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Research Article

Development and Validation of Clinical Nursing Teacher Self-efficacy Scale and Investigation of Self-efficacy among Clinical Nursing Teachers

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SUMMARY

Purpose: The purpose of this study was to (1) add relevant contemporary items to develop an assessment instrument for the self-efficacy of clinical nursing teachers, to verify and evaluate the validity and reliability of the instrument, and (2) investigate the self-efficacy of clinical nursing teachers.

Method: A cross-sectional study was designed. A total of 205 clinical nursing teachers were recruited in Taiwan. Data were collected using the Clinical Nursing Teacher Self-efficacy Scale. An exploratory factor analysis was performed to examine the scale.

Results: The degree of self-efficacy of clinical nursing teachers was moderate to high. The 35-item scale showed great psychometric qualities. The Cronbach coefficient of the overall scale was 0.92; and 0.83, 0.91, 0.93, and 0.87 on the four subscales were acceptable. Four factors were extracted by exploratory factor analysis and explained 68.53% of the total variance. Four factors were (i) teachers' professional growth ability, (ii) teaching ability, (iii) clinical nursing competencies, and (iv) personality traits. The highest self-efficacy category evaluated by teachers was personality traits; the second was clinical nursing competencies; after that, teaching ability and teachers' professional growth ability. The item with the lowest self-efficacy was foreign language ability (English).

Conclusion: Clinical nursing teachers have a moderate to high degree of self-efficacy. This scale with good reliability and validity can be used for the training and evaluation of the self-efficacy of clinical nursing teachers.

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Introduction

Clinical nursing teachers (CNTs) are those who teach nursing students in a clinical setting. The term "clinical nursing teacher" is defined as someone who integrates theory into practice and creates an optimal learning environment [1]. In Taiwan, CNTs are typically experienced clinical nurses and registered nurses employed in university or college nursing schools to provide clinical instruction to nursing students in a variety of clinical settings [2] and are

responsible for helping nursing students achieve learning outcomes. Taiwanese CNTs are full-time employees of nursing school; they were assigned to guide a group of six to seven students to perform clinical practice at clinical sites [3]. Since clinical practice is a compulsory and very important part of the nursing curriculum, CNTs are essential to promote students learning in clinical practice, improve students' professionalism, and improve their professional ability [4]. CNTs are considered to be able to guide differences between students and nurses; it means the difference from theory to practice; the gap between theory and practice is defined as the difference between knowledge and theory learned by student nurses in the classroom and their practical experience in clinical settings [5]. CNTs must create a supportive learning environment to achieve learning integration, especially the learning environment related to differences in theory and practice in the clinical environment [6].

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The significance and importance of self-efficacy of CNT are that when CNTs teach nursing students in clinical practice, it is necessary to help students achieve a balance between the theoretical knowledge obtained in the class and the application of the theory in the clinical setting [6,7]. Therefore, CNTs must be aware of effective self-efficacy and equipped with the necessary competencies [8]. Nursing also emphasizes the need for a hands-on experience [7,9]; it is important to identify what kinds of behavior or characteristics of CNT are effective and modify clinical teaching methods to achieve learning effectiveness [10]. Furthermore, to ensure the quality of clinical teaching, CNTs are required to apply classroom theory to concrete clinical situations; they need to demonstrate the clinical skills and abilities to create strategies that are conducive to clinical learning and help students combine theory with practice to improve clinical decision-making [10,11]. CNTs must demonstrate good self-efficacy to facilitate the best clinical teaching, evaluate students' critical thinking, provide support, and establish good relationships with students to guide students toward achieving clinical learning goals and outcomes [12].

The concept of self-efficacy was derived from Bandura's social cognitive theory of behavioral change [13,14]. Bandura describes self-efficacy as "a judgment of a person's ability to organize and execute a course of action to achieve a specified type of performance" [14]. Teacher efficacy is "a teacher's confidence in his or her ability to promote student learning" [15,16]. According to Bandura (1997), teacher efficacy refers to teachers' beliefs about their ability to influence student achievement [14]. It refers to the belief of teachers that they have the ability to cope successfully with tasks, obligations, and challenges related to their professional activities, thus playing a key role [15]. Teachers use their professional abilities, professional attitudes, and confidence to demonstrate their professional knowledge to help students learn effectively and achieve learning goals [17]. It is important for its implications for teaching effectiveness, teaching practices, and student academic results (e.g., student achievement and motivation) [16]. Self-efficacy will be used throughout this paper to refer to teacher's efficacy (confidence) in their influence on students' achievement.

