Constructing a Teaching-Ability Evaluation System for Chinese Student Teachers using Delphi and Analytical Hierarchical Process Methods

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Abstract. With the deepening of teacher educational reforms, increasing focus has been placed on the importance of evaluating student teachers' teaching abilities in Chinese universities. The Delphi method and an Analytic Hierarchical Process were used to construct an evaluation system for student teachers' teaching abilities. Delphi specialists included administrators, teachers and teacher educators working in primary, secondary and tertiary education. The evaluation items consisted of four dimensions, namely teacher ethics, teaching skills, educational ability, and developmental ability and a total of 31 indicators. Teaching skills were ranked highest, followed by teacher ethics, educational ability and developmental ability. The overall mean of the dimensions and components was rated as very important to important after three rounds of the Delphi process. Overall, the evaluation system demonstrated high reliability and validity; its' entries were reasonably distributed indicating its evaluation potential and its' weighting system denotes priorities for student teachers' competencies' evaluation.The evaluation system could help teachers identify key capacities in teacher training ,guide the development of talent nurturing programs, and provide developmental feedback for student teachers.

Keywords: Delphi method; Analytic Hierarchy Process; teacher training students; teaching ability

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1. Background of the study

In 2018, China conducted a teacher professional certification process in its' universities. The university education in China system was prompted to provide student teachers with an opportunity to equip themselves with ethics, teaching skills, and developmental abilities. The Education 2030 Framework for Action states that achieving quality education for all will need well-trained pre-service teachers who must constantly focus on improving their teaching abilities (Mundial & UNICEF, 2016). Pre-service teachers need certain abilities to meet the demands of teaching; such skills have been broadly categorized as complex cognitive skills, highly integrated knowledge structures, and attitudes (Blömeke et al., 2015). The current evaluation system for Chinese student teachers' teaching abilities is wrought with dilemmas such as an incomplete multidimensionality of its contents, insufficient plurality of evaluation subjects, and insufficient diversity of evaluation methods (Wu N & Shi D, 2023). In China, scholars such as Peng and Liao (2018) and Qin and Chen (2021) conducted studies on student teachers' teaching abilities and unanimously agreed that student teachers' teaching abilities are comprised of teaching skills, classroom management skills, and teaching research ability (Peng & Liao, 2018; Qin Z & Chen L, 2021); however, comprehensive research on what specific indicators should be used to evaluate each of these aspects has not been done. The existing system does not provide a comprehensive list of indicators of teaching ability, it does not explore what teaching abilities primary and secondary educators believe that student teachers should possess become qualified teachers, and it does not prioritize indicators for evaluating student teachers' teaching abilities. Therefore, there is a need to establish a system for evaluating the teaching abilities of student teachers that can be used for assessment purposes. Therefore, the objectives of this study were:

(1) To identify the contents of an evaluation system for the teaching abilities of Chinese student teachers.

(2) To determine the priority weights that should be accorded to each element of an evaluation system for the teaching ability of student teachers.

2. Literature Review
2.1. Teaching ability
The evaluation structure and evaluation indicators of teaching ability is a topic of conversation in current educational research. Teaching abilities are defined as a set of personal characteristics, knowledge, skills, and attitudes required in various teaching environments (Stoof et al., 2002; Swank et al., 2012; Tigelaar et al., 2004). Scholars have defined the components of teaching ability from different perspectives such as teacher trainees, higher education, professional standards for teachers, and teaching competency scales. Some scholars have adopted the three-dimensional proposition, Chinese scholars routinely use expert opinions to categorize student teachers' teaching abilities into teaching,

educational, developmental abilities (Peng & Liao, 2018). Some scholars also categorize teaching abilities into four dimensions, such as that used by the Delphi method to categorize higher education teaching ability into the Person as teacher，an expert on content knowledge，a facilitator of learning processes, an organized scholar，and a lifelong learner (Tigelaar et al., 2004). Alternatively, teaching ability could be categorized using the factor analysis method into knowledge，skills，behaviors, and dispositions (Swank et al., 2021). Chinese scholars have used expert opinions to establish an evaluation system for student teachers teaching abilities that include professional ethics, teaching ability, educational ability, developmental ability (Qin Z & Chen L, 2021).

