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Construction of a Comprehensive Competency Evaluation Index System for Master of Nursing Specialist Postgraduates

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Abstract: This study aimed to construct a comprehensive competency evaluation index system for Master of Nursing Specialists (MNS) postgraduates to support standardized assessment of training outcomes. A preliminary set of indicators was developed through literature analysis, semi-structured interviews, and group discussions, followed by a two-round Delphi survey to refine the indicators. The analytic hierarchy process was then applied to determine the weight of each indicator. Expert response rates reached 96% and 100% in the two rounds, with authority coefficients of 0.919 and 0.927, respectively. Kendall's W values were 0.171 and 0.289 (both $P<0.001$), reflecting strong consensus among experts. The finalized system consists of 6 first-level indicators—Moral Cultivation (0.1926), Professional Competence (0.1894), Theoretical Knowledge (0.1658), Practical Ability (0.2146), Social Engagement (0.1285), and Social Evaluation (0.1091)—along with 18 second-level and 52 third-level indicators. The resulting index system demonstrates scientific validity and practical utility, providing a structured tool for evaluating and fostering comprehensive competencies in MNS postgraduate training.

Keywords: master of nursing specialist, professional degree, comprehensive literacy, evaluating index

1. Introduction

In 2010, the Academic Degrees Committee of the State Council released the Guidelines for the Training of Master of Nursing Specialist (MNS) Graduate Students, formally establishing the Master of Nursing Specialist (MNS) degree program (Academic Degrees Committee of the State Council, 2010). By 2023, a total of 148 institutions nationwide had been approved to offer MNS graduate programs (Academic Degrees Committee of the State Council, 2023). However, with the continuous growth in the number of MNS students, how to scientifically evaluate their comprehensive competence has become an urgent and central issue in the fields of nursing education and nursing management (Park & Cho, 2021). In 2020, the Central Committee of the Communist Party of China and the State Council issued the *Overall Plan for Deepening the Reform of the Education Evaluation System in the New Era,* which emphasized the improvement of the educational evaluation system and the avoidance of one-sided practices that overemphasize intellectual development while neglecting moral education (World Health Organization, 2020). Comprehensive competence refers to the organic integration of knowledge, skills, attitudes, and values demonstrated by individuals in both professional domains and social activities, underscoring the systematic integration of multidimensional abilities. Nevertheless, existing research has mainly concentrated on single dimensions, such as core

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competence (American Association of Colleges of Nursing, 2021), clinical practice competence (Minty-Walker et al., 2023), and thinking skills (Minty-Walker et al., 2023), while lacking a holistic evaluation of the comprehensive competence of MNS students. This study aims to construct an evaluation index system for the comprehensive competence of MNS graduate students, providing a standardized evaluation tool to support their training, promote teaching and learning through assessment, and ultimately advance the high-quality and sustainable development of MNS education in China.

2. Research Methods

This study adopted a multi-stage mixed-methods approach to construct an evaluation index system for the comprehensive competence of MNS graduate students. First, a research team was established, and the division of responsibilities was clearly defined. Second, through a literature review and semi-structured interviews, a preliminary draft of the evaluation indicators for MNS graduate students' comprehensive competence was developed. Finally, two rounds of expert consultations were conducted on the preliminary draft to determine the specific contents of each indicator system. The research design flowchart is shown in Figure

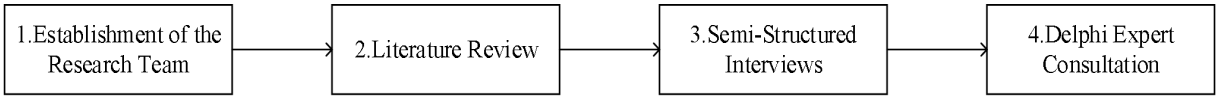

Figure 1 Research Design Flowchart

2.1 Establishment of the research team

The research team consisted of four members. One graduate supervisor with a senior professional title was responsible for research design and process management. Two clinical instructors with intermediate professional titles were responsible for distributing and collecting expert consultation forms. One doctoral student was responsible for literature review, expert interviews, as well as data organization and analysis.

