

Higher Vocational Nursing Students' Clinical Core Competence in China: A Cross-Sectional Study

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Abstract

Introduction: Understanding the clinical core competence of nursing students in higher vocational colleges is crucial for adjusting the nursing core curriculum and training of nursing professionals. However, little is known about the level of clinical core competence of higher vocational nursing students in China.

Objective: To investigate nursing students' clinical core competence in the school of nursing and health at a vocational and technical college in Guangdong, China.

Methods: The Core Competency Scale for Registered Nurses in China was used to evaluate the clinical core competence of higher vocational nursing students from February to March 2022. Data were analyzed by descriptive statistics, Mann-Whitney *U* test and Kruskal–Wallis test.

Results: A total of 1,120 nursing students were investigated, 1,069 were valid questionnaires, and the response rate was 95.4%. The total score of core competence score of higher vocational nursing students was 176.55 ± 43.95 , only 43.3% of students obtained an overall score more than 178, and 47.7% of students scored between 116 and 178 scores. The lowest score was on critical thinking and scientific research (2.72 ± 0.77) following by clinical nursing (2.85 ± 0.80), which had differences in gender, category of students, and years of study. There were differences in the total average score of core competence in terms of gender and category of students. Leadership and interpersonal relationships differ significantly by gender, while professional development, teaching, and coaching differ significantly by category of student.

Conclusions: The findings revealed the core competence of higher vocational nursing students is at a medium level. Moreover, critical thinking and scientific research, and clinical nursing ability are significantly insufficient.

Keywords

Nursing students, higher vocational education, core competence, cross-sectional study

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Introduction

Core competence is the basic ability in people's career besides the specialized ability of the post, which is applicable to all kinds of occupations, can adapt to the constant change of the post, and is a lifelong sustainable development ability (Holmes & Hooper, 2000; Javidan, 1998). In the competency-based education system conducted by the United States, Australia, Singapore, and other developed countries, core competency-based professional education is an indispensable part (Misko, 2006). However, China's vocational education is still in the primary stage, and many systems are not perfect, including core competence system (Wu & Ye, 2018; Xue & Li, 2022).

Nurses are an important profession to protect human health, making irreplaceable contributions to preventing

diseases, maintaining health, relieving pain, and promoting health (Iriarte-Roteta et al., 2020). Due to the complexity of the clinical nursing work environment and the particularity of patients, it is necessary to have the corresponding clinical core competence to provide high-quality professional services for patients and meet the clinical postdemand (Willman et al., 2020). Clinical core competency of nurses

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is vital to the nursing profession, which guarantees the high quality and effectiveness of delivered care and maintains the social value and status of the nursing profession (Chen, 2010; Fukada, 2018). For example, the nurses have the abilities: Using the research, professional awareness, ethical values, tutorial functions, professional leadership, educational interventions, management of care processes, understanding of human beings and communication, critical thinking and evaluation, judgment of clinical presentation (Lee et al., 2017; Notarnicola et al., 2018). In 2003, the concept of nursing core competence was first mentioned in China including the ability of health assessment, communication, health care guidance and health education, the ability of proficient computer basic operation and a certain ability of English application, the ability of emergency treatment and cooperation in rescue of critically ill patients, the ability to implement holistic nursing for nursing objects, the ability to treat common diseases, frequent diseases and drug reactions should be able to observe, have the nursing ability of geriatric nursing, community nursing and other professional directions (Ministry of Education General Office, 2003). Liu et al. emphasized that core competence was the ability level of nurses to organically combine knowledge, skills and attitudes in clinical practice, and constructed a framework of core competence for nurses in China, including critical thinking/scientific research, clinical nursing, education/consultation, interpersonal relations (communication), leadership (management), legal/ethical practice, and professional development (Liu et al., 2008). At present, nursing courses in vocational college in China mainly involve professional basic courses, such as health assessment, human anatomy, physiology, biochemistry, pathology, nursing etiquette, and interpersonal communication. And professional core courses were included such as basic nursing, internal medicine nursing, surgical nursing, obstetrics and gynecology nursing, pediatric nursing, geriatric nursing, nursing management, nursing ethics, and law to cultivate students' core competency.

