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Research into the Construction and Application Effectiveness of a Job Competency Training System for Geriatric Care Personnel Based on the "Medical-Educational Integration" Model

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Abstract

To establish a standardized competency training system for geriatric care personnel based on the "medical-educational integration" model and evaluate its effectiveness in enhancing job competency, a mixed-methods research design was employed as following. First, the status quo of job competency and training needs among geriatric care personnel in Deyang City (a major city in southwestern China) were systematically analyzed through literature review, questionnaire survey (n=360), semi-structured interviews, and expert consultation. Second, guided by the "integration of medical and educational resources" philosophy, a standardized training system covering three dimensions— "knowledge, skills, and emergency response"— was developed in collaboration with hospitals, academic institutions, and elderly care industry associations. An "Intelligent Industry-Academia-Research Training Platform for Elderly Health Care" was henceforth established. Finally, 120 caregivers underwent a 6-month systematic training program. A pre-post self-comparison design was employed to assess differences in theoretical knowledge, operational skills, emergency response capabilities, and professional value perception before and after training. Results showed baseline surveys revealed that caregivers were predominantly female (78.5%), with 73.5% holding a high school diploma or lower. Awareness of emergency care stood at only 18.3%, while knowledge of rehabilitation care was a mere 12.5%. Post-training, theoretical knowledge, operational skill, professional value perception and emergency response capability scores all increased, from (65.3 ± 12.1) to (86.7 ± 8.5) points ($P < 0.001$); (58.6 ± 14.3) to (82.4 ± 9.2) points ($P < 0.001$); (42.5 ± 15.6) to (78.9 ± 11.3) points ($P < 0.001$); (3.2 ± 0.8) to (4.1 ± 0.6) points (on a 5-point scale, $P < 0.001$) respectively. Training satisfaction

reached 92.5%. In conclusion, the competency training system for geriatric care personnel, developed based on the "medical-educational integration" model, could significantly enhance caregivers' professional knowledge, skill proficiency, emergency response capabilities, and occupational identity. This approach represents an effective pathway to improve regional elderly care service quality.

Keywords: medical-educational integration, elderly care services, care personnel, job competency, training system, effectiveness evaluation

1. Background

As China's population ages at an accelerated pace, demand for elderly care services has surged dramatically, posing significant challenges to the nation's long-term care system (H. Song et al., 2022). Projections indicate that during the 14th Five-Year Plan period, China's population aged 60 and above will exceed 300 million, marking the transition into a moderately aged society (Wang, n.d.). Concurrently, the number of elderly individuals with disabilities or dementia is projected to rise from 43.75 million in 2020 to 91.4 million by 2050 (Liang Wen Zhang & Fang, 2021). According to internationally recognized standards, the ideal caregiver-to-disabled-elderly ratio should be 3:1, which implies China requires 13 million care workers correspondingly. However, the actual workforce numbers are less than 500,000, with only about 20,000 certified professionals, indicating a massive talent gap (Liu & Tu, n.d.). Moreover, internationally, caregiver turnover rates have long been regarded as a key indicator of care quality (Gandhi et al., 2021).

The elderly care industry currently faces a dual predicament: on one hand, a severe shortage of personnel; on the other, concerns about the professional competence of existing staff. Surveys indicate widespread issues among care workers, including low educational attainment, inadequate professional skills, and diminished sense of professional value, making it difficult to meet the growing demand for high-quality care among the elderly (Cheng, 2018). Professor. Zhang Liangli points out that inadequate training mechanisms and an incomplete training system are the root causes of lagging professional talent development (Xu et al., 2020). Concurrently, relevant research clearly indicates that it is essential to center on "nursing-type institutions" and fully leverage smart elderly care to provide precise services for the elderly (Han et al., 2021).

