Journal of Contemporary Educational Research, 2024, Volume 8, Issue 11
http://ojs.bbwpublisher.com/index.php/JCER
ISSN Online: 2208-8474
ISSN Print: 2208-8466

Preliminary Study on the Construction of Evaluation Index System for Clinical Medicine Postgraduates Based on Job Competency

Dandan Yuan*, Yunhong Liu, Chao Wang

The First Affiliated Hospital of Baotou Medical College, Inner Mongolia University of Science and Technology, Baotou 014010, Inner Mongolia Autonomous Region, China

Corresponding author: Dandan Yuan, 68chloe@sina.com

Abstract: *Objective:* To evaluate the practicality of constructing multiple evaluation index systems for postgraduates in clinical medicine professional degree based on job competency. *Methods:* The theoretical framework of the evaluation index system was initially developed using expert consultation, literature review, and other methods. 20 survey experts were selected and consulted using the Delphi method to screen and evaluate the weights of multiple indicators. Data was then entered into a table to evaluate the practicality of the constructed indicators. *Results:* The questionnaire recovery rate of the first round of expert consultation was 92.50%, and the second round was 100.00%. The comparison between the two groups showed $P < 0.05$. The authority level of the first round was 0.817, and the second round was 0.811. In the first round of coordination, the chi-square value of the first-level indicators was 0.498, and the chi-square value of the second-level indicators was 0.628. In the second round of coordination, the chi-square value of the first-level indicators was 0.573, and the chi-square value of the second-level indicators was 0.634. The comparison between the two rounds showed $P < 0.05$. The evaluation index system included 2 first-level indicators, 5 second-level indicators, and 31 third-level indicators. *Conclusion:* Constructing an evaluation index system based on job competency is highly scientific, with a reasonable construction process and high practical value.

Keywords: Job competency; Clinical medicine profession; Postgraduates; Evaluation index system

Online publication: December 2, 2024

1. Introduction

The latest reform in medical education emphasizes that the education system should be the core of reform, clarifying multiple requirements for job competency based on global experience to enhance educational effectiveness. Under this premise, postgraduates can be considered the main focus of education, strengthening clinical training and effectively bridging education and career guided by job competency,

thereby improving the comprehensive strength of postgraduates [1]. The evaluation index system can summarize the training process and educational outcomes of postgraduates. By improving evaluation elements based on job competency theory, a deep and highly operable evaluation system can be obtained, and then an assessment plan can be developed. This study selected 20 survey experts to explore the construction process and practical value of the evaluation index system.

2. Materials and methods

2.1. General information

Twenty survey experts were selected, including 9 males and 11 females, aged between 37 and 53 years, with a mean age of (54.65 ± 3.19) years old. Inclusion criteria: having qualifications as a postgraduate mentor, having trained ≥ 3 postgraduates; having ≥ 3 years of educational management experience; holding a position above the department level; being able to cooperate with this study and provide professional advice. Exclusion criteria: age over 55 years old; multiple chronic diseases with limited physical activity; general cooperation with this study.

2.2. Methods

A research project team was formed to initially determine the index elements based on the expert consultation method and literature review method. The index elements were revised through group discussion and expert interviews to generate a survey questionnaire. The Likert five-point scale was used to score the questionnaire indicators, and a suggestion box for modifications was provided. The Delphi method was used to conduct two rounds of surveys among experts, and a framework for job competency was developed, including 2 first-level indicators, 5 second-level indicators, and 31 third-level indicators.

The expert consultation form designed by the Delphi method consisted of three parts: the first part was expert confidence, the second part was the consultation content of evaluation indicators, and the third part was the expert judgment basis and familiarity level. In the first round of the survey, experts evaluated the feasibility of various indicators. The scores for first-level and second-level indicators were 100, and the scores for third-level indicators ranged from 1 to 10. Evaluation indicators were screened using the coefficient of variation (CV) and direct scoring method. The former selected indicators based on sensitivity, while the latter selected indicators based on importance. Based on the results of the first round, pre-reserved and pre-deleted indicators were determined. Then, a second round of consultation was conducted to make appropriate corrections to the indicator system. Experts provided targeted suggestions for pre-deleted and controversial indicators to clarify the weight coefficients and evaluation index system.