Knox and Mogan (1985) [18] pointed out that the effectiveness of nursing clinical teachers is teaching ability, nursing competence, evaluation, interpersonal relationships, and personality traits. The effectiveness and competencies of clinical teaching are the key determinants of the quality of clinical learning; the most effective behavior was teaching ability/competence, which was reported to be 96% [19]. The definition of competence is the application of skills in all domains for the role of practice, focusing on specific outcomes, improving levels of competence, accountability of the learner, practice-based learning, self-assessment, and individualized learning experience [20]. The effective clinical teaching characteristics of CNT included nursing competencies, teaching ability, professional knowledge, interpersonal relationships, and positive personality traits [17]. Several studies report that teaching ability and nursing competence were the highest rated evaluations, which were more important than evaluation skills, personality factors, and relationships with students [21,22]; however, personality was the most favored teaching characteristics of students [10]. Additionally, factors that affect teaching competence include knowledge expansion; Kelly (2007) [23] found that teacher knowledge is the most important, become a knowledgeable teacher; followed by feedback and communication skills, create a positive learning environment, demonstrate professionalism and academic characteristics, and provide support [18,24]. Teacher efficacy includes showing motivation to teach and being a good role model in a clinical setting. Collaboration between CNTs and nurses transforms the patient care unit into an environment that supports the learning of nursing students [19]. Furthermore,

the internationalization of nurses continues to be a common phenomenon today. With the globalization and collaboration of educational programs, increased mobility requires nurses to have a foreign language ability and good language skills to communicate with patients and nurses from other countries [25].

Overall, the characteristics of effective clinical educators and the most important competencies included teaching abilities, nursing competencies [4,11], clinical teaching skills, professional knowledge, clinical skills, interpersonal relationships [16,17], personality traits [16], among which being a role model is important for nurse educators [18,19,21,26]. The conceptual framework of self-efficacy of CNTs is shown in Figure 1.

Aims

To evaluate the self-efficacy of CNTs in complex clinical situations, this study aimed to (1) add contemporary applicable items to develop an assessment tool for the self-efficacy of CNTs (the Clinical Nursing Teachers Self-Efficacy Scale), validate psychometric properties and evaluate its validity and reliability; and (2) survey and describe the self-efficacy of CNTs.

Methods

Study design

This was a descriptive cross-sectional study conducted in the nursing department of universities and colleges.

Participants

A convenience sample was used and CNTs were recruited from 43 universities and colleges [27]. The average number of CNT members in each nursing school is five to ten; therefore, the total sample size of CNT was estimated to be 215–430 in Taiwan. The inclusion criteria were (1) currently employed full-time CNTs by the department of nursing in colleges and universities, (2) more than 3 months of clinical nursing teaching experience; exclusion criteria were (1) within 3 months of probation period, (2) part-time employed, (3) according to the voluntariness principle, teachers who refused to participate were excluded. A previous exploratory factor analysis (EFA) study has shown acceptance of a small sample size [21]. The latest review of psychological research reports that a sample of 200 subjects or less is acceptable in 40–60% of studies [28]. A total of 35 items were included on the scale in this study, and considering the attrition rate, a sample size between 175 and 350 ($n = 205$ in our study) was estimated.

Measurement

Demographic questionnaire

This questionnaire includes gender, age, education level, years of clinical nursing work, and years of clinical nursing teaching.

Clinical Nursing Teachers Self-efficacy Scale

The Clinical Nursing Teacher Self-efficacy Scale (CNT-SES) was developed to comprehensively measure the self-efficacy of CNTs in guiding students' clinical practice. The CNT-SES survey tool developed by the authors determined the CNT-SES items through a literature review [10–12,16–19,21–26,29–33], expert consultation, and a preliminary small sample survey.

Morgan and Knox (1987) [11] developed the Nursing Clinical Teacher Effectiveness Scale, which divided teacher characteristics into five categories: teaching ability, nursing competence, personality traits, interpersonal relationship, and evaluation. In addition,

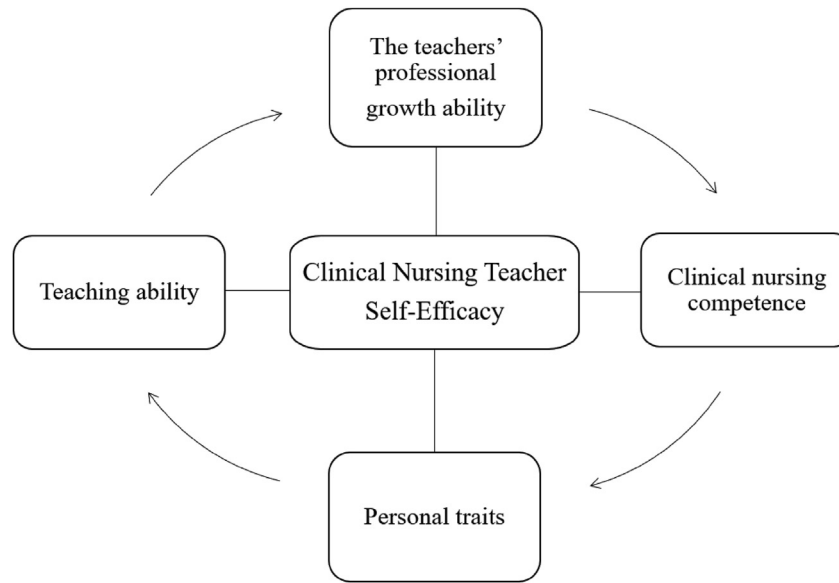


Figure 1. The conceptual framework of self-efficacy of clinical nursing teachers.