Facing complex problems such as critical patient care, ethical decision-making, nurse-patient disputes, nurses with clinical core competence can analyze and judge the problem, and even make an accurate decision (Allande-Cussó et al., 2022; Butts & Rich, 2022; Wang et al., 2020). With core competencies, nurses are better able to adapt to changes in the environment, process information and communicate effectively, even avoid conflict. Moreover, these nurses are confident in the development of the nursing profession. Nowadays, the rise in chronic diseases and the problem of an ageing population have led to dramatic changes in the global medical industry, posing new and greater challenges to the capabilities of nurses (Chang et al., 2019; Vos et al., 2015). According to the clinician of the future report 2022, clinical precision decision-making, information processing, adaptability, and communication skills will become the core competencies of future nurses (Elsevier 2022).

Literature Review

At present, research works on the core competence of nurses mainly focused on the evaluation tools and methods of the

core competence of nurses, influencing factors, and training approaches (Chan et al., 2020; Flinkman et al., 2017; Goniewicz et al., 2021; Rizany et al., 2018; Rutledge et al., 2021; Wang et al., 2022; Wu et al., 2021). Tools for measuring nurses' core competencies are evolving. Different countries have their own tools, some of which are more complex and specific, others more concise (Flinkman et al., 2017). Wu et al. (2021) developed the infectious disease Nurse's Core competence scale, and the framework of scale included: Professional development abilities, infection prevention and control abilities, nursing abilities for infectious diseases, professionalism and humanistic accomplishment, and responsiveness to emergency infectious diseases. In Sweden, the Ambulance Nurse Competence (ANC) scale was designed, consisting of 8 factors: nursing care, value-based nursing Care, medical technical care, care environment's community, care Environment's serious events, leadership management, supervision and professional conduct, and research and development (Nilsson et al., 2020). Chan et al. (2020) used the Delphi approach to determine nurse practitioner (NP) core competencies with forty-nine items core competences, which refined and reduced redundancy in the NP core competencies of the National Organization of College of Nurse Practitioners (NONPF) and the American Association of Colleges of Nursing (AACN) through the consensus of NP practice experts.

Previous studies showed that there were six factors affecting the development of nursing competence: Work experience, type of nursing environment, educational level achieved, adherence to professionalism, critical thinking, and personal factors (Rizany et al., 2018). Marriage and good relationship quality can potentially improve nursing and midwifery professionals' core competence (Wang et al., 2022). A study demonstrated that it is important to train nurses through basic education and continued education with awareness of achievement and improvement of clinical nursing competency. Basic education should promote the ability to make clinical training experience meaningful and continuing education should enable nurses to continue to grow independently through reflection (Yamamoto et al., 2021). Previous studies have shown that strengthening the education and training of core competence can improve the core competence of nurses or nursing students (Falcó-Pegueroles et al., 2021; Forneris, 2012; Klotz et al., 2022; Mangan et al., 2022; Mao et al., 2021). Considering the core competence of nursing postgraduates is very important, Hicks et al. (2018) set up the core curriculum matching with professional competence, and strengthened and standardized the training of primary nursing graduate students. Competency-based education in transitional NP students from education into practice, the results of the study showed the improvement of students' basic knowledge, skills and attitudes (Hodges et al., 2019). A quasiexperimental study indicated that Team-based learning can improve clinical competence skills, communication competence, and

self-leadership, which is an effective approach method to teaching core competencies in nursing education (Lee, 2018). There are many studies on the core competence of nurses with different specialties, and there are differences in the proportion of each dimension of core competence, such as intensive care unit nurses (Wei et al., 2019), infectious disease management nurses (Li et al., 2021), midwives (Li et al., 2022). The researches mainly focus on undergraduate students, graduate students, clinical nurses, and nurse administrators.