2.3. Statistical analysis

Data was organized using Excel 2021 and processed using SPSS 28 software. Count data were compared and tested using chi-square, and $P < 0.05$ was considered statistically significant. The positive coefficient was evaluated using the questionnaire recovery rate, calculated as the number of questionnaires recovered divided by the number of questionnaires distributed multiplied by 100%. The authority coefficient was used to evaluate the degree of authority, and a higher value indicated more authoritative expert opinions. It was calculated as (index judgment basis + index familiarity level) / 2. Typically, an authority coefficient ≥ 0.7 indicates acceptable reliability. Kendall's coefficient of concordance was used to evaluate the degree of coordination. The consistency coefficient ranged from 0 to 1, and a value closer to 1 indicated higher

consistency. A coordination coefficient of 0.7 indicated good consistency.

3. Results

3.1. Comparison of positive coefficients in two rounds

In the first round, 120 questionnaires were distributed, and 111 questionnaires were recovered, with a recovery rate of 92.50%. In the second round, 50 questionnaires were distributed, and all 50 questionnaires were recovered, with a recovery rate of 100.00%. Comparing the recovery rates of the two groups, chi-square = 3.960, $P = 0.047$. **Table 1** shows the basic information of the experts in the two rounds. Except for the work field, the intra-group comparison showed $P < 0.05$.

Table 1. Analysis of basic information of experts in two rounds [*n*/%]

Basic situation		Round 1 (*n* = 111)	Round 2 (*n* = 50)	χ^2	*P*
Education	Undergraduate	43 (38.74)	2 (4.00)	104.436	0.000
	Postgraduate	68 (61.26)	12 (24.00)		
	PhD	0	36 (72.00)		
Job title	Primary	2 (1.80)	0	59.689	0.000
	Intermediate	11 (9.91)	6 (12.00)		
	Deputy	27 (24.32)	9 (18.00)		
	Senior	71 (63.96)	35 (70.00)		
Working experience (years)	1–5	13 (11.71)	0	6.484	0.039
	6–10	28 (25.23)	13 (26.00)		
	> 10	70 (63.06)	37 (74.00)		
Work areas	Clinical experts	78 (70.27)	30 (60.00)	2.272	0.321
	College teacher	20 (18.02)	10 (20.00)		
	Administrative manager	13 (11.71)	10 (20.00)		

3.2. Analysis of authority level in two rounds

The authority level in the first round was 0.817, and in the second round, it was 0.811, indicating a high level of expert authority (**Table 2**).

Table 2. Analysis of authority level in two rounds

Consultation rounds	Indicator judgment basis	Indicator familiarity	Authority
First round	89.10	74.32	0.817
Second round	79.11	83.14	0.811

3.3. Analysis of coordination degree in two rounds

For both the first-level indicators and second-level indicators, the coordination degree in the first round was significantly different from that in the second round, with $P < 0.05$ (**Table 3**).

Table 3. Analysis of coordination degree in two rounds

Consultation rounds	Index	Weight	χ^2 value	*P*-value
First round	Level 1	0.498	37.221	< 0.05
	Level 2	0.628	50.331	< 0.05
Second round	Level 1	0.573	45.828	< 0.05
	Level 2	0.634	60.471	< 0.05

3.4. Screening evaluation indicators

The evaluation indicator system can be used to assess job competency. It is advisable to select evaluation indicators with high importance, and a total of 30 indicators is considered appropriate. After two rounds of expert consultation, based on threshold competencies and differentiating competencies, 2 first-level indicators, 5 second-level indicators, and 31 third-level indicators were constructed, as shown in **Tables 4** and **5**.