Hou et al. (2011) [21] developed a clinical nursing faculty competence inventory (CNFCI) that indicated the competencies of clinical nursing faculty, including leadership ability, problem-solving ability, educational intelligence, general teaching ability, and clinical nursing skills. The difference between our CNT-SES and these two inventories was that we have added contemporary applicable items, focus on the future development trends of the nursing profession; apply modern education technology and innovative teaching methods [30], pay attention to the development of nursing science, proficiency and ability in nursing research, participating in interdisciplinary research projects and interdisciplinary learning [31], presentation at international conferences, international foreign language ability [25], decision-making [32] and evidence-based nursing [33]. Finally, we develop the "CNT-SES" consisting of 35 items. There are four dimensions: (1) teachers' professional growth ability (1–8; 8 items), (2) teaching ability (9–19; 11 items), (3) clinical nursing competencies (20–24; 5 items) and (4) personality traits (25–35; 11 items). The scoring range for each item was 0–4; participants were instructed to rate all items on a 5-point Likert scale (4 = strongly agree, 3 = agree, 2 = neutral, 1 = disagree, 0 = strongly disagree); and the total score range was 0–140. The range of subscale scores was 0–32, 0–44, 0–20, and 0–44, respectively; the higher the score, the stronger the self-efficacy of the CNTs.

Data collection

The investigation of CNT self-efficacy was divided into three stages: (1) item generation and content validity; (2) preliminary survey; and (3) collect data in the descriptive and cross-sectional study.

Stage 1: Item generation and content validity

The instrument development procedure was based on a theoretical and literature review [2,4,6,8,10–13,16–20,23,24,28–33] and initially constructed a list of 60 items in six categories: (1) teachers' professional growth ability, (2) teaching ability, (3) clinical nursing competency, (4) personality traits, (5) fostering student learning ability, and (6) competencies of clinical nursing educators. Three experienced nursing education experts were invited to

review the initial 60 items to examine the content validity of the generated items. The experts offered comments and suggestions and also rated the suitability of each item on a 5-point scale. According to experts' suggestions, categories and some items were merged, the content validity index of these items ranged from 0.85 to 1 [34], and the scale-level CVI calculated based on the experts' score was 0.95 [35]; therefore, the questionnaire was revised to 50 items in four categories.

Stage 2: Preliminary survey

At this stage, the procedure included recruiting 20 CNTs to assess the suitability of the 50 items. Twenty participants from a university in central Taiwan conducted a questionnaire survey of 50 items, hoping to find out whether the description of the items was clear, readable, unambiguous, equivocal, and accurately reflects the self-efficacy of CNTs. They reported that it takes approximately 10–15 minutes to complete the instrument. In the preliminary study, the 50 items were carefully modified to make them more specific and explicit. A preliminary survey showed that the mean age of 20 CNTs was 43.25 (± 5.39) years; clinical nursing teaching experience was 9.50 (± 4.56) years, and clinical nursing work experience was 9.35 (± 4.58) years. Respondents said that these items were easy to understand; it takes an average of 10 to 15 minutes to complete the questionnaire.

Stage 3: Collect data in the descriptive and cross-sectional study

We collected descriptive and cross-sectional data from July 2019 to January 2020. Data were collected from nursing schools in northern, central, southern, and eastern Taiwan. We do our best to contact all potential participants to complete the questionnaire electronically by sending an email invitation with a link to the questionnaire to potential participants. All participants were informed of the purpose of the study, read informed consent, and the time required to complete the survey. 400 emails were sent and 205 questionnaires were returned, and the response rate was 51.25%. The questionnaire was distributed and returned at the appointed time. Since the design of the questionnaire required that all questions be answered, otherwise the questionnaire was invalid and the valid questionnaires were 100%. After collecting the data, 15 items that did not meet the statistical significance were eliminated

by item discriminant analysis; the initial 35 items were retained. The flow chart of data collection and item generation is shown in Figure 2.