However, there are limited research works on the core competence of nursing students in vocational colleges. Since the expansion of vocational education in China, the number of nursing students in higher vocational education has increased significantly. The diversity of students leads to the uneven quality of nursing students and the cultivation of students' core competence is full of challenges for educators. Therefore, the purpose of this study is to investigate the core competence of higher vocational nursing students, analyze the existing problems, and put forward countermeasures to provide a theoretical basis for nursing educators to implement education and teaching.

Methods

Study Design and Setting

A cross-sectional study was designed to assess the core competence of higher vocational nursing students from February to March 2022. This study was conducted in a Humanities and Social Sciences program in the School of Nursing and Health of a private vocational college in Guangdong. At the time of data collection, a total of 3,843 nursing students are enrolled, including students receiving regular education in school (sophomores) as well as students on internships in the hospital (juniors).

Research Questions

1. What is the level of core competence of nursing students in higher vocational colleges?
2. Are there differences in core competence of nursing students in higher vocational colleges in terms of gender, year of study, and category of students?

Sampling

The specific formula of sample size for cross-sectional survey (Taherdoost, 2017): $n = Z_{1-\alpha/2}^2 \times p \times (1-p) / \delta^2$, among them, n is the sample size, δ is the margin of error 0.03, $Z_{1-\alpha/2}$ was fractional bits of the standard normal distribution of significance levels, $Z_{1-\alpha/2} = 1.96$, p is the proportion of high core competence of position. Thirty students who meet the inclusion criteria are randomly selected for the pre-survey, and the result shows that $p = .5$. Therefore, sample

size $n = 1.96^2 / 0.05^2 \times 0.5(1-0.5) \approx 1067$. Considering the rejection rate and the effective rate of the questionnaire, the sample size is expanded by 5%, and the expected sample size is 1,120.

Inclusion/Exclusion Criteria

Nursing students from the second to third year were included in the school of Nursing and Health at the vocational college in Guangdong, China. The researchers considered that first-year students have not yet been exposed to the core curriculum of nursing and lack relevant education and teaching activities. Therefore, these first-year students were excluded from the study. A total of 1,120 students (from second to third year) were randomly selected from 2,626 students. In order to ensure adequate representation and reduce the sampling error, students in each class are randomly selected. Specifically, stratified random sampling was used to identify a sample, consisting of 1357 sophomores (receiving regular education in school) and 1,269 juniors (internship). Finally, a total of 1,120 nursing students agreed to participate in this study comprising 636 second-year students and 484 third-year students.

Data Collection

The questionnaire includes basic information and core competence of nursing students. The basic information such as age, gender, year of study, and category of students was included in the online version of the investigation. The online version of Core Competency Scale for Registered Nurses in China (CCSRNC) compiled by Liu Ming et al. (2008) was used to assess the clinical core competence of nursing students. This scale contains a total of 58 items from 7 dimensions, including 10 items for critical thinking and scientific research, 9 items for clinical nursing, 10 items for leadership, 8 items for interpersonal relations, 8 items for legal ethics practice, 6 items for professional development, and 7 items for teaching-coaching. The 5-point Likert scale (0–4 points) was used for measurement, with totally incapable (0), partially incapable (1), average (2), capable (3), and very capable (4). The higher the score, the stronger the ability. When the recommended item score is more than 3, it means that the core competence is good. An individual overall score above 178 is regarded as high core competence, 116–178 as moderate core competence, and less than 116 as low core competence. The Cronbach's α value of the scale was 0.89, the Cronbach's α value of the 7 dimensions was 0.79–0.86, the reliability of repeated measurement at 2 weeks interval was 0.83, the criterion validity was $r = .44$, $p = .04$, and the construct validity was $p < .05$. Moreover, the internal structure is highly consistent with the theoretical framework. Therefore, the CCSRNC has good reliability and validity. The online version of the questionnaire was administered by the first author and set

mandatory items, otherwise it cannot be submitted to avoid incomplete or missing data. Then, the first author published an online questionnaire, and students could choose a smartphone, tablet, or computer to access questionnaire.