Table 4. Results of threshold competency weight values

First-level indicator	Weight	Second-level indicators	Weight	Third-level indicators	Weight
Threshold competencies	0.588	Skill	0.495	Clinical thinking skills	0.1206
				Research capabilities	0.1021
				Clinical teaching ability	0.0745
				Doctor-patient communication skills	0.1129
				Teamwork skills	0.1189
				Information management capabilities	0.0879
				Innovation	0.0791
				Lifelong learning ability	0.0979
				Crisis response	0.0778
				Clinical practice skills	0.1328
		Knowledge	0.509	Basic medical knowledge	0.2798
				Clinical medical knowledge	0.3385
				Natural science knowledge	0.1698
				Humanities and social sciences knowledge	0.2129

Table 5. Results of differentiating competency weight values

First-level indicator	Weight	Second-level indicators	Weight	Third-level indicators	Weight
Differentiating competence	0.416	Self-awareness	0.335	Self-control	0.1322
				Self-confidence	0.1569
				Self-awareness	0.1403
				Communication skills	0.1972
				Self-reflection ability	0.0136
				Time management skills	0.1098
				Stress resistance	0.1429
		Social role	0.356	Professional ethics	0.5178
				Professionalism	0.4829
		Traits and motivations	0.319	Responsibility	0.1439
				Willpower	0.1310
				Hard work	0.1089
				Careful and rigorous	0.1455
				Gratitude	0.1079
				Service awareness	0.1175
				Achievement need	0.1215
				Empathy	0.1268

4. Discussion

In higher education, master's degree students possess a relatively high level of cultural literacy, and their training quality directly impacts the quality of talent development [2]. Currently, there is a significant number of master's degree students, but talent cultivation measures are often one-sided, leading to varying levels of professional competency among them. Since 2015, the talent training model for degree master's students has adopted a "5+3" format, aiming to enhance their professional capabilities. However, this format suffers from chaotic rotation rules, inadequate assessment systems, and limited emphasis on clinical skills, thus exhibiting certain limitations [3].

Job competency serves as a metric to evaluate the work performance and environment of master's degree students. It comprises two primary components: explicit competency and implicit competency. Explicit competency, or threshold competency, covers skills and knowledge, representing the basic quality requirements for master's students. Conversely, implicit competency, or differentiating competency, encompasses values, motivations, attitudes, and personalities, distinguishing between average and excellent performers [4]. The characteristics of job competency include: (1) specificity, where different job positions have distinct competency requirements; (2) multidimensionality, encompassing both deep psychological qualities like motives and traits, as well as superficial qualities like knowledge and skills; (3) hierarchy, where multiple levels can be defined within a single job position, each with specific competency demands [5,6]; (4) dynamism, where students with high job competency can adapt to changing environments and proactively adjust their abilities; and (5) strategic importance, where job competency continuously enhances the core qualities of master's students,

aligning with organizational strategies. This novel competency theory promotes sustainable development for master's students in clinical medicine [7].

In this study, the Delphi method was employed for expert consultation, selecting experts with rich teaching experience in clinical medicine master's programs and involvement in teaching research and management. This approach provided a comprehensive understanding of master's students' job competency characteristics and their current training status [8]. The results indicated a high level of expert engagement, with a questionnaire recovery rate of 92.50% in the first round and 100.00% in the second round ($P < 0.05$). This suggests that experts reliably assign values to various evaluation indicators based on their practical and theoretical experiences. Using the Iceberg Model and the Onion Model as foundations, an evaluation index system model was constructed, and a basic framework for the evaluation index system was designed. The Iceberg Model organizes competency characteristics using a subconscious model, observing representative competency features above the sea level, mainly including explicit characteristics like knowledge and skills while implicit features lie below the sea level [9]. The Onion Model provides a layered interpretation of competency characteristics, encompassing surface features like knowledge and skills, and deeper implicit features such as self-cognition, social roles, traits, and motivations. These five forms, progressing from the outermost to the innermost layer, ensure the comprehensiveness and rigor of the evaluation indicators. Although these two models differ in their representation, they both comprehensively evaluate multiple elements of threshold and differentiating competencies [10]. The results showed that the authority levels of the first-level and second-level indicators in both rounds exceeded 0.8. Among the first-level indicators, the weight coefficient for threshold competency was 0.588, and for differentiating competency, it was 0.416. This indicates that the competency elements within the evaluation index system can assess master's students' job competency from multiple dimensions, ensuring strong scientific validity in the evaluation process. Evaluation indicators were screened using the coefficient of variation method and the direct scoring method. Indicators with direct scores in the bottom 8 positions and those with a coefficient of variation ≥ 0.25 were removed. Additionally, expert group discussions were organized to ensure consensus among experts on each indicator, based on the two rounds of consultation, before finalizing the deletion of indicators. These evaluation methods can identify master's students' job competency, predict their career development potential, and evaluate their professional abilities in multiple domains, thus exhibiting high value in constructing the indicator system [11].