Data analysis

SPSS version 26.0 was used for data analysis. The statistical significance level was set at $p < .05$ (two-tailed). The descriptive statistics of the demographic data are the standard deviation (SD) and frequency (rate). Psychometric properties consider validity, reliability, and rigor. The content validity index was used to assess the content validity of the scale. Internal consistency was determined by the Cronbach α coefficient (>0.70). Item analysis is the process of examining the responses to individual items to assess the quality of the items; and identify the underperforming items; including the mean and standard deviation [34–37]; the critical ratio (CR) is a test for item discrimination, and good item discrimination is statistical significance [34–37]. Pearson correlation analysis is used to test the correlation between the items and the total score, and the significance level is 0.01 [21,34,38]. EFA was used to determine the construct validity of the scale and used principal component analysis. To determine whether it is suitable for factor analysis, the Kaiser–Meyer–Olkin (KMO) value was used to measure the adequacy of the sampling. Bartlett's test of sphericity, factor loading, and measure of sampling adequacy were used to determine the suitability of items. Items with factor loading $<.5$ would be excluded; factors with an eigenvalue greater than 1.0 were retained as common factors. The factorization of the correlation matrix was determined by the KMO test $>.70$ was acceptable, and significant on the Bartlett's test of sphericity [39].

Ethical considerations

This study was approved by ethics committees; the approval came from an Institutional Review Board (No. CS2-19024). All participants gave their informed consent. Research data will be strictly protected and confidential. All participants were informed that they could withdraw from the study at any time without affecting their rights.

Results

Demographic characteristics

A total of 205 participants came from 43 nursing schools in different regions of Taiwan. CNTs (400 in total) were invited to participate; 205 questionnaires were completed for data analysis, with a response rate of 51.25%. The age of the CNTs was between 26 and 57 years, with a mean age of 41.20 (± 6.41) years; all were women ($n = 205$, 100%). Participants with a master's degree were 71.70% ($n = 146$) and with a bachelor's degree were 28.30% ($n = 59$). The mean clinical nursing work experience was 9.42 (± 5.11) years, and the clinical nursing teaching experience was 8.38 (± 5.76) years. Most of the clinical nursing experience was 11–15 years ($n = 76$, 37.07%), the clinical teaching experience was 1–5 years ($n = 68$, 33.17%) and 11–15 years ($n = 66$, 32.20%) accounted for the majority (Table 1).

Overall status of the Clinical Nursing Teacher Self-efficacy Scale

The CNTs demonstrated moderate to high self-efficacy (neutral to strongly agree); in this study, the most highly rated category was personality traits, which implies that the CNTs demonstrate confidence in their personality traits (3.04 ± 0.34); the second was

Table 1 Demographic Data of CNTs ($N = 205$).

Characteristic	n (%)	Mean (SD)
Age (years)		41.20 \pm 6.41
Gender		
Female	205 (100)	
Education level		
Bachelor	59 (28.30)	
Master	146 (71.70)	
Years of clinical nursing work		9.42 \pm 5.11
1–5	44 (21.46)	
6–10	68 (33.17)	
11–15	76 (37.07)	
≥ 16	17 (8.29)	
Years of clinical nursing teaching		8.38 \pm 5.76
1–5	68 (33.17)	
6–10	55 (26.83)	
11–15	66 (32.20)	
≥ 16	16 (7.80)	

clinical nursing competencies, that is, the CNTs recognize the importance of having clinical competencies (3.02 ± 0.45); after that was teaching ability (2.89 ± 0.43) and the teachers' professional growth ability (2.50 ± 0.65). Among the 35 items, the mean of each item ranges from 2.09 (± 0.79) to 3.27 (± 0.49), indicating that the respondents were neutral or strong agree on this scale. Twenty-four of these items had a mean score of 2.09 (± 0.79)–2.99 (± 0.47), indicating that the respondents were neutral or agree with the 24 items. There were 11 items with a mean score was higher than 3.0, which means that the CNTs in these 11 items showed agree or strong agree on self-efficacy (Table 2). However, the item with the lowest mean score of 2.09 (± 0.79) was “Foreign language ability - English” (Table 2).

Items discrimination analysis and homogeneity test

Add all items in each subscale to get the total score. In the item discriminant analysis, the high-score group was in the top 27% and the low-score group was in the bottom 27%. Item analysis focuses on item and test quality and explores difficulty index (p -values; p -values converted to percentages) and discrimination index. The observed proportions in the two extreme groups into measures of item difficulty and item discrimination. Item discrimination helps to detect the ability of items to discriminate between low-achieving group and high-achieving score group [40,41]. Item analysis constructs a high-low-27% group method. Generally, the top 27% are regarded as the high-achieving group, and the last 27% (73%) are regarded as the low-achieving group [40,41]. In this study, item analysis was performed showing the discrimination indices, as well as the percentage of people in the upper and lower 27% who responded to each alternative. To examine the significant differences between the high-score group and the low-score group, an independent t -test was used; there was a significant difference between two groups ($t = -10.634$, $p < .001$) [34–37]. A total of 15 items that did not meet the significant difference were eliminated; the remaining items showed statistically significant in CR values (Table 2).

