

A Study on the Construction and Implementation Effectiveness of a Higher Vocational Nursing Talent Development Model Based on the 1 + X Certificate System

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Abstract: *Objective:* To explore the methodology for constructing a talent development model integrating the 1 + X Certificate System into vocational nursing internship teaching, as well as to assess the effectiveness of this approach. *Methods:* A quasi-randomized controlled trial design was employed. A total of 280 vocational nursing students who were undertaking internships at a tertiary Grade-A hospital in Sichuan Province between May 2024 and March 2025 were recruited and randomly assigned, using a random number table, into an experimental group (n = 140) and a control group (n = 140). The control group received conventional internship teaching instruction, while the experimental group was taught using a curriculum-certificate integration training model based on the 1 + X Certificate System. The theoretical scores, clinical practical skills, clinical thinking abilities, and course evaluation outcomes were compared between the two groups. *Results:* The experimental group demonstrated significantly higher scores than the control group in theoretical knowledge, total clinical practical skills score, total clinical thinking ability score, and course evaluation score ($p < 0.05$). *Conclusion:* Integrating the 1 + X Certificate System into vocational nursing internship teaching can effectively enhance nursing students' theoretical knowledge, practical skills, and clinical thinking abilities, and thus holds potential for broader application.

Keywords: Higher vocational nursing program; 1 + X certificate system; Talent development model

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1. Introduction

Amid the accelerating aging of the population and the evolving demand structure for healthcare services, there is a growing societal need for highly skilled nursing professionals. In this context, to align nursing talent development models with the rapid developmental trends within the healthcare industry, it is essential

to reform and innovate traditional approaches to cultivating high-caliber nursing professionals ^[1,2]. The conventional higher vocational nursing education model primarily focuses on academic education, while practical skills and job-specific competency development remain relatively inadequate, making it difficult to fully meet the diverse demands of clinical practice ^[2]. The “1 + X Certificate System” implemented by the Chinese government for vocational education is designed precisely to enhance the quality of vocational education, thereby injecting new vitality into higher vocational education and creating favorable development opportunities. Under this system, the “1” represents an academic degree certificate—serving as proof of a student’s completion of higher vocational nursing education and reflecting the fundamental standards for talent development; the “X” denotes various vocational skill level certificates, encouraging nursing professionals to enhance their multifaceted professional competencies beyond the completion of their academic studies; these certificates also serve as strong credentials of their diverse professional capabilities ^[3,4]. The effective implementation of this system aims to deepen school-enterprise collaboration and integrate industry with education. By facilitating the alignment of academic qualifications with vocational certifications, this approach equips nursing students with stronger employability, thereby meeting the high demands that contemporary society places on nursing professionals. During their clinical training at hospitals, nursing students should not only master their core professional knowledge and establish a solid theoretical foundation in nursing but also obtain various vocational qualification certificates—such as the Elderly Care Certificate, which is in increasing demand amid the aging population trend, as well as certificates in Health Management and Rehabilitation Nursing—thereby enhancing their professional competence and practical skills within the specific nursing fields to which these certificates apply. This approach enables them to better adapt to the complex and ever-changing demands of contemporary nursing practice ^[5,6]. Consequently, it is necessary to reform the current talent development model for the nursing profession by deeply integrating it with the “1 + X Certificate System” to effectively improve teaching efficacy. This paper primarily investigates the effectiveness of the talent development model for higher vocational nursing programs under the “1 + X Certificate System”; the findings are reported below.

2. Materials and methods

2.1. Research subjects

Using convenience sampling, a total of 280 higher vocational nursing students who were interning at a tertiary Grade-A hospital in Sichuan Province between May 2024 and March 2025 were recruited. These students were randomly assigned to either an experimental group or a control group, with 140 students in each group. There were no statistically significant differences between the two groups in baseline characteristics such as gender, age, or academic performance ($p > 0.05$), indicating comparability between the groups; all participants consented to participate in this study.

2.2. Teaching methods

2.2.1. Control group

The control group received the traditional teaching methodology:

(1) Pre-class preparation

Using the “LXT” APP, the hospital-based clinical instructors should assign students pre-class preparatory tasks, enabling them to gain an early understanding of the key teaching points of the course,

identify the critical and challenging concepts to be covered in class, and prepare for subsequent classroom learning.