Ethical Considerations

This research is investigative research on education, which meets the conditions for exemption from ethical review and has obtained the application for exemption from ethical review from the college. The first author makes a request to the Dean of the School of Nursing stating the purpose of the research and, with written permission, contacts the counselor to communicate with the student. The purpose of the study and the method of test were elucidated to the students by face-to-face communication and their consent was obtained. All those who consented to participate were provided with two-dimensional code to access the inventory online, asked to carefully read the informed consent form online, and sign an electronic written informed consent before self-assessment. It is emphasized that students voluntarily participate in this study and fill out the questionnaire anonymously about 5 to 10 minutes.

Statistical Analysis

Descriptive statistics were carried out. Specifically, categorical data were expressed as the frequency and percentage, while quantitative data were described as mean and standard deviation (SD). Seven CCSRNC subscales were tested by Shapiro-Wilk normality. Independent t-test was utilized to determine the statistically significant differences regarding gender, students' category, and years of study for normally distributed data. Nonparametric tests such as Mann-Whitney *U* Test and Kruskal-Wallis Test were conducted for Non-normally distributed data. The two-sided α test was 0.05, and the *p* value <.05 indicates statistical significance. Data was analyzed using SPSS software Version 21.0 (SPSS, Chicago, Illinois, USA).

Results

Sample Characteristics

Finally, a total of 1069 students were identified from 1120 participants, the response rate of evaluation is 95.4% (Figure 1). Fifteen participants dropped out of the study because the questionnaire was too long. There were 24 students in the process of filling in the questions due to network problems resulting in incomplete data, resulting in automatic submission. Twelve participants filled out the same options in all items, which were deemed invalid. Students' average age was 20.77 years, ranging from 18 to 25 years old. Most students were females, 973 (91.0%). There were 612 students (57.2%) in the second year and

457 students (42.8%) in the third year. About the category of students, 597 students (55.8%) were from technical secondary school while 472 (44.2%) were from senior high school. 43.3% of students have high core competencies, while 47.7% of students have moderate core competences (Table 1).

Research Question Results

The total score of core competence of higher vocational nursing students was 176.55 ± 43.95 , and the overall mean score for core competency is 25.22 ± 6.28 , as shown in Table 2. Except for two subscales, critical thinking, and scientific research, and clinical nursing, which had average scores below 3.0, indicating the low ability, other five subscales had average scores above 3.0. The score of the highest items was found in legal and ethics practice (3.39) closely followed by professional development (3.22) and interpersonal relations (3.15). The lowest score was found on critical thinking and scientific research (2.72). The

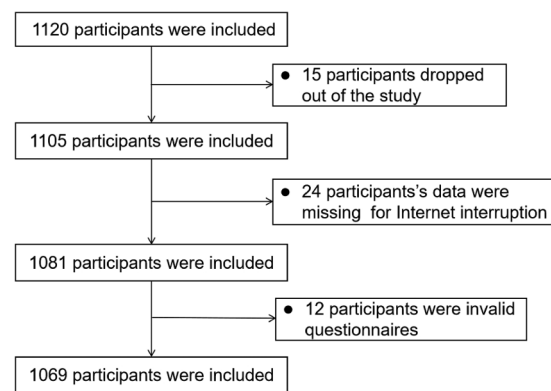


Figure 1. Participants inclusion flow chart.

Table 1. Demographic and Educational Characteristics, and Core Competence (*n* = 1,069).

	Frequency	Percentage (%)
Age (mean \pm SD)	20.77	1.24
Gender		
Male	96	9.0
Female	973	91.0
Year of school		
Second year	612	57.2
Third year	457	42.8
Category of students		
Technical secondary school	597	55.8
Senior high school	472	44.2
Core competence		
Low	96	9.0
Moderate	510	47.7
High	463	43.3

second lowest score was in clinical nursing (2.85) followed by teaching-coaching (3.05) and leadership (3.08).