2.2 Literature review

For the literature search, keywords such as nursing graduate students, professional degree, comprehensive competence, and evaluation index were used to search China National Knowledge Infrastructure (CNKI), VIP Database, and Wanfang Database. For the English-language search, keywords including master of nursing specialist, APN/APRN, comprehensive competency, and assessment methods were used to search Web of Science, CINAHL, and PubMed. The search timeframe covered all records from the inception of each database up to July 2024. Relevant information was extracted from the included studies, and indicators were summarized and refined with reference to guidelines, policies, and regulations related to MNS graduate education.

2.3 Semi-structured interviews

2.3.1 Interview experts

From September to October 2024, the snowball sampling method was applied to recruit participants engaged in nursing education, nursing management, and clinical teaching as interviewees. Inclusion criteria were as follows: (1) MNS graduate supervisors or clinical practice instructors; (2) intermediate professional title or above; (3) bachelor's degree or above; (4) at least 10 years of work experience; and (5) willingness to participate in the study. Exclusion criteria included the presence of severe physical or psychological illness. The sample size was determined based on information saturation, defined by the following criteria: (1) fewer than 5% of new themes emerging in three consecutive interviews; and (2) double-blind coding consistency reaching 90%. A total of 16 participants were ultimately included.

2.3.2 Interview outline

Based on the literature review, an interview outline was developed focusing on the following questions: "How would you evaluate the current status of the comprehensive competence of MNS graduate students in China?" "What comprehensive competences do you think MNS graduate students should possess?" "What are the differences in comprehensive competence between MNS graduate students and academic nursing graduate students?" "What shortcomings exist in the current evaluation of MNS graduate students' comprehensive competence?" and "What are your suggestions for improving the evaluation of MNS graduate students' comprehensive competence?" Face-to-face interviews were conducted following this outline. The results, combined with the literature review, were analyzed using Kirkpatrick's "4R" theoretical model (Lee & Song, 2021) and the iceberg model (McClelland, 1973) as frameworks. Through multiple rounds of group discussions, a preliminary draft of the evaluation system for the comprehensive competence of MNS graduate students was developed, encompassing six first-level indicators, eighteen second-level indicators, and fifty-two third-level indicators.

2.4 Delphi Expert Consultation

2.4.1 Selection of experts

The inclusion and exclusion criteria for Delphi experts were consistent with those applied to the interview participants. According to the requirements of the Delphi method, the sample size is typically set between 20 and 30 to ensure diversity of opinions while facilitating consensus (Manyara et al., 2024). In this study, both the first and second rounds of consultation included 22 experts, meeting the methodological requirements.

2.4.2 Implementation of expert consultation

Between November and December 2024, the consultation questionnaires were distributed and collected via email. After the first round of consultation, revisions, deletions, or additions were made to the questionnaire based on the following criteria: an average importance score greater than 4.0, a coefficient of variation (CV) less than 0.25 (Ansari et al., 2021), and expert feedback. This formed the basis for the second-round consultation questionnaire. Following the results of the second round, the evaluation indicators at all levels were further refined, ultimately producing the finalized evaluation system for the comprehensive competence of MNS graduate students.

2.5 Statistical methods

Data analysis in this study was performed using SPSS version 24.0. Categorical variables were expressed as frequencies and percentages, while continuous variables were expressed as mean ± standard deviation ($\bar{x}\pm s$). The reliability of the Delphi consultation was evaluated using the expert positivity coefficient, authority coefficient (Cr), coefficient of variation (CV), and Kendall's coefficient of concordance (Kendall's W). The weights of the indicators at each level were calculated using Yaahp 10.1 software. A p-value of less than 0.05 was considered statistically significant.

3. Results

3.1 General information of the experts

The Delphi experts were selected from eight universities (including national key nursing discipline construction units) and fifteen tertiary grade-A hospitals (all provincial-level or above clinical nursing specialty training bases) across 13 provinces and municipalities in Northeast, Northwest, North China, Central South, and Southwest China. This ensured the representativeness of the expert panel. General information about the experts is shown in Table 1.