(2) Classroom instruction

The clinical instructors should systematically explain professional theoretical knowledge in the classroom based on nursing textbooks. For the Basic Nursing course, the principles, procedures, and precautions associated with nursing procedures should be elaborated in detail; for example, the principle of intravenous infusion involves the relationship between liquid static pressure and human venous pressure—this should be explained by the instructor using blackboard writing, PowerPoint presentations, or other appropriate methods to help interns understand the underlying theory. For courses such as Medical Nursing and Surgical Nursing, the instructor should introduce the etiology, clinical manifestations, diagnostic methods, and nursing interventions for various conditions in a systematic manner, categorized by disease type. When teaching cardiac nursing, the instruction should cover different types of cardiac disorders—such as coronary artery disease and cardiomyopathy—and incorporate relevant clinical cases to provide students with a more intuitive understanding of the material.

(3) Practical observation

Students are arranged to accompany their clinical instructors into hospital clinical departments for practical observation sessions. In the ward, the instructor should demonstrate various nursing procedures—such as catheterization and oxygen therapy—on the spot, while students observe; the instructor should emphasize key procedural points and standard practices as they perform the procedures. During these clinical department observations, students should follow their clinical nurse to observe actual nursing workflows, including routine patient care and patient condition monitoring. For example, in a surgical ward, students should observe the actual implementation of nursing procedures such as postoperative wound care and drainage tube management. Students should also engage in independent practice under the guidance of their teachers to master the course content.

(4) After-class homework for consolidation

Teachers should assign appropriate written assignments that cover a variety of question types, which helps students reinforce the theoretical knowledge acquired in class. For example, a case study involving a diabetic patient can be presented, requiring students to analyze the nursing challenges and develop a nursing care plan—thereby enhancing their ability to apply the knowledge in practice. Students may also engage in self-directed learning using the Xuexitong APP. Additionally, regular theoretical examinations should be conducted to assess students' intermediate learning outcomes and encourage continuous learning. Furthermore, a certain number of practical assignments should be assigned, allowing students to apply the nursing skills learned in class during clinical practice in hospitals, with teachers providing on-site guidance and evaluation.

2.2.2. Experimental group

The experimental group was assigned the vocational nursing talent cultivation model under the 1+X Certificate System.

(1) Development of a curriculum system that integrates academic courses with professional certifications.

① Talent Development Program Development. The 1+X Certificate System should serve as a guiding framework and benchmark for adjusting the current talent development programs for higher vocational

nursing programs. These programs should be tailored to meet the current demands for nursing professionals as identified by institutions such as our hospital, clearly defining the specific skills that nursing practitioners need to master. The adjustment of nursing talent development programs should be based on the standards outlined in certification requirements for fields such as maternal and infant nursing and elderly care; this process requires the collaborative participation of both the hospital and the educational institution. For example, for the Elderly Care Certification program, the criteria for obtaining the certificate should be integrated into the nursing professional internship curriculum system to ensure effective alignment between teaching standards and certification requirements. The structure of course hours should be adjusted to incorporate additional specialized theoretical and practical teaching components in the relevant modules, and the assessment mechanisms for academic courses should be aligned with those for relevant skill-level certifications, thereby facilitating the integration of academic credentials and professional certifications. This approach enables nursing students to obtain both an academic degree and multiple tiered professional certifications, fostering the development of versatile, technically skilled nursing professionals who possess both academic qualifications and practical expertise. ② Curriculum System Development. Since many certificates do not correspond to a single course—often resulting in overlapping between course content and certificate-based training content—it is essential to develop supporting learning resources and teaching materials in strict accordance with the certificate standards. This involves incorporating certificate-related content not covered in conventional academic education and optimizing both the instructional content and the course structure. For example, in a geriatric nursing course, content such as the use of rehabilitation assistive devices for elderly patients and care techniques for seniors with dementia should be added in line with the Professional Competence Level Certificate for Geriatric Care Standards, ensuring that the course content precisely aligns with the actual demands of the industry. Additionally, specialized certificate training course modules should be developed; for popular “X” -certificates—such as those in maternal and infant care or emergency nursing—experienced physicians from the relevant fields should be invited to deliver intensive lectures, providing detailed explanations of key examination points, standardized skill operation procedures, and case study methodologies. This approach ensures the seamless integration of vocational skills training content with general course material, enabling students to complete their certificate-based training even through traditional classroom instruction.