"Medical-educational integration," as a novel talent cultivation model integrating medical and educational resources, offers new insights for addressing these challenges. Cheng Guiling et al. established an integrated "medical-nursing-eldercare" model through university-enterprise collaboration, creating a five-in-one training system encompassing talent cultivation, talent incubation, industry research, professional training, and skill certification (Cheng, 2018). Research by Li Mengchu et al. indicates that robust platforms and institutional support are needed to enhance pre-elderly individuals' awareness and participation in "Internet + Elderly care Services" (Meng Chu Li et al., 2022; An Qi Li, 2017). However, studies on constructing and evaluating standardized competency training systems for elderly care personnel under the "medical-education integration" model remain scarce.

Based on a survey of the status quo of elderly care personnel in Deyang City, this study collaborates with hospitals, educational institutions, and elderly care industry associations to establish a standardized training system covering three dimensions: knowledge, skills, and emergency response. An intelligent training platform is developed to systematically evaluate its effectiveness in enhancing the job competency of care personnel, hoping to provide a replicable practical model for regional elderly care talent development.

2. Research Methods

2.1 Research Design

This study employs a mixed-methods design comprising two phases:

Phase I (System Development): Analyze the status quo and training needs of caregivers through literature review, questionnaire surveys, semi-structured interviews, and expert consultation to establish a standardized training system.

Phase II (Effectiveness Evaluation): Conduct a quasi-experimental study using a pre-post self-control design to evaluate the effectiveness of the training system.

2.2 Research Participants

2.2.1 Baseline Survey Participants

Using convenience sampling, elderly care personnel from 3 communities, 3 municipal public hospitals, and 3 private elderly care institutions in Deyang City were selected as survey participants between July and December 2023. Inclusion criteria: ① Age ≥ 18 years; ② ≥ 3 months of experience in elderly care work; ③ Voluntary participation in this study.

2.2.2 Training Intervention Participants

120 caregivers who volunteered for systematic training were recruited from the baseline survey participants. Inclusion criteria: ① Completion of baseline survey; ② Ability to commit to full participation in the 6-month training program; ③ Informed consent from participants.

2.3 Training System Development Methodology

2.3.1 Evidence-Based Literature Review

Systematically searched databases including CNKI, Wanfang Data, VIP, and PubMed to review domestic and international literature from the past 5 years on elderly care competency framework development and job competency assessment (Layton et al., 2022), extracting core elements for the training system.

2.3.2 Questionnaire Survey

Developed the "Elderly Health and Wellness Care Personnel Job Competency Survey Questionnaire," comprising two sections:

General Information: Gender, age, years of experience, education level, income, etc.

Care Competency: 22 items across 4 dimensions: Theoretical Knowledge (4 items), Basic Skills (4 items), Emergency Response in Daily Scenarios (6 items), and Other Items (8 items). A 5-point Likert scale was used (1 = Strongly Disagree, 5 = Strongly Agree), with higher scores indicating stronger job competency. The questionnaire underwent expert review by five specialists, achieving a content validity index of 0.89. A pre-test yielded a Cronbach's α coefficient of 0.86.

2.3.3 Field Research and Semi-Structured Interviews

Purposive sampling was employed to select 15 caregivers (5 each from community settings, hospitals, and elderly care institutions) for semi-structured interviews. The interview outline included questions such as: “What are the greatest challenges you encounter in your daily work?” “What areas of training would you most like to receive?” and “What suggestions do you have regarding training formats and duration?” All interviews were audio-recorded, transcribed, and analyzed using Colaizzi's seven-step method to extract themes.

2.3.4 Expert Consultation

Ten experts in elderly care (4 geriatric care specialists, 3 nursing education experts, 2 care facility managers, 1 healthcare IT specialist) participated in two rounds of Delphi expert consultation (Yin et al., 2025) to evaluate and refine training content, formats, and assessment criteria. The expert authority coefficient was 0.85, with both consultation rounds achieving 100% active participation.

2.4 Training System Content

Based on preliminary research and expert consultation, a standardized “three-dimensional integrated” training system is established:

2.4.1 Training Content

Knowledge System: Theoretical knowledge of common chronic diseases (hypertension, diabetes, coronary heart disease, etc.), physiological characteristics of the elderly and medication safety, mental health care.