Internal consistency

The overall scale reliability of the Cronbach α coefficient (>0.7 was acceptable) was 0.92, and 0.83, 0.91, 0.93, and 0.87 for the four subscales were acceptable [42]. Regarding the correlation of each item with the total score, the results of Pearson correlation analysis between the items and the total scale score ranged from 0.310 to 0.662 ($p < .001$) (Table 2), which means that the 35 items correlated well with the scale, showing satisfactory reliability.

Table 2 The Item Discrimination and Pearson Correlation Coefficients of Clinical Nursing Teacher Self-efficacy Scale.

No	Items	Mean (SD)	Critical ratio (CR)	p value	Correlation coefficient (R)	p value
A. Teachers' professional growth ability						
1	Ability to read and study extensively in one's own professional field.	2.73 (0.58)	4.425	<.01	.467	<.001
2	Ability to understand current or future development trends of the nursing profession.	2.53 (0.62)	8.035	<.01	.507	<.001
3	Ability to learn and use modern and innovative teaching methods to assist in teaching.	2.60 (0.58)	8.857	<.01	.574	<.001
4	Ability to develop nursing science and apply evidence-based nursing (EBN).	2.61 (0.61)	8.849	<.01	.525	<.001
5	Ability to conduct independent nursing research.	2.52 (0.65)	6.972	<.01	.590	<.001
6	Have the ability to read the nursing research literature.	2.55 (0.59)	5.199	<.01	.451	<.001
7	Have self-improvement ability (such as participating in continuing education, academic conferences, presentation at international seminars, participating in teamwork, or interdisciplinary research projects).	2.35 (0.77)	5.054	<.01	.516	<.001
8	International foreign language ability (English etc.)	2.09 (0.79)	3.899	<.01	.311	<.001
B. Teaching ability						
9	Ability to assess students' knowledge and clinic skills.	2.94 (0.36)	2.768	<.01	.527	<.001
10	Answer students' questions carefully and accurately.	2.95 (0.38)	1.714	<.01	.364	<.001
11	Stimulate students' reasoning ability.	2.87 (0.44)	4.086	<.01	.603	<.001
12	Ability to assess students' knowledge and clinic skills.	2.89 (0.45)	3.703	<.01	.661	<.001
13	Stimulate students' interest in nursing.	2.71 (0.57)	6.304	<.01	.662	<.001
14	Effectively organize and arrange clinical teaching plans.	2.90 (0.44)	2.230	<.01	.431	<.001
15	Guide students to solve problems based on literature and evidence.	2.89 (0.42)	3.037	<.01	.623	<.001
16	Establish a good learning environment.	2.92 (0.43)	3.921	<.01	.540	<.001
17	Show students the clinical decision-making process.	2.86 (0.43)	3.935	<.01	.611	<.001
18	When students encounter difficulties, provide individual help.	2.97 (0.43)	4.221	<.01	.546	<.001
19	Quickly grasp the meaning of students' questions or students' words.	2.87 (0.39)	4.069	<.01	.598	<.001
C. Clinical nursing competency						
20	Have good clinical nursing skills.	3.06 (0.48)	4.989	<.01	.546	<.001
21	Have a good clinical problem assessment ability.	3.01 (0.43)	4.900	<.01	.621	<.001
22	Have the ability to make judgments and analyses based on clinical data assessment.	3.03 (0.43)	3.524	<.01	.508	<.001
23	Possess professional knowledge of the subject.	3.02 (0.42)	3.339	<.01	.548	<.001
24	Ability to handle emergencies properly.	2.99 (0.47)	4.420	<.01	.589	<.001
D. Personal traits						
25	Establish interpersonal relationships and a harmonious teamwork spirit.	3.10 (0.43)	2.269	<.01	.423	<.001
26	Empathy	3.08 (0.53)	3.744	<.01	.493	<.001
27	Effective self-management (such as emotional stability, punctuality, and compliance with rules).	3.08 (0.49)	3.558	<.01	.541	<.001
28	Understand self-limitations.	3.09 (0.46)	3.460	<.01	.524	<.001
29	Good communication skills.	2.97 (0.43)	3.979	<.01	.506	<.001
30	Open-minded and not critical.	2.96 (0.48)	2.569	<.01	.418	<.001
31	Enthusiastic and energetic.	2.92 (0.60)	3.960	<.01	.510	<.001
32	Be responsible for your behavior.	3.27 (0.49)	2.838	<.01	.310	<.001
33	Be a good role model for nursing students.	3.09 (0.44)	3.180	<.01	.429	<.001
34	Master the level of student learning ability.	2.90 (0.40)	4.770	<.001	.581	<.001
35	Touch people's hearts (understand students to express their thoughts and feelings, so as to perceive and evaluate their own behavior).	3.02 (0.46)	4.358	<.001	.656	<.001