(2) Faculty development

To effectively implement the nursing education program under the “1 + X Certificate System,” it is essential to have nursing instructors with enhanced professional capabilities, which entails higher qualifications and competencies for these educators. Such instructors should possess a thorough understanding of current professional practice requirements, demonstrate strong ability to integrate certification processes into their teaching, and be well-versed in the examination standards and procedures for relevant professional qualification certificates. However, in practice, such instructors are scarce; therefore, it is necessary to strengthen the existing nursing faculty within hospitals. First, existing hospital nursing instructors should be trained to deepen their knowledge of the latest advancements in their respective fields and to familiarize themselves with the job competency standards associated with these certification programs. Hospitals should also revise their assessment criteria for nursing instructors by incorporating instructors’ skill levels into their evaluation frameworks, thereby motivating them to adapt their teaching

practices and place equal emphasis on both instructional delivery and certification processes. During the training of nursing instructional instructors, professionals from the elderly care sector and experts responsible for certifying these qualifications should be invited to provide specialized technical and skill-based training as well as practical guidance to enhance their teaching capabilities. Key nursing staff should be selected for targeted training focused on the vocational skill level standards, enabling them to master the core content and educational objectives of these certifications, clarify the specific assessment requirements, and integrate the relevant certification standards and content into their professional teaching practices. Additionally, through school-enterprise partnerships, nursing instructors can be dispatched to elderly care facilities or other relevant organizations for learning, communication, and rotational practical experience, thereby enhancing their professional practice skills and vocational competencies.

(3) Teaching Practice

① Theoretical instruction: In the theoretical teaching component of the nursing program, information technology resources and tools should be fully leveraged to implement a blended learning approach through the integration of curriculum and certification training. The “Xuexitong” APP can be utilized to optimize core nursing courses by uploading relevant certification-related teaching materials and content to this platform, enabling students to engage in self-directed online learning via the platform. For example, when optimizing the existing core nursing courses, content related to geriatric care should be incorporated; this allows students to study geriatric care practice videos and related knowledge anytime and anywhere during their free time. A question bank for obtaining the Basic Geriatric Care Certificate should be compiled and analyzed, and the textbook content within this bank should be restructured and systematized to establish a foundational question bank for the institution’s geriatric care curriculum. To expand the scope of this question bank, questions relevant to the National Nurse Professional Qualification Examination should be curated, with those that are pertinent to geriatric care extracted and the resulting question bank uploaded to the platform, enabling students to conduct self-assessment on theoretical knowledge through the online platform. For in-person classroom instruction, hospitals should collaborate with educational institutions to develop offline teaching materials and other resources; through classroom teaching by faculty members, students can systematically master the skills and knowledge related to geriatric care, thereby acquiring the practical operational competencies required in this field. ② Practical Teaching: In line with the teaching content and educational requirements, a practical training base shall be established through collaboration between hospitals and educational institutions; this base will be utilized for the time-based development and assessment of relevant clinical skills. As a result, nursing students will not only be able to participate in routine clinical rotations within hospitals but also engage in the actual implementation of home care, community nursing, and other related programs conducted at other healthcare facilities. During their clinical practice, students shall receive on-site guidance from both specialized nursing professionals at these institutions and hospital-based clinical instructors. The practical training base shall be developed in accordance with the requirements and certification standards for geriatric care, featuring a standardized patient training center, a modern nursing practical training center, and simulated home wards; for the Maternal and Infant Nursing Certification program, a dedicated Maternal and Infant Nursing Room shall be established, enabling students to undertake rotational clinical practice under the supervision of various specialized clinical instructors within the department. Within this authentic hospital clinical environment, students can practice basic nursing procedures firsthand; however, for high-complexity nursing tasks—

such as emergency procedures in the Intensive Care Unit (ICU)—students shall undergo repeated practice in simulated training rooms, thereby enhancing their proficiency in performing nursing interventions and improving their ability to respond to emergent situations. At this training base, both curricular skill training and certification-based skill assessments shall be conducted simultaneously.