Skill System: Basic nursing techniques (bathing, repositioning, back percussion, sputum clearance, nasogastric feeding, urinary catheter care), VTE prevention procedures, rehabilitation exercise guidance, and elderly facility usage.

Emergency Response: Protocols for handling incidents such as falls, aspiration, sudden illness, and fire incidents.

2.4.2 Training Formats

Online Platform: Establish the “Smart Industry-Academia-Research Training Platform for Elderly Health Care,” developing digital resources including micro-videos, online courses, and digital question banks to support fragmented learning.

Offline Practical Training: Conduct bi-monthly centralized skill training and assessments at nursing training centers affiliated with medical colleges.

Clinical Practice: Clinical observation and job shadowing in geriatric and rehabilitation departments of partner hospitals.

2.4.3 Training Cycle and Assessment

Training duration: 6 months (July–December 2024). Assessment components:

Process Assessment: Online tests upon completing each module.

Final Assessment: Written exam (closed-book) + practical skills evaluation + scenario-based simulation exercises.

Pre-employment Assessment: Successful candidates receive a training certificate jointly issued by the hospital, academic institution, and elderly care industry association, serving as proof of job eligibility.

2.5 Evaluation Metrics

The following metrics are assessed before and after training:

Theoretical Knowledge: Standardized closed-book examination, maximum score 100 points.

Operational Skills: Five core skills—bathing, repositioning, back tapping, nasogastric feeding, and urinary catheter care—are assessed by expert evaluators on-site. Scores are averaged, with a maximum of 100 points.

Emergency Response Capability: Scenario-based simulations simulate sudden falls, aspiration, and cardiac arrest. Experts score responses based on procedural compliance and timeliness, with a maximum of 100 points.

Professional Value Perception: Assessed using a self-developed questionnaire comprising five items (e.g., “I find my work meaningful,” “I take pride in my caregiving role”), scored on a five-point scale with the mean value recorded.

Training Satisfaction: Evaluated post-training via a self-designed survey covering content design, instructor quality, platform experience, and overall satisfaction, rated on a five-point scale.

2.6 Statistical Analysis

Data analysis was performed using SPSS 26.0 software. Quantitative data are expressed as mean ± standard deviation ($\bar{x} \pm s$). Paired t-tests were used for pre- and post-training comparisons. Qualitative data are presented as frequencies and percentages (%). $P < 0.05$ was considered statistically significant.

3. Research Findings

3.1 Baseline Survey Results

3.1.1 Demographic Characteristics of Caregivers

A total of 380 questionnaires were distributed, with 360 valid responses collected, yielding a

valid response rate of 94.7%. General demographic findings: Among the 360 respondents, 282 were female (78.5%) and 78 were male (21.5%); Age distribution: 85 respondents (23.6%) under 30 years old, 196 (54.4%) aged 31–50, and 79 (22.0%) over 50 years old; Educational attainment: 265 respondents (73.5%) with education below high school, 76 (21.1%) with high school/vocational school education, and 19 (5.4%) with college education or higher; Years of Experience: <1 year: 98 (27.2%); 1-3 years: 156 (43.3%); >3 years: 106 (29.5%). See Table 1 for details.

Table 1. Baseline Survey of Caregiver Demographics

Demographic Characteristics	Category	Number of Cases	Percentage (%)
Gender	Female	282	78.5
	Male	78	21.5
Age	Under 30	85	23.6
	31-50	196	54.4
	50+	79	22.0
Education	Below High School	265	73.5
	High School/Vocational School	76	21.1
	College/University or Higher	19	5.40
Years of Experience	<1 year	98	27.2
	1-3 years	156	43.3
	>3 years	106	29.5

3.1.2 Status Quo of Job Competency

The awareness rates across dimensions are shown in Table 2. Results indicate that caregivers demonstrate relatively high awareness in basic nursing procedures (66.5%), but significant deficiencies exist in mental health (36.5%), medication safety (36.7%), emergency care (18.3%), and rehabilitation care (12.5%). Regarding emergency response capabilities in daily scenarios, only 3.3% of caregivers self-rated their proficiency as “excellent.”