For the overall scale, only 42.6% of students scored more than the recommended point of 3. For teaching and coaching (G), 40.5% of students received scores more than the recommended point of 3. Also, 43.8% of students scored more than the recommended 3 points in leadership (C). Similarly, regarding interpersonal relations (D), 46.9% of participants scored above the cut-off point of 3 (see Figure 2). Likewise, 48.8% of students scored more than 3 in the professional development (F). Specially, 57.4% of students scored more than the recommended point of 3 on legal and ethics practice (E). In contrast, in critical thinking and scientific research (A), a high proportion of participants (71.7%) scored less than the recommended score of 3. Equally, 67.4% of participants scored equal or below 3 on clinical nursing (B).

The results of the normality test found that the score of each dimension was non-normally distributed data, so non-parametric test was used to compare the core competence of different characteristics. Table 3, Mann-Whitney *U* test was used to examine the differences of core competence scores for gender, category of students, and years of study, respectively. Compared with female students, male students had higher overall core competence scores ($Z=2.106, p<.05$), critical thinking and scientific research ($Z=2.860, p<.001$), clinical nursing ($Z=2.744, p<.001$), leadership ($Z=2.107, p<.05$), interpersonal relations ($Z=2.085, p<.05$). Comparing with the students from senior high school, the students from the technical secondary school had higher overall score ($Z=3.197, p<.001$), critical thinking and scientific research ($Z=7.059, p<.001$), clinical nursing ($Z=4.073, p<.001$), professional development ($Z=1.945, p<.05$),

Table 2. Scores of CCSRNC Inventory and Ranking of Vocational Nursing Students ($n=1,096$).

Subscale	Dimensions mean \pm SD	Items mean \pm SD	Ranking
Critical thinking and scientific research (10)	27.17 \pm 7.73	2.72 \pm 0.77	7
Clinical nursing (9)	25.65 \pm 7.24	2.85 \pm 0.80	6
Leadership (10)	30.76 \pm 8.40	3.08 \pm 0.84	4
Interpersonal relations (8)	25.20 \pm 6.80	3.15 \pm 0.85	3
Legal and ethics practice (8)	27.15 \pm 7.43	3.39 \pm 0.93	1
Professional development (6)	19.29 \pm 5.31	3.22 \pm 0.89	2
Teaching-coaching (7)	21.33 \pm 6.36	3.05 \pm 0.91	5
Total (58)	25.22 \pm 6.28	3.06 \pm 0.76	-

Note: CCSRNC = Core Competency Scale for Registered Nurses in China; SD = standard deviation.