2.3. Evaluation methodology

During the entire teaching period, nursing students shall maintain thorough observation records and be assessed and compared against the following metrics: their theoretical assessment scores (on a 100-point scale), their clinical practice competency scores (including dimensions such as nursing assessment, diagnosis, and implementation), their clinical thinking skills before and after the teaching intervention, and the Nursing Curriculum Evaluation Questionnaire.

2.4. Statistical methods

Statistical analysis was performed using SPSS 26.0 software; *t*-tests and χ^2 -tests were employed. Measurement data were expressed as mean $\pm$ standard deviation ($\bar{x} \pm s$), while categorical data were presented as [n (%)]. A *P*-value < 0.05 was considered statistically significant.

3. Results

3.1. Comparison of theoretical assessment results between the experimental group and the control group among nursing students

The theoretical scores in the experimental group were significantly higher than those in the control group ($p < 0.001$); detailed results are presented in **Table 1**.

Table 1. Comparison of theoretical assessment results between the two groups of nursing students ($\bar{x} \pm s$)

Group	n	Theoretical assessment score (points)	Classroom assessment full mark rate (%)
Test team	140	88.94 $\pm$ 2.80	92.19 $\pm$ 3.81
Control group	140	76.94 $\pm$ 3.31	79.81 $\pm$ 4.78
<i>t</i>	-	17.714	13.642
<i>p</i>	-	< 0.001	< 0.001

3.2. Comparison of clinical practice competence between the experimental group and the control group among nursing students

The experimental group demonstrated higher scores in nursing diagnoses, nursing assessments, health education, nursing interventions, and total scores compared to the control group ($p < 0.05$); detailed results are presented in **Table 2**.

Table 2. Comparison of clinical practice competency assessment scores between the two groups of nursing students ($\bar{x} \pm s$, points)

Group	n	Nursing diagnosis and plan	Nursing assessment	Health guidance	Nursing implementation	Total points
Test team	140	22.80 $\pm$ 2.01	22.94 $\pm$ 1.13	23.48 $\pm$ 1.32	23.64 $\pm$ 1.36	89.59 $\pm$ 5.45

Control group	140	19.12 ± 1.25	20.67 ± 1.15	20.20 ± 1.49	19.07 ± 1.48	78.96 ± 5.79
t	-	5.132	4.864	8.652	7.849	12.594
p	-	< 0.05	< 0.05	< 0.001	< 0.001	< 0.001

3.3. Comparison of clinical thinking skills between the experimental and control groups of nursing students before and after teaching intervention

There was no statistically significant difference in clinical thinking ability scores between the first two groups before intervention ($P > 0.05$); after intervention, the scores across all dimensions and the total score in the experimental group were significantly higher than those in the control group ($p < 0.05$); detailed results are presented in **Table 3**.

Table 3. Comparison of clinical thinking skills between the two groups of nursing students before and after teaching ($\bar{x} \pm s$, points)

Group	n	Seeking the truth		Open-mindedness		Analyzing ability		Systematic capability	
		Before Teaching	After Teaching	Before Teaching	After Teaching	Before Teaching	After Teaching	Before Teaching	After Teaching
Test team	140	34.05 ± 5.26	46.40 ± 5.67	38.24 ± 5.46	45.19 ± 5.94	35.46 ± 5.90	42.74 ± 5.82	36.14 ± 5.31	42.92 ± 7.82
Control group	140	33.67 ± 5.14	35.42 ± 6.16	37.85 ± 5.03	39.54 ± 6.88	34.22 ± 5.85	36.27 ± 6.29	35.88 ± 4.99	37.61 ± 7.64
t	-	0.411	9.873	0.399	4.605	1.121	5.497	0.569	3.618
p	-	> 0.05	< 0.001	> 0.05	< 0.001	> 0.05	< 0.001	> 0.05	< 0.001

Continued

Group	n	Critical thinking confidence		Thirst for knowledge		Cognitive maturity		Total points	
		Before Teaching	After Teaching	Before Teaching	After Teaching	Before Teaching	After Teaching	Before Teaching	After Teaching
Test team	140	33.84 ± 5.65	42.96 ± 5.44	42.10 ± 6.24	46.62 ± 6.60	38.81 ± 6.70	43.69 ± 5.91	259.32 ± 20.15	310.15 ± 21.22
Control group	140	32.64 ± 5.23	34.55 ± 6.26	40.58 ± 5.92	42.82 ± 6.95	38.09 ± 6.05	39.97 ± 6.87	253.19 ± 19.78	266.04 ± 20.91
t	-	1.652	8.862	1.305	2.894	0.592	3.013	1.605	10.942
p	-	> 0.05	< 0.001	> 0.05	< 0.05	> 0.05	< 0.001	> 0.05	< 0.001

3.4. Comparison of curriculum evaluation between the experimental group and the control group among nursing students

The total course evaluation score in the experimental group was significantly higher than that in the control group ($p < 0.001$); detailed results are presented in **Table 4**.