Table 2. Awareness Rates of Caregivers' Job Competency Dimensions (n=360)

Dimension	Item	Number of Respondents (n)	Awareness Rate (%)
Theoretical Knowledge		239	66.5
	Daily Living Care	131	36.5
	Mental Health Care	167	46.5
	Prevention and Care of Common Diseases	167	46.5
	Daily Living Care	132	36.7
	Safe Medication Use	149	41.5
Basic Skills		131	36.5
	Fundamental Technical Care	66	18.3
	Safety Care	45	12.5
	Emergency Care	12	3.3
	Rehabilitation Therapy Care	81	22.6
Emergency Response		133	36.9
	Excellent	134	37.2

3.2 Training Effectiveness Evaluation

3.2.1 Comparison of Competencies Before and After Training

A total of 120 caregivers completed the training program. The comparison of assessment scores before and after training is shown in Table 3. Post-training, caregivers demonstrated significant improvements (P<0.001) in four competency areas: theoretical knowledge, operational skills, emergency response capabilities, and professional value perception, as illustrated in Figure 1 & 2.

Table 3. Comparison of Caregiver Competencies Before and After Training ($\bar{x}\pm s$), Points

Indicator (n=120)	Before Training (n=120)	After Training (n=120)	*t*	*P*
Theoretical Knowledge	65.3 ± 12.1	86.7 ± 8.5	-18.324	<0.001
Operational Skills	58.6 ± 14.3	82.4 ± 9.2	-16.897	<0.001
Emergency Response Capabilities	42.5 ± 15.6	78.9 ± 11.3	-22.156	<0.001
Sense of Professional Value	3.2 ± 0.8	4.1 ± 0.6	-10.235	<0.001