Exploratory factor analysis

EFA was conducted to examine the psychometric properties of the developed scale, in this study, EFA extracted four factors: (1) the teachers' professional growth ability; (2) teaching ability; (3) clinical nursing competencies; and (4) personality traits. Our result showed that the KMO value was 0.949, and Bartlett's test of sphericity was significant ($\chi^2 = 6457.117$, $df = 595$, $p < .001$). The results showed that 35 items were acceptable for factor analysis. Four factors explained 68.53% of the total variance (Table 3), and the variance explained for each factor (21.523, 19.633, 15.348, and 12.021) was presented in Table 3. The final version of the CNT-SES consists of four factors and 35 items.

Discussion

Demographic characteristics

In this study, the majority of teachers have a master's degree (71.70%), with clinical teaching experience 6–10 years (26.83%) and 11–15 years (32.20%) accounting for the majority, which means that more than half of the CNTs are experienced (59.03%). The result of this study showed the self-efficacy of CNT, with 33 of the 35 items were agreed or strongly agreed (mean ≥ 2.5). This study was

consistent with Cayır and Ulupınar (2021) who found that perceptions of general self-efficacy and performance levels increased with age, occupational experience, and academic experience [43]. Although the individual items on the scale range from strongly disagree to strongly agree, the participants conducted a highly consistent assessment of these 33 items.

Construct validity and reliability of the CNT-SES

The newly developed CNT-SES showed a satisfactory estimation of psychometric properties. In the original CNT-SES development process, an item analysis was performed to guarantee fitting items for EFA; the results of the item analysis showed that 15 items were excluded because they did not meet the statistically significant and these 15 items obviously showed caring for students. Additionally, previous studies emphasized problem-solving ability, general teaching ability, nursing competence, clinical nursing skills, interpersonal relationships, and personality traits [11,21]; in this study, the item analysis of these items was considered a high score. The item analysis identified the high-score group and the low-score group, and an independent sample *t*-test was required to test whether there was a significant difference in the total score between the high-score group and the low-score group. The CR was statistically significant, indicating that the total score of the high-

Table 3 Factor Loading for Clinical Nursing Teacher Self-efficacy Scale.

Item	Components				
A. Teachers' professional growth ability					
1	Ability to read and study extensively in one's own professional field.	.182	.163	.698	.195
2	Ability to understand current or future development trends of the nursing profession.	.204	.267	.768	.128
3	Ability to learn and use modern and innovative teaching methods to assist in teaching.	.284	.216	.720	.147
4	Ability to conduct independent nursing research.	.121	.177	.692	.209
5	Ability to develop nursing science and apply evidence-based nursing (EBN).	.126	.201	.722	.311
6	Have the ability to read the nursing research literature.	.183	.117	.738	.135
7	Have self-improvement ability (such as participating in continuing education, academic conferences, presentation at international seminars, participating in teamwork, or interdisciplinary research projects).	.002	.202	.679	.197
8	International foreign language ability (English etc.)	.148	.188	.560	.235
B. Teaching ability					
9	Ability to guide students to organize patients' problems.	.296	.675	.212	.430
10	Answer students' questions carefully and accurately.	.369	.701	.182	.231
11	Stimulate students' reasoning ability.	.291	.676	.332	.200
12	Ability to assess students' knowledge and clinic skills.	.304	.723	.308	.308
13	Stimulate students' interest in nursing.	.329	.658	.240	.104
14	Effectively organize and arrange clinical teaching plans.	.261	.700	.235	.360
15	Guide students to solve problems based on literature and evidence.	.322	.750	.286	.249
16	Establish a good learning environment.	.462	.635	.265	.177
17	Show students the clinical decision-making process.	.421	.668	.294	.223
18	When students encounter difficulties, provide individual help.	.453	.668	.260	.134
19	Quickly grasp the meaning of students' questions or students' words.	.414	.599	.284	.234
C. Clinical nursing competency					
20	Have good clinical nursing skills.	.314	.274	.269	.745
21	Have a good clinical problem assessment ability.	.339	.354	.288	.726
22	Have the ability to make judgments and analyses based on clinical data assessment.	.333	.325	.250	.767
23	Possess professional knowledge of the subject.	.341	.299	.263	.742
24	Ability to handle emergencies properly.	.398	.241	.244	.725
D. Personal traits					
25	Establish interpersonal relationships and a harmonious teamwork spirit.	.744	.230	.116	.258
26	Empathy.	.731	.245	.134	.212
27	Effective self-management (such as emotional stability, punctuality, and compliance with rules).	.694	.285	.158	.174
28	Understand self-limitations.	.715	.252	.141	.174
29	Good communication skills.	.759	.244	.197	.172
30	Open-minded and not critical.	.687	.315	.199	.171
31	Enthusiastic and energetic.	.695	.237	.169	.186
32	Be responsible for your behavior.	.690	.239	.118	.247
33	Be a good role model for nursing students.	.679	.307	.106	.289
34	Master the level of student learning ability.	.614	.455	.202	.195
35	Touch people's hearts (understand students to express their thoughts and feelings, so as to perceive and evaluate their own behavior).	.578	.464	.281	.148