5. Conclusion

In summary, constructing an evaluation index system for clinical medicine master's degree students based on job competency can comprehensively evaluate their talent characteristics, disciplinary features, and training models. Incorporating both superficial and intrinsic characteristics into the system enhances the systematicness, practicality, and comprehensiveness of the evaluation index system, making its construction reasonable.

Funding

Graduate Education and Teaching Reform Project of Baotou Medical College in 2023 "Research on the Quality Evaluation System for the Cultivation of Postgraduates in Clinical Medicine Professional Degree" (A-YJSJG202304)

Disclosure statement

The authors declare no conflict of interest.

References

[1] Wang D, Tang M, Liu B, et al., 2020, Analysis of Evaluation Elements for Professional Degree Master's Students Based on Job Competency. Health Vocational Education, 38(2): 4–6.

[2] Zhu S, Yang M, 2024, Research on Constructing an Evaluation System for Pediatric Professional Degree Master's Students with Job Competency as the Core. Chinese Continuing Medical Education, 16(13): 35–41.

[3] Wang Y, Xu A, Wang Y, et al., 2022, Construction of a Competency-Based Talent Quality Evaluation System for Clinical Professional Degree Graduate Students. Chinese Continuing Medical Education, 14(17): 160–163.

[4] Yue X, Zhang P, 2024, Investigation on Evidence-Based Practice Awareness and Training Model of Clinical Professional Degree Graduate Students. Journal of Henan University (Medical Edition), 43(3): 230–234.

[5] Li Y, Luo H, Gao J, 2024, Construction of a Job Competency Evaluation System for Professional Degree Master's Students in the Field of Clinical Pharmacy Based on the Delphi Method. China Medical Herald, 21(20): 100–104.

[6] Kuang L, Zhang Y, Bi X, 2024, A Qualitative Study on the Clinical Training Needs of Professional Master's Degree Students in Oral Nursing Based on Job Competency. Chinese Journal of Modern Nursing, 30(9): 1189–1194.

[7] Liu J, Chen S, Tao Y, et al., 2020, Improving the Training Model of Military Medical Professional Masters with a Focus on Job Competency Requirements. Medical Journal of National Defending Forces in Southwest China, 30(4): 351–353.

[8] Niu J, Zhu B, 2023, Problems and Countermeasures in the Standardized Training of Resident Doctors for Master's Degree Students in Clinical Medicine. Basic Medical Sciences and Clinics, 43(5): 857–860.

[9] Li H, Wang J, Zhang W, et al., 2022, Research on Clinical Practice Teaching of Tuina for Master's Degree Students in Acupuncture and Moxibustion Based on "Job Competency." Traditional Chinese Medicine Journal, 28(6): 194–197.

[10] Shen M, Zhou D, Jia J, et al., 2023, Research on the Practical Path of Optimizing the Training Model of Public Health Masters and Improving Job Competency. Chinese Journal of Disease Control & Prevention, 27(3): 307–312.

[11] Zhang H, Sun Q, Zong L, et al., 2022, Teaching Practice of Thoracic Surgery Rotation Training for Master's Degree Students in Clinical Medicine. Chinese Journal of Medical Education Research, 21(5): 517–520.