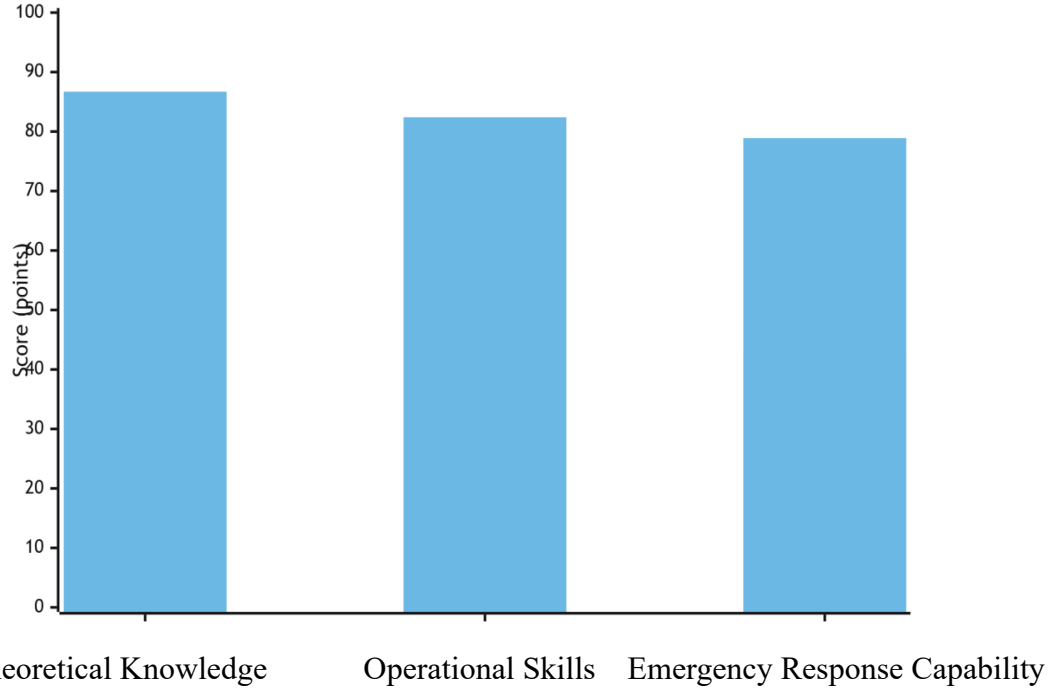

Figure 1. Comparison of Caregivers' Competency Scores Before and After Training

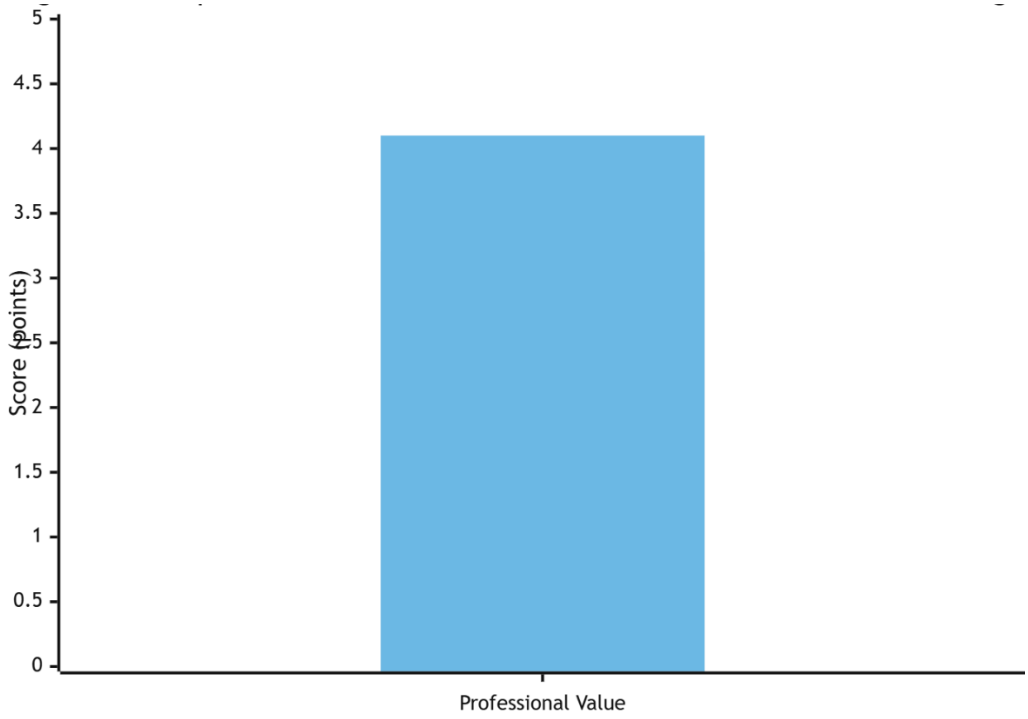

Figure 2. Comparison of Professional Value Scores Before and After Trainin

3.2.2 Training Satisfaction

Following the training, a satisfaction survey was conducted among 120 participants, with results shown in Table 4. Overall satisfaction reached 92.5%, with the highest satisfaction rating for instructor quality (95.0%) and relatively lower satisfaction with the platform experience (88.3%). This indicates a need for further optimization of the online platform experience in future sessions.

Table 4. Training Satisfaction Survey Results (n=120)

Dimension	Number of Satisfied Individuals (n)	Satisfaction Rate (%)
Content Design	110	91.7
Faculty Quality	114	95.0
Platform Experience	106	88.3
Overall Satisfaction	111	92.5

4. Discussion

4.1 The Current Competency Status of Elderly Care Workers in the Regin Is Not Encouraging, and Training Needs Are Urgent

The baseline survey of this study revealed several prominent issues within the current elderly care workforce: First, the phenomenon of "low educational attainment and high age" is widespread, with 73.5% holding a high school diploma or lower, and 22.0% aged 50 or older, consistent with findings from multiple domestic studies (Yang et al., n.d.); Second, there is a severe lack of professional knowledge and skills. Only 18.3% are familiar with emergency care, and only 12.5% are familiar with rehabilitation care. A staggering 74.1% self-assess

their emergency response capabilities as "poor" or "average." This situation is concerning and directly threatens the quality and safety of elderly care. As Zhang Liangwen et al. (2021) noted, the contradiction between the rapidly increasing number of elderly with disabilities and the shortage of professional caregivers has become a major bottleneck constraining the development of elderly care services. Therefore, establishing a scientific and systematic training system (Gulline et al., 2025) to rapidly enhance the job competency of existing care personnel is an urgent necessity to overcome the current challenges (Aleo et al., 2024).