Table 1 General Information of the Delphi Experts (n = 44)

Item	Number	Percentage (%)
Age (years)		
≤ 40	13	29.55
40–50	20	45.45
≥ 50	11	25.00
Gender		
Male	10	22.73
Female	34	77.27
Work experience (years)		
10–20	8	18.18
21–30	22	50.00
≥ 31	14	31.82
Education		
Bachelor's degree	16	36.36
Master's degree	26	59.09
Doctoral degree	2	4.55
Professional title		
Intermediate	8	18.18
Associate senior	26	59.09
Full senior	10	22.73
Supervisor role		
Non-master/PhD supervisor	10	22.73
Master's supervisor	30	68.18
Doctoral supervisor	4	9.09

3.2 Enthusiasm and authority of experts

In the first round of consultation, 23 questionnaires were distributed and 22 were returned, yielding a response rate of 96%. In the second round, 22 questionnaires were distributed, and all 22 were returned, achieving a 100% response rate, indicating a high level of enthusiasm among the experts. The authority coefficients (Cr) of the two rounds were 0.919 and 0.927, respectively, both higher than the commonly accepted threshold of 0.7, suggesting strong authority of the experts.

3.3 Degree of consensus among experts

The coefficients of variation (CV) for the two rounds of consultation ranged from 7% to 16%, all less than 25%, indicating a high level of consistency in expert opinions. Kendall's coefficients of concordance (W) for the two rounds were 0.171 and 0.289 ($P < 0.001$), respectively. According to the grading standards for concordance, the W value in the first round fell into the "weak" consensus range ($0.1 \leq W < 0.2$), while the second-round value increased to the "moderate" consensus level ($0.2 \leq W < 0.4$), demonstrating that the feedback mechanism effectively enhanced consensus among the experts. Details are presented in Table 2.

Table 2 Coordination Coefficients of Expert Opinions and Significance Testing

Indicator Level	Round 1			Round 2		
	Kendall's W	X^2	*P*	Kendall's W	X^2	*P*
First-level indicators	0.220	17.471	0.004	0.199	9.966	0.018
Second-level indicators	0.163	42.523	＜0.001	0.322	39.291	＜0.001
Third-level indicators	0.152	124.458	＜0.001	0.213	133.004	＜0.001
Overall	0.171	156.296	＜0.001	0.289	178.235	＜0.001

3.4 Finalization of evaluation indicators

Following the first round of expert consultation, 18 modification suggestions were raised. Based on the CV results and group discussions, the following adjustments were made: (1) five third-level indicators were deleted, including "organizational coordination competence," "nursing practice competence," "interdisciplinary integration competence," "theoretical knowledge of diseases," and "occupational protection"; (2) two second-level indicators and two third-level indicators were revised, including renaming "core qualities" to "professional qualities," "nursing management competence" to "nursing leadership competence," "teaching evaluation competence" to "teaching assessment and feedback competence," and "teaching implementation competence" to "teaching design and implementation competence"; (3) four new third-level indicators were added, namely "knowledge of medical equipment and technology," "resource management competence," "time and task management competence," and "emergency nursing rescue activities."

In the second round of consultation, two third-level indicators were revised and one new third-level indicator was added: "personal development competence" was revised to "career development planning competence," "stress management competence" was revised to "emotion and stress management competence," and "teaching resource development competence" was added.

The final evaluation system for the comprehensive competence of MNS graduate students consisted of six first-level indicators, eighteen second-level indicators, and fifty-two third-level indicators. The details are presented in Table 3.

Table 3 Evaluation Index System for the Comprehensive Competence of MNS Graduate Students

Indicator	Importance Score ($\bar{x} \pm s$)	CV	Full Score Ratio (%)	Weight
1. Moral Cultivation	4.71±0.54	0.11	68.18	0.1926
1.1 Political Literacy	4.73±0.46	0.10	72.73	0.0408
1.1.1 Political Attitude	4.63±0.57	0.12	63.64	0.0191
1.1.2 Organizational Discipline	4.68±0.57	0.12	72.73	0.0075
1.1.3 Values	4.55±0.60	0.13	59.09	0.0142
1.2 Professional Qualities	4.86±0.35	0.07	86.36	0.0817
1.2.1 Benevolence and Dedication	4.68±0.48	0.10	68.18	0.0114
1.2.2 Rigor and Conscientiousness	4.77±0.43	0.09	77.27	0.0233
1.2.3 Professional Identity	4.73±0.46	0.10	72.73	0.0320
1.2.4 Sense of Responsibility	4.59±0.50	0.11	59.09	0.0150
1.3 Personal Cultivation	4.72±0.46	0.10	72.73	0.0701
1.3.1 Self-respect and Self-love	4.68±0.48	0.10	68.18	0.0213

