colleges and Universities

The distinctive feature of the new era is that the economy and society have entered a stage of high-quality development, requiring the cultivation of a large number of technical and skilled talents that match high-quality development. College education can optimize the allocation of secondary vocational education resources by strengthening the integration with industry development and talent market demand within the region, emphasizing the curriculum system and professional settings, improving the quality and internal competitiveness of secondary vocational education, cultivating students' learning ability, knowledge application ability, and good professional ethics and craftsmanship spirit, in order to adapt to the new requirements of high-quality development in the new era. Vocational colleges can establish a market-oriented approach, fully consider factors such as student employment, teaching quality, and social recognition in accordance with the requirements of industrial structure optimization and economic development mode transformation, and construct a dynamic adjustment system for professional settings. In the face of changes in the external environment, they can dynamically deal with professional warning, elimination, and new settings.

5.3 Strengthening the Construction of the "Dual Teacher" Team

The key to improving the quality of talent cultivation lies in teachers. Optimizing the construction of the "double qualified" team and strengthening the construction of high-quality teachers can provide strong talent guarantee and intellectual support for the high-quality development of higher vocational education [9]. At present, most young and middle-aged teachers in vocational colleges come from undergraduate colleges and lack certain practical experience in enterprises, leading to inaccurate grasp of market dynamics and skill demands. Therefore, teachers should be encouraged to participate in technology research and development or innovation and entrepreneurship to establish economic entities, enhance their social service capabilities, and appropriately relax the conditions for selecting high-level and skilled talents. By optimizing the teacher training system and establishing a "dual teacher" training base and practical base for college

enterprise cooperation, we aim to provide a good learning platform for dual teacher quality training.

6. CONCLUSION

The National Vocational Education Reform Implementation Plan proposes overall requirements and goals for vocational education from seven modules and twenty measures, completing the transformation from government sponsored education to government coordinated management and social diversified education, from pursuing scale expansion to improving quality, and from referring to the general education mode to enterprise social participation and distinctive professional characteristics of type education. The assessment of high-quality development of higher vocational colleges by higher-level government departments mainly includes student development, education and teaching, integration of industry and education, international exchange and cooperation, social services, and comprehensive projects, which are divided into 14 quantitative indicators and 1 qualitative indicator for comprehensive projects. From the perspective of high-quality development assessment based on college status data, this article establishes 4 first level indicators and 16 second level indicators from four aspects: student development, education and teaching, social services, and international cooperation. RAGA-AHP is used to measure the high-quality development level of 5 vocational colleges in CZ Science and Education City, and the relative measurement results of their high-quality development level are obtained. From three aspects: integration of industry and education, educational connotation, and teacher team construction, Provide relevant suggestions for the high-quality development path of vocational education.

AUTHORS' CONTRIBUTIONS

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