Table 4. Comparison of nursing curriculum evaluation scores between the two groups ($\bar{x} \pm s$, points)

Group	n	Content learning	Course value	Behavioral learning	Personal understanding	Total points
Test team	140	31.47 ± 3.21	27.99 ± 1.82	31.32 ± 3.04	27.36 ± 3.14	118.09 ± 6.28

Control group	140	26.84 ± 2.76	22.17 ± 1.62	26.61 ± 2.81	23.62 ± 2.31	102.35 ± 5.80
<i>t</i>	-	7.986	8.013	8.317	7.136	10.361
<i>p</i>	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

4. Discussion

In the cultivation of nursing professionals at higher vocational institutions, the talent development model under the “1 + X Certificate System” offers the following advantages.

4.1. Enhances the effectiveness of theoretical knowledge acquisition

When implementing this system, hospitals need to restructure their nursing professional internship curriculum frameworks by integrating the theoretical knowledge covered by the certification into conventional nursing curricula, enabling students to acquire a broader and more comprehensive range of nursing theoretical knowledge ^[7,8]. Furthermore, the process of restructuring the curriculum framework significantly improves its hierarchical structure and makes it more modular; within such a framework, students can progressively master nursing professional knowledge. Additionally, to simultaneously facilitate both certification-based learning and professional training in the teaching process, diverse instructional resources are incorporated into the curriculum content. Students can not only acquire relevant knowledge through online learning platforms but also gain richer theoretical understanding by utilizing case study repositories, instructional videos, and other materials ^[9,10]. Offline, through collaboration between the hospital and other professional organizations, students can access the latest theoretical advancements, thereby building a more extensive theoretical knowledge base. In this study, the experimental group achieved superior scores in theoretical assessments compared to the control group ($p < 0.05$), which directly demonstrates this advantage.

4.2. Enhancing clinical practice competence

Under this teaching model, hospitals can establish deep collaborations with other specialized healthcare institutions, enabling students to gain opportunities to participate in real-world clinical projects at these institutions, as well as to acquire and develop relevant clinical skills at dedicated training bases. For example, in the field of geriatric care, students can directly engage with communities to provide nursing care to elderly individuals, thereby honing their practical skills. Alternatively, they can perform and practice nursing procedures in simulated environments using various virtual scenarios and equipment, which helps enhance their clinical practice competence ^[11–12]. In this study, the experimental group demonstrated higher scores in the clinical practice competence assessment ($p < 0.05$), which aligns with this advantage.

4.3. Cultivating clinical thinking skills

In the certificate-based training programs offered by the hospital, instructors consistently incorporate a large number of real-world hospital cases into their teaching. This enables students to develop nursing care plans based on actual case studies, assess changes in patients’ conditions, and implement specific nursing interventions within the clinical training facility—thereby applying theoretical knowledge in practice, examining clinical problems from multiple perspectives, and ultimately effectively honing their clinical thinking skills ^[13,14]. The experimental group demonstrated significantly stronger clinical thinking skills after

the intervention ($p < 0.05$), effectively demonstrating the advantage of this teaching approach.

4.4. Higher nursing course evaluations

This teaching model primarily requires instructors to continuously enhance their professional competencies, thereby improving the quality of instruction. As a result, this teaching approach is more targeted and practical, making it easier for students to understand the material and leading to higher student evaluations. In this study, the experimental group received higher course evaluations ($p < 0.05$), which aligns with this advantage.

5. Conclusions

In conclusion, implementing the nursing talent cultivation model under the “1 + X Certificate System” for training vocational nursing professionals can enhance their clinical practice skills and theoretical knowledge mastery, effectively foster their clinical thinking abilities, and ultimately yield superior evaluation outcomes for nursing curriculum assessments.

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