1.3.2 Courtesy and Civility	4.59±0.50	0.11	59.09	0.0279
1.3.3 Proper Appearance	4.70±0.47	0.10	72.73	0.0211
2. Professional Competence	4.68±0.35	0.13	86.36	0.1894
2.1 Humanistic Care Competence	4.82±0.39	0.08	81.82	0.0703
2.1.1 Privacy Protection	4.68±0.48	0.10	68.18	0.0061
2.1.2 Empathy	4.64±0.49	0.11	63.64	0.0320
2.1.3 Psychological Support	4.82±0.39	0.08	81.82	0.0322
2.2 Critical Thinking Competence	4.68±0.48	0.10	68.18	0.0628
2.2.1 Systematic Thinking	4.68±0.48	0.10	68.18	0.0205
2.2.2 Clinical Decision-making	4.73±0.46	0.10	72.73	0.0203
2.2.3 Evidence-based Nursing	4.77±0.43	0.09	77.27	0.0219
2.3 Self-management Competence	4.63±0.49	0.11	63.64	0.0399
2.3.1 Emotion and Stress Management	4.68±0.48	0.10	68.18	0.0082
2.3.2 Time and Task Management	4.73±0.46	0.10	72.73	0.0146
2.3.3 Career Development Planning	4.64±0.58	0.13	68.18	0.0171
2.4 Nursing Leadership Competence	4.68±0.48	0.10	68.18	0.0164
2.4.1 Cross-departmental Collaboration	4.64±0.58	0.13	68.18	0.0037
2.4.2 Team Management and Empowerment	4.68±0.65	0.14	72.27	0.0052
2.4.3 Resource Management	4.68±0.48	0.10	68.18	0.0075
3. Professional Knowledge	4.64±0.51	0.14	72.73	0.1658
3.1 Clinical Specialty Knowledge	4.68±0.48	0.10	68.18	0.0891
3.1.1 Specialized Nursing Knowledge	4.63±0.58	0.13	68.18	0.0447
3.1.2 Advanced Health Assessment	4.59±0.50	0.11	59.09	0.0261
3.1.3 Complex Disease Management	4.68±0.48	0.10	68.18	0.0183
3.2 Interdisciplinary Knowledge	4.68±0.48	0.11	68.18	0.0467
3.2.1 Pharmacology and Pathophysiology	4.73±0.46	0.13	72.73	0.0202
3.2.2 Public Health and Epidemiology	4.63±0.58	0.13	68.18	0.0156
3.2.3 Knowledge of Medical Equipment and Technology	4.59±0.59	0.13	63.64	0.0109
3.3 Management Systems and Ethics	4.73±0.46	0.10	72.73	0.0299
3.3.1 Clinical Management Systems	4.68±0.48	0.10	68.18	0.0106
3.3.2 Quality and Safety Systems	4.55±0.51	0.11	54.54	0.0109
3.3.3 Nursing Ethics	4.64±0.49	0.11	63.64	0.0084
4. Practical Ability	4.82±0.46	0.13	81.82	0.2146
4.1 Clinical Practice Ability	4.68±0.48	0.10	68.18	0.0816
4.1.1 Basic Nursing Skills	4.82±0.50	0.10	86.36	0.0114
4.1.2 Specialized Nursing Skills	4.86±0.35	0.07	86.36	0.0301
4.1.3 Communication and Collaboration	4.77±0.53	0.11	81.82	0.0400
4.2 Emergency Response Ability	4.77±0.43	0.09	81.82	0.0320
4.2.1 Preventive Competence	4.68±0.65	0.14	77.27	0.0109
4.2.2 In-situ Handling	4.73±0.55	0.12	77.27	0.0115
4.2.3 Post-event Management	4.64±0.66	0.14	72.73	0.0096
4.3 Scientific Research and Innovation	4.82±0.50	0.10	86.36	0.0630