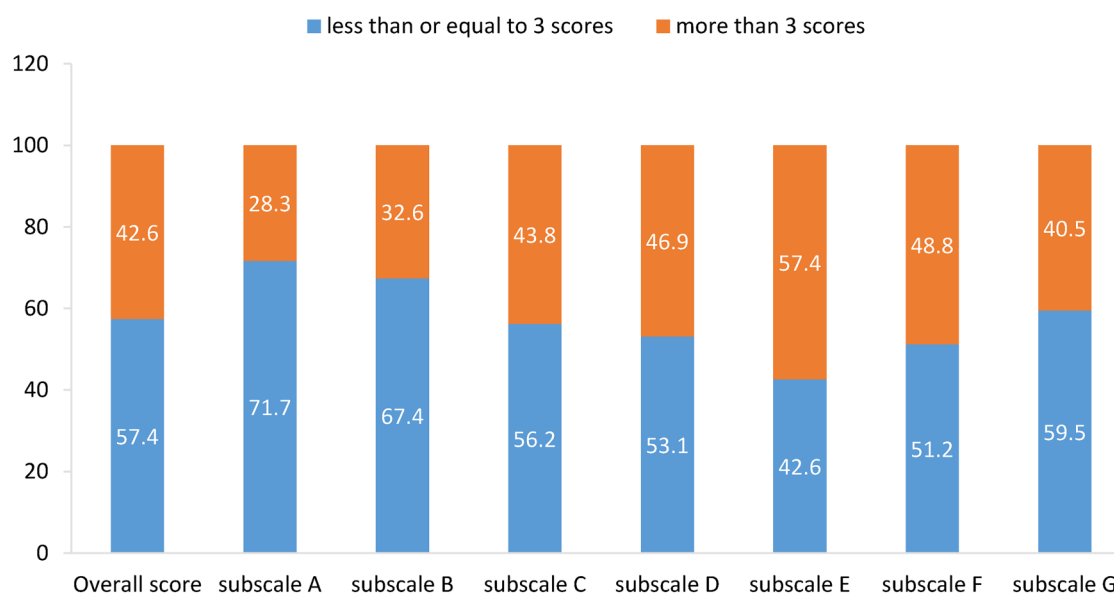


Figure 2. Core competence among nursing students ($n=1,069$). Notes: Percentage of students with high (more than 3) and low (less than or equal to 3) scores dichotomy for each subscale. *Overall Score*: Items's overall average score; *Subscale A*: Critical thinking and scientific research; *Subscale B*: Clinical nursing; *Subscale C*: Leadership; *Subscale D*: Interpersonal relations; *Subscale E*: Legal and ethics practice; *Subscale F*: Professional development; *Subscale G*: Teaching-coaching.

Table 3. Comparison of Core Competence of Students with Different Baseline Information.

	Gender		Category of students (source of students)				Year of school		
	Male (n = 96)	Female (n = 973)	Technical secondary school (n = 597)	Senior high school (n = 472)	Z value	Second year (n = 457)	Third year (n = 612)	Z value	
Critical thinking and scientific research	29.19 ± 7.76	26.97 ± 7.70	28.67 ± 7.53	25.28 ± 7.56	7.059*	28.59 ± 7.32	26.11 ± 7.86	5.556*	
Clinical nursing	27.54 ± 7.76	25.46 ± 7.17	26.44 ± 7.07	24.65 ± 7.35	2.744*	26.33 ± 6.89	25.14 ± 7.46	2.964 [#]	
Leadership	32.73 ± 8.92	30.56 ± 8.33	31.17 ± 8.25	30.23 ± 8.57	2.107 [#]	30.72 ± 8.27	30.78 ± 8.50	0.025	
Interpersonal relations	26.58 ± 7.02	25.07 ± 6.77	25.43 ± 6.73	24.92 ± 6.90	2.085 [#]	25.12 ± 6.61	25.27 ± 6.95	0.444	
Legal and ethics practice	27.76 ± 7.76	27.09 ± 7.40	27.38 ± 7.28	26.87 ± 7.63	0.837	27.04 ± 7.24	27.24 ± 7.58	0.456	
Professional development	19.67 ± 5.56	19.25 ± 5.29	19.64 ± 5.28	18.85 ± 5.33	0.726	19.22 ± 5.23	19.34 ± 5.38	0.210	
Teaching-coaching	21.81 ± 6.51	21.28 ± 6.35	21.99 ± 6.08	20.49 ± 6.61	0.783	21.23 ± 6.15	21.40 ± 6.52	0.168	
Overall	185.28 ± 45.43	175.69 ± 43.73	180.72 ± 43.52	171.29 ± 43.97	2.106 [#]	178.26 ± 43.53	175.28 ± 44.25	1.186	

*p < .001, [#]p < .05.

teaching-coaching ($Z=3.979$, $p<.001$). However, when compared with the third-year students, the second-year students had higher scores in critical thinking and scientific research ($Z=5.556$, $p<.001$) and clinical nursing ($Z=2.964$, $p<.05$).

Discussion

This study indicated that the overall core competence of higher vocational nursing students is at a moderate level. There were significant differences in the core competency in gender, and the category of students. Male students have higher total core competences, critical thinking and scientific research, clinical nursing, leadership, and interpersonal relations compared with female students, which is inconsistent with previous studies. For example, Carlsson's studies showed that male students' core competence in development and leadership higher than females, female students' core competence in giving value-based nursing care as higher than males (Carlsson, 2020). The results showed that students from technical secondary had higher competency in critical thinking and scientific research, clinical nursing, professional development, teaching-coaching, and overall core competency. Perhaps those students had clinical practice experience, which had an impact on the improvement of core competence. Moreover, students' core competences such as critical thinking, scientific research, and clinical nursing are weaker and needed to be further strengthened.