4.2 "Medical-Educational Integration" Training System Could Significantly Enhance Caregivers' Job Competency

The training system developed in this study centers on "medical-educational integration," integrating hospital resources (clinical experts, practice bases), academic teaching resources (training centers, curriculum development), and industry association resources (standard setting, accreditation). This achieves seamless integration between theoretical instruction and clinical practice (Si et al., 2021). After six months of systematic training, caregivers demonstrated significant improvements in theoretical knowledge, operational skills, and emergency response capabilities ($P<0.001$). These outcomes align with the competency model for professionals in smart elderly care institutions reported by Y. Song et al. (2022), adequately validating the effectiveness of this model.

Notably, the enhancement in emergency response capabilities was most pronounced (scores increased from 42.5 to 78.9). This improvement stemmed from the training system's emphasis on scenario-based simulations. By recreating real-life situations such as falls, aspiration, and cardiac arrest (Pongtriang et al., 2024), trainees learned through hands-on practice, effectively overcoming the traditional training pitfall of prioritizing theory over practice (Yu et al., n.d.; Jing Zhang, n.d.). Concurrently, the rise in perceived professional value (from 3.2 to 4.1 points) indicates that systematic training and professional recognition bolster caregivers' occupational identity (Yeh et al., 2025). This holds significant implications for stabilizing the elderly care workforce and reducing attrition rates (Lin et al., 2023).

4.3 Intelligent Platforms Provide Robust Support for Fragmented Learning

The "Intelligent Industry-Academia-Research Training Platform for Elderly Health Care" established in this study digitizes and modularizes training resources, enabling learners to engage in self-directed study during fragmented time slots. This effectively resolves the "work-study conflict" faced by working professionals. Diverse formats—including micro-videos, online courses, and digital question banks—accommodate varied learning preferences. With an 88.3% satisfaction rate, the platform demonstrates broad learner acceptance of this innovative approach. As Li Anqi (2017) noted, promoting the "Internet Plus Elderly Care Services" model requires multi-departmental collaboration. This study provides a successful example of implementing this concept through tripartite cooperation among medical institutions, educational institutions, and industry.

4.4 Innovation and Practical Value of the Study

The innovation of this study lies in: First, its novel perspective, focusing on the hot topic of

elderly care talent cultivation and systematically introducing the concept of "medical-educational integration" into caregiver training. Second, its rigorous methodology, employing a mixed-methods design that organically combines literature review, questionnaire surveys, qualitative interviews, expert consultation, and quasi-experimental research. Third, its transferable outcomes, as the established training system, intelligent platform, and evaluation standards possess strong replicability and promotional value.

4.5 Limitations and Future Directions

This study has the following limitations: First, the effectiveness evaluation relied solely on pre-post self-comparisons without a concurrent control group, potentially introducing confounding factors such as historical effects. Second, the follow-up period was relatively short, failing to assess the long-term sustainability of training effects (Perruchoud et al., 2021). Third, the sample was exclusively from Deyang City, necessitating caution when extrapolating conclusions. Future studies should employ randomized controlled designs with extended follow-up periods and collaborated hospital cooperative studies to evaluate the long-term impact of training on geriatric care outcomes, such as pressure ulcer incidence, fall rates, and quality of life.

5. Conclusion

The competency training system for elderly care personnel, developed based on the "integration of medical and educational resources" model, could significantly enhance caregivers' professional knowledge, operational skills, emergency response capabilities, and sense of professional value. This is achieved by integrating resources from hospitals, educational institutions, and industry associations through a blended training approach combining online and offline formats (Carrier et al., 2023). This model provides a replicable and scalable practical pathway for regional elderly care talent development, holding significant practical implications for enhancing service quality and proactively addressing population aging in China and across the world.

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Author contributions

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Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Macrothink Institute.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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