4.3.1 Basic Research Ability	4.77±0.53	0.11	81.82	0.0256
4.3.2 Clinical Innovation	4.82±0.39	0.08	81.82	0.0218
4.3.3 Translational Research	4.72±0.55	0.12	77.27	0.0155
4.4 Clinical Teaching Ability	4.73±0.46	0.10	77.27	0.0379
4.4.1 Teaching Design and Implementation	4.64±0.73	0.16	77.27	0.0122
4.4.2 Clinical Assessment and Feedback	4.68±0.65	0.14	77.27	0.0136
4.4.3 Teaching Resource Development	4.59±0.73	0.16	72.73	0.0120
5. Social Participation	4.59±0.46	0.11	72.27	0.1285
5.1 Public Welfare Practice	4.73±0.46	0.10	77.27	0.0698
5.1.1 Health Education and Promotion	4.64±0.49	0.11	63.64	0.0315
5.1.2 Emergency Nursing Rescue	4.59±0.50	0.11	59.09	0.0231
5.1.3 Care for Special Populations	4.55±0.51	0.11	54.54	0.0151
5.2 Research Practice	4.68±0.48	0.10	72.27	0.0586
5.2.1 Innovation and Entrepreneurship	4.59±0.59	0.13	63.64	0.0310
5.2.2 Scientific and Technological Innovation	4.45±0.67	0.15	54.54	0.0276
6. Social Evaluation	4.63±0.50	0.10	68.18	0.1091
6.1 Hospital Evaluation	4.68±0.57	0.12	72.73	0.0507
6.1.1 Departmental Evaluation	4.41±0.59	0.15	45.45	0.0299
6.1.2 Peer Evaluation	4.45±0.51	0.11	45.45	0.0208
6.2 Patient Evaluation	4.73±0.55	0.12	77.27	0.0583
6.2.1 Work Attitude	4.55±0.51	0.11	59.09	0.0356
6.2.2 Technical Level	4.45±0.60	0.13	50.00	0.0227

4. Discussion

4.1 Scientific analysis of the evaluation index system for MNS graduate students' comprehensive competence

This study employed literature analysis, interviews, and group discussions to initially construct the item pool for evaluating the comprehensive competence of MNS graduate students. Two rounds of Delphi consultation were conducted with experts of wide geographical and institutional coverage, characterized by high authority and good coordination. Ultimately, six first-level indicators, eighteen second-level indicators, and fifty-two third-level indicators were finalized. Among them, "Moral Cultivation" and "Professional Competence" correspond to the reaction level of Kirkpatrick's "4R" model, "Professional Knowledge" corresponds to the learning level, "Practical Ability" and "Social Participation" correspond to the behavior level, and "Social Evaluation" corresponds to the results level. Furthermore, the progression from moral cultivation to social evaluation reflects the transition from implicit qualities to explicit capabilities in the iceberg theory (Figure 2). This evaluation system reflects the comprehensive competence of MNS graduate students from multiple perspectives, stages, and levels, demonstrating strong scientific rigor.