Critical thinking is necessary in clinical practice and is an important part of nursing education programs that promote the development of nurses' critical thinking skills. Nurses should have the ability to make critical decisions independently and quickly in emergency situations. While critical thinking enables them to quickly identify key information, distinguish between urgent and non-urgent issues, and make timely interventions on urgent issues. In addition, it is very important that nurses are able to use critical thinking to reflect on their actions and analyze the possible consequences of each action to make an correct decision. Critical thinking is an important basic skill for nursing students and should be regarded as the core content of higher nursing education, but at present colleges seldom attach importance to students' critical thinking (Papathanasiou et al., 2014). Studies have shown that nursing students have unacceptably poor critical thinking score (Azizi-Fini et al., 2015; Dilekli, 2017). Our results showed that about 60%–70% of students score below 3 on critical thinking, which was consistent with previous research. The study by Van and Liu (2021) showed that most participants had a low (45.5%) or moderate (48.3%) level of critical thinking. Therefore, nursing students in vocational colleges should not only master nursing technology, but also strengthen the training of critical thinking. For example, we can set up the critical thinking course, or combine with clinical problems to simulate medical situations to exercise students' critical thinking ability.

Nursing research refers to systematic research for exploring the important phenomena of nurses and nursing, solving nursing problems, and guiding nursing practice. The results of a study by Falcó-Pegueroles et al. (2021) indicated that critical thinking comprises a crucial component of the nursing research process, which can enhance their ability of nursing research and cultivate their ability to find, analyze, and solve problems. Nevertheless, our findings showed that nursing scientific research level was poor. Perhaps because of the emphasis on the clinical nursing skills of vocational nursing students, while ignoring the importance of scientific research. At present, nursing research course was not been set up in the curriculum of vocational nursing students. In recent years, more and more attention has been paid to evidence-based nursing, which provides more scientific nursing services for patients (Maxwell, 2022). It is necessary to strengthen the study of nursing research course and improve their ability of scientific research. Using evidence-based nursing research to guide clinical practice, rather than simply relying on clinical experience, which is of great significance to promote the development of nursing discipline (Chien, 2019).

Interestingly, clinical nursing ability is also not ideal. During the school, students mainly learned some basic nursing skills, and the specialized nursing practice is less exposure due to the limitations of equipment and space of practice. However, the junior students' clinical nursing ability was relatively stronger than the sophomore students, mainly because the junior students have been in clinical practice, practical ability have been significantly improved. Clinical practice in the hospital provides students with a good opportunity to improve their clinical practice ability. Generally, students are required to have at least eight months of internship before graduation to achieve proficiency and accuracy in the application of core nursing skills. In addition, good clinical nursing ability also requires observation ability, analytical ability, judgment ability, and decision-making ability, so the implementation of clinical nursing skills is also inseparable from critical thinking (Forneris, 2012).

The ability of health education and leadership is slightly lower. Health education is very important for the prevention and rehabilitation of diseases, and becomes another big ability of nurses in the future, testing the output of nurses' professional knowledge. The greatest benefit of health education is seen in terms of adherence to pharmaceutical treatment and self-care. A systematic review has shown that health education is effective in promoting the formation of knowledge, attitude, and behaviors of patients with chronic noncommunicable diseases (Heine et al., 2021). However, the health education course is not offered in higher vocational education, and the knowledge is interspersed with health education in professional core courses, which is not enough to improve students' health education ability. In the future, it is necessary to increase the training and practice of health education.

Nurse's leadership plays an important role in clinical practice. First, nurses with leadership can influence patients to cooperate with treatment more actively and carry out self-management more actively, greatly improving the quality of nursing. Second, it is better able to cope with difficulties and setbacks and constantly improve their professional level. Third, nurses with leadership are the best right-hand men for managers, who can play a positive role in the team and help managers achieve their goals efficiently. As nursing educators, we should consciously cultivate students' core competencies of leadership and education, so that students can realize the importance of leadership and health education for clinical nursing work, calmly and orderly deal with complex clinical nursing work, in order to provide high-quality nursing for patients.