Different research groups have investigated teaching abilities in different country contexts and using different research methods or evaluation tools and teaching competency components. Although researchers have labelled some abilities using different names, their meanings are often similar, for instance, the person as a teacher, personality, professionalism, morality, can be substituted with the term "teacher ethics." Therefore, this study adopted the systematic approach of the practical perspective of the framework of the higher education teaching competency mentioned by Tigelaar et al. (2004) that focuses on the four domains viz: the person as a teacher, a facilitator of learning processes, an organized scholar, and a lifelong learner (Tigelaar et al., 2004). In this study, teacher trainees' teaching abilities are divided into four dimensions: teacher ethics, teaching skills, educational ability, and developmental ability.

2.2. Teacher ethics

The personality of a teacher determines his or her ability to teach effectively (Korthagen, 2001). The key aspects of a teacher's personality for effective teaching include his or her professional identity (how they view themselves as a teacher), his or her beliefs about teaching, and his or her involvement in teaching. Lowyck (1994) reported that the most important indicator of teaching effectiveness is a teacher's personality rather than the act of teaching. Student teachers should possess not only a subject's solid basic knowledge and teaching ability, but also good teaching ethics. In addition, student teachers should be able to think rationally to make reasonable judgments and choices when encountered with moral or value dilemmas in teaching practice. Moreover, they should be self-aware regarding such values (Lowyck, 1994). Four evaluation items were set up under the teacher ethics dimension, "Strengthening moral education to nurture people" was examined from the behavioral level of education and teaching practice; "Teacher moral code" was observed from the aspects of laws and regulations,

professional ethics, and modeling; "Professional identity" was considered based on two dimensions, career planning and identification with the teaching profession; and "Caring for students" referred to student teachers' care for their students and respect for their students' personalities an emotional level during practical training.

2.3. Teaching skills
Teaching skills represent a collection of different sub-abilities (Long et al., 2014). Researchers have categorized teaching abilities based on different perspectives that elaborate on the components of teaching abilities such as competency levels, ways of teaching, working objects, ways of organizing teaching, teaching sessions, and working environment (Gilis et al., 2008; Tigelaar et al., 2004). From an organizational teaching process perspective, the teaching skills of student teachers are comprised of the following aspects: an ability to "familiarize oneself with curriculum standards," "analyze the learning situation," "determine learning objectives," "design the teaching process," "prepare-learning resources," "integrate learning resources," "design performance tasks," and "create a learning environment" at the level of teaching design; an ability to "organize teaching," "explain and demonstrate," "ask and answer questions," "manage and monitor teaching," "summarize and improve," and "teach with information technology" at the level of teaching implementation; and an ability to "design evaluation tools," "implement teaching evaluation," and "analyze evaluation results" at the level of teaching evaluation.

2.4. Educational ability
Teachers, as educators, should contribute to the formation of a student's character and personality, should perform tutorial education including activities such as supervision or classroom management, and creating psychosocial and pedagogical conditions, and perform duties that cultivate social values among students (Buller, 2016; Tarango & Machin-Mastromatteo, 2017). Swank and Houseknecht (2019) proposed two categories of professional behaviors of teachers, the first focusing on behaviors related to self and the second focusing on behaviors related to student interactions (Swank & Houseknecht, 2019). Herein, educational ability was divided into "moral education and psychological health guidance," "classroom management," "parent-school communication," "educational activity planning," and "educational activity guidance" based on the behavior and emotional value related to interaction with students, the cognition of students and educational activities, and the guidance of students through teaching practices.