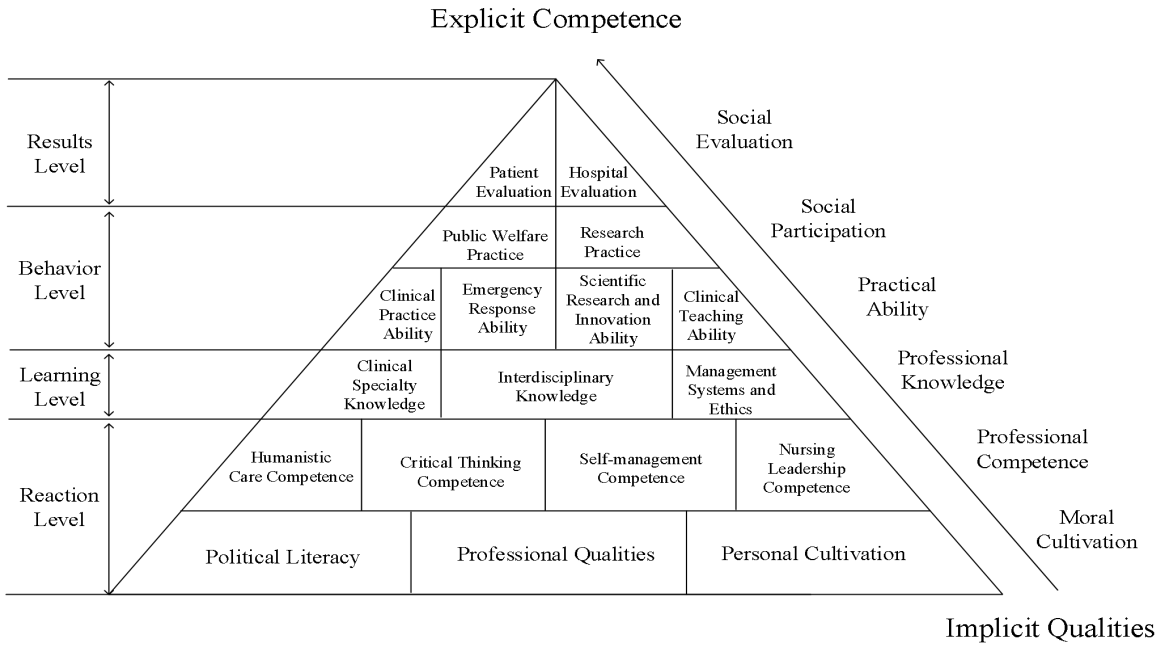

Figure 2 Model of the Evaluation Index System for the Comprehensive Competence of MNS Graduate Students

4.2 Content analysis of the evaluation index system

From the content of the evaluation index system, "Practical Ability" received the highest weight, with "Clinical Practice Ability" and "Scientific Research and Innovation Ability" ranking highest among the second-level indicators. The establishment of MNS education aims to cultivate high-level, application-oriented nursing professionals, where clinical practice ability is not only the core of training but also the key feature of job competency (Forber et al., 2016). Meanwhile, research and innovation ability, as another crucial factor, directly influences the advancement of nursing as a discipline (Hedges & Williams, 2022). "Moral Cultivation" and "Professional Competence" ranked second in weight. Emphasizing the cultivation of professional spirit and values in nursing students, and including moral cultivation as an important indicator, holds long-term significance in ensuring the stability of the nursing workforce, improving nursing quality, and promoting the development of the profession (Park & Cho, 2021). "Professional Competence" ranked third, with "Humanistic Care Competence" as the most weighted second-level indicator. The National Nursing Development Plan (2021–2025) also explicitly emphasizes strengthening humanistic care in nursing services. Therefore, the cultivation of MNS graduate students should transcend traditional disciplinary boundaries to integrate natural sciences and humanities. On the other hand, "Professional Knowledge" received relatively low weight, mainly because MNS students have already acquired systematic theoretical knowledge during their undergraduate education. As for "Social Participation" and "Social Evaluation," the former highlights the social orientation of professional development, enabling graduate students to address real health care needs and enhance their ability to solve public health problems through diverse practice activities. The latter adopts a dual-assessment mechanism involving both hospitals and patients, where hospitals emphasize professional standards and patients focus on humanistic service, reflecting a "demand-oriented, outcome-based" training concept consistent with the goals of professional degree education.

4.3 Practical value of the evaluation index system

The evaluation index system constructed in this study demonstrates significant practical application value. By establishing multiple evaluation entities (including supervisors, clinical instructors, peers, and self-assessment) and quantifying weights (indicator weight × score), the system standardizes, digitizes, and dynamically manages the evaluation process. It can not only provide a scientific and objective assessment of graduate students' comprehensive competence but also supply precise data support for training institutions. This, in turn, guides the optimization of MNS training programs and enhances the overall quality of professional nursing education.

Conclusion

Based on Kirkpatrick's "4R" model and the iceberg theory, this study constructed an evaluation index system for the comprehensive competence of MNS graduate students using literature analysis, semi-structured interviews, and expert consultation. The system demonstrates strong scientific validity and feasibility, providing a standardized, quantitative tool for assessment, evaluation, and training of MNS students' comprehensive competence. It offers insights for cultivating distinctive nursing graduate talent and provides a China-specific training model and pathway for the development of advanced practice nurses.

Conflict of interest

The authors declare that they have no conflicts of interest in this work.

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