More than 45% of the students scored higher in interpersonal relations, laws and regulations, professional development, mainly because the school offered courses on interpersonal communication and etiquette of nursing, nursing laws and regulations, nursing ethics, and nursing management. However, the core competence of these students needs to be further improved. Good interpersonal communication can form a harmonious nurse-patient relationship and reduce medical disputes and promote collaboration between doctors and nurses, and between nurses. The cooperation between nurses and other medical staff and patients' families was extremely important. Previous studies showed that interpersonal interactions practice communication, which increases confidence, competence awareness, and empathy, and increases awareness of preconceived biases (Mangan et al., 2022). Students understand the laws and regulations related to nursing can be better maintained the legitimate rights and interests of nurses, regulate nursing behavior, promote the development of nursing career, and safeguard medical safety and human health (Klotz et al., 2022). Nursing ethics can improve nursing students' moral cognition, stimulate their sense of responsibility, improve their moral level, do not harm patients, respect patients' right to privacy, autonomy, and informed consent, treat patients fairly and justly, and do not discriminate against patients because of special diseases (Martins et al., 2021). Professional development including education courses, curriculum ideology and politics, and introduction to nursing has improved students' cognition of the development of nursing profession, such as the development prospect, importance, status, salary and treatment of the nursing profession, job stability, and other aspects (Mao et al., 2021). More importantly, professional development education can improve students' confidence and identity in their profession.

Strengths and Limitations

The strength of this study is to explore the clinical core competence of higher vocational nursing students with a large sample. However, this study has several limitations. First,

nursing students from only one nursing school were evaluated. If cluster sampling was used to include vocational nursing students from other schools, the results might be different and more representative. Second, this is a cross-sectional study, and longitudinal intervention research can be carried out in the future, such as teaching methods and curriculum reform in students' core competence. Third, students' core competence is reflected mainly through self-evaluation in this study, while the third-party evaluation, such as the evaluation from full-time teachers in schools or hospital instructors, is ignored. Perhaps adding other evaluation methods can compensate for the influence of students' subjective cognition. Fourth, only the three indicators of gender, category of students, and year of study were selected for comparison based on the research background and students' learning experience in this study. Admittedly, there may also be differences between other categories/classes, such as different places of birth and family economic status. So the differences in other core competencies will continue to be explored in the future. Finally, the CCSRNC was directly used in the evaluation of students in this study. In the future, we can explore and develop a scale that can measure the core competence of higher vocational nursing students according to the clinical postdemand and talent training plan.

Implications for Practice

This study found that the core competence of higher vocational nursing students needs to be improved, and educators neglect the critical thinking and scientific research ability of higher vocational nursing students. Therefore, the current model of nursing education needs to be re-examined, strengthen the training of evidence-based thinking and critical thinking of higher vocational nursing students, such as increasing relevant courses or reforming teaching methods, in order to cultivate high-quality skilled talents with core competence.

Conclusions

The core competence of nursing students in higher vocational colleges is at the medium level. The critical thinking and scientific research ability, clinical nursing ability are weak. Educators should pay attention to the cultivation of students' core competence, increase nursing research, critical thinking, and other courses, improve students' critical thinking ability, scientific research ability, and clinical nursing skills, so that students' core competence can be improved as a whole, and help students transition from learning process to nursing practice.

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Author Contributions

All the authors made substantial contributions to the manuscript. SW and SH conceived and designed the study. HS is responsible for contacting counselors. SW and LY contacted students to explain the purpose of the research and collected data. SW analyzed data and drafted the manuscript. SH and LY supervised the study and also made critical revisions on the paper.

Data Availability

Data that support the findings are available from the corresponding author upon a reasonable request.


Declaration of Conflicting Interests

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