The percentage (%) of variance by factors (Rotation sums of squared loading)

Factor 1	Factor 2	Factor 3	Factor 4
21.525	19.633	15.348	12.021
Total percentage of the factor model 68.53%			

score group and the low-score group had good discrimination [44]. Additionally, correlation analysis was used to test whether the scores of each item were correlated with the total scale score. The higher the correlation coefficient, the stronger the internal consistency between items. Pearson correlation coefficients were interpreted as weak ($r = .10-.30$), moderate ($r = .40-.60$), strong ($r = .70-.90$) or very strong ($r = 1.00$) [45]. The correlation coefficient is reported weakly with an r of .30; and consider removing items with correlation coefficients below .30 [34,36,43]. Fortunately, in this study, the correlation coefficient for each item was $>.30$. In addition, the results of the Cronbach α coefficient reliability test for the overall scale and for the four subdimensions were acceptable, ranging from 0.83 to 0.90, showing that the higher the value of Cronbach α , the higher the internal consistency between items. Furthermore, factor analysis is the most effective method to test construct validity; from these factors, some structural elements of psychostatistical concepts can be identified to understand the valid measurement factors [39]. The four dimensions explained 68.53% of the total variance, which met the criteria for selecting factors.

Self-efficacy of CNTs and the significance of each attribute of the scale in clinical practical implications

This study surveyed the self-efficacy of CNTs in clinical teaching settings by developing a structured questionnaire; CNT-SES was divided into four factors with a total of 35 items.

Teachers' professional growth ability

Items 1–8 were professional growth, research ability, and innovative teaching methods to facilitate teaching; according to our results, the CNT showed that the lowest self-efficacy was the professional growth ability. Hou et al. (2011) [11] found that teaching ability and clinical practice ability were the top two competence characteristics of clinical faculty; which was the same as our study included teachers' professional growth ability and proficiency in theoretical knowledge, teaching ability, clinical nursing competencies, and clinical skills proficiency. However, despite having the lowest score in the four categories, the CNTs still highly recognized by the professional growth ability. This result was consistent with the results of previous studies on

teaching effectiveness and competencies among CNTs [11,21]. Professional growth can effectively improve the general professional ability and teaching ability of teachers, which is conducive to mastery of the clinical knowledge and operational practices of nursing students [8]. In addition, especially in item 8 “International foreign language ability-such as English” (2.09 ± 0.79), indicating that CNTs lack the ability or confidence to speak a foreign language (English). This result showed that the lowest ability was the ability to speak a foreign language, which means that the confidence of CNTs in the ability to speak a foreign language was not as good as other items, which was consistent with the study [21]. Therefore, we suggest that teachers pay more attention to cultivating foreign language skills. Nursing professions face new challenges at any time, and these challenges are accompanied by the need for new technologies and skills development to ensure that clinical nursing continues to advance and educate its profession. Teachers are more confident when they have extensive experience and expertise in the field they teach, use advanced technology to aid learning, and serve as role models for their students [46]. The self-professional growth of nursing teachers enables them to achieve proficiency in clinical competencies [47,48], and implementing optimal teaching of nursing curriculum, support training programs, and provide nursing students with quality nursing education is critical. Therefore, the promotion of professional growth and development of CNTs is of great significance and administrators should consider investing in the professional growth and development of CNTs.

Teaching ability

In this study, the teaching ability score was $2.89 (\pm 0.43)$. Good clinical teaching leads to good clinical learning [8]. The focus of CNTs is clinical practice teaching; they must be able to instruct students while providing care to the patient, including helping students learn to care for patients, nursing technology and skills, planning assignments or evaluating students' learning outcomes, maintaining patient safety and fostering relationships with students, patients and nursing staff [3,17,21,47]. CNTs are responsible for cultivating students' abilities in decision-making, critical thinking, and developing successful interpersonal relationships in clinical practice [3,21]. They guide students to implement the correct nursing interventions to improve their skills and prepare them to be a good nurse [6,49]. In addition, CNTs' assignments include classroom lecturing, research, or participation in seminars to improve their teaching ability.

Clinical nursing competencies

Additionally, CNTs recognize the importance of having clinical competencies (3.02 ± 0.45). The clinical nursing competencies of CNTs are the most important factor that affects the clinical learning [47,48]. However, when teachers have insufficient clinical experience and lack the relevant skills to facilitate student learning, students cannot learn effectively in the clinical field, and the level of CNT skills may affect students' perception of the teacher's ability [38,45,50]. Professional competence has been proposed as a core element of nursing [39,49]. The development of professional competence, that is, the provision of nursing services according to professional standards, is crucial. In the past, the professional competence of nurses was defined as the combination of skills, knowledge, attitudes, values, and competencies that lead to effective or high performance in occupational and professional positions [51]. Similarly, the professional competence of nursing teachers is an essential requirement, and nursing teachers must be more competent and committed to their nursing or clinical teaching.

Personality traits

Items 25–35 are related to personality traits; they demonstrate self-efficacy in their personality traits. The literature indicated that the personality traits and characteristics of CNTs have a profound impact on the clinical experiences of students [17,19]. In this category, teachers showed greater confidence in communication skills and interpersonal relationships, which was consistent with previous studies showing that the ability to develop interpersonal relationships is the most valued skill by clinical teachers [12,16,25]. Certain items such as empathy, open-mindedness and enthusiasm are also consistent with Collier (2018) who identified approachability as the most important personality trait of clinical teachers [15]. Furthermore, being responsible for behavior, emotional stability, punctuality, obedience to rules, and understanding self-limitations, which means focusing on proactive behaviors, including aspirations and efforts to start changing yourself and/or the environment, as well as self-initiated (as opposed to passive) and change-oriented (as opposed to maintaining the status quo) and focus on the future (instead of focusing on the current situation) [52].

Looking toward the future

In this study, the author suggested that the definition of self-efficacy of CNT was that the CNTs possessed four characteristics: professional growth ability, teaching ability, clinical nursing competencies, and positive personality traits. In recent years, with the rapid development of international health issues and international nursing education, several studies have appeared on teacher self-efficacy. However, the strengths of the tool we developed and compared to similar tools in the past were that this study highlights the potential and self-efficacy of CNT in the future nursing profession, modern education technology, innovative teaching methods, nursing science, international conferences, leadership, evidence-based nursing, research competence, and interdisciplinary learning; these issues have received more attention [53]. To maintain the pace and progress in nursing practice and education, we may need to pay more attention to the application of EBN and independent research ability in clinical nursing practice rather than traditional concepts of competency [54].

Study limitations

The limitation of this study was that it was not easy to collect data while having direct face-to-face contact with all CNTs in Taiwan because the participants were teachers of nursing schools and assigned to various hospitals and scattered in various regions. Therefore, the sample was not expanded, which was our main limitation. Additionally, it was not easy to collect data directly and complete the questionnaire, which may limit sample sizes. Therefore, we sent email notifications and questionnaires to collect data, and the email was sent many times to all potential participant; however, the response rate was not as expected. Furthermore, more comprehensive studies are needed to explore the self-efficacy of CNTs in different cultures and contexts.

Recommendations

We encourage researchers to use the entire scale for future research or clinical practice. In future research, we suggest that this tool can be used to explore the perceptions of nursing students about CNT in nursing education. We suggested modifying the CNTSES from the views of nursing students to measure students' perceptions of the effectiveness and competence of CNTs. This tool can serve as the basis for creating a self-efficacy assessment tool in the

field of nursing education, which can be used to train and assess the self-efficacy of CNT. CNT-SES can also serve as an assessment tool for observational and intervention studies of teacher self-efficacy in future research. The significance of using this tool depended on the evaluation results of each attribute of the scale, to formulate strategies for CNTs to improve self-efficacy. Therefore, it is important to refer to the various items of the CNT-SES in clinical practice to develop teaching strategies to promote the self-efficacy of CNTs and further facilitate the clinical learning of students. Our suggested strategies include an appropriate continuing education course should be formulated for each attribute of the item, encouraging the setting of personal goals, sharing teaching experiences and participating in Nursing Teachers Associations, building self-confidence and empowerment to help teachers improve their self-efficacy.

Conclusions

The 35-item CNT-SES provides an available assessment tool with good reliability and validity. CNTs showed moderate to high self-efficacy. The study findings offered information on the characteristics of self-efficacy of CNT, including nursing professional growth, teaching ability, nursing competence, ability to develop interpersonal relationships, and certain personality traits. These efficacy characteristics are mainly reflected in the perception of self-efficacy of CNT, and their identification can guide clinical nursing teaching strategies.

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Ethical approval

The study protocol was reviewed and approved by the Ethics Committee of Chung Shan Medical University Hospital (No. CS2-19024). Date of approval: May 15, 2019.

The author agrees to be responsible for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of interest

The authors declare that they have no competing interests.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.anr.2022.05.001>.

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