2.5. Developmental ability

Faculty development is also referred to as professional development (Gillespie, 2010; Gopal, 2011; McQuiggan, 2012; Villar & Alegre, 2008) , or educational development (Ramsden, 2003). Student teachers should be highly sensitive to contextual change, be willing to pursue lifelong learning and to focus on professional development（Qin & Chen , 2021）. Herein, Developmental abilities have been classified as "developmental planning," "reflection and improvement," "learning research," "communication skills," and "collaborative learning." "Developmental planning" includes the enhancement of basic education reforms at both home and abroad as well as career planning. "Reflection and improvement "include mastering reflection skills, having a sense of innovation, and critical thinking. "Learning research" includes mastering basic methods of subject and educational research, an ability to write research papers, and to use information technology to carry out research and develop innovations. Communication skills include having a sense of teamwork, mastering basic communication skills, and an ability to communicate effectively. "Collaborative learning" includes a teamwork spirit, mutual assistance, and a cooperative learning ability.

In this study, the teaching ability of Chinese student teachers includes a theoretical foundation circle (why), an assessment construct (what), a method of convergence of opinions (how), and an object of assessment (who). Figure 1 shows a basic model depicting how research questions will be addressed in this study.
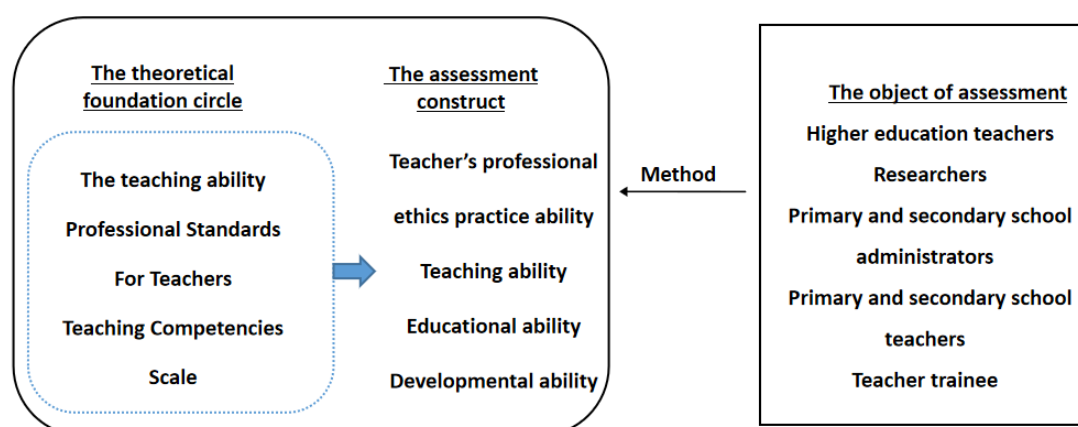

Figure 1. Architecture of an assessment model of the teaching abilities of Chinese student teachers

3. Research Methods

3.1. Research approach

The Delphi and Analytic hierarchy process were used to address the study objectives. The Delphi method, which is used to discover new information through consensus in expert groups (Strear et al., 2018), was used to construct and adjust indicator constructs and detailed items. The Delphi technique has several advantages. First, it obtains information and consensus from a group of experts in sequential rounds. Second, it counteracts the bias of a dominant viewpoint in a panel discussion as members can individually rate the teaching competencies, they consider important (Strear et al., 2018).

An analytical hierarchy process was used to complete the item structure of the competency assessment; expert members determined the relative weights of facets and items (Saaty, 2001).

3.2 Participants

Fifteen experts were initially invited to participate but only 11 questionnaires were collected (a recovery rate of 73%) since four experts were unable to participate due to competing work assignments. The established Delphi expert team consisted of 11 people from different institutions including elementary schools to universities at provincial, municipal (district), and county (township) levels. The participants included four professors from colleges and universities who were all managers of relevant teacher training faculties and highly experienced in teacher training professional certification; three education managers from primary and secondary schools; three primary and secondary school teachers who were highly experienced in education and teaching and had served as teaching and research team leaders or classroom teachers; and one student teacher representative who had recently became a high school teacher. Table 1 shows the list of Delphi experts in this study.

Table 1. *List of Delphi experts in this study*

Serial No.	Initials	Institution	Position or Occupation and Selection criteria	Length of teaching experience	Gender
01	LBX	College	Vice Dean of an Education College- Famous Normal Universities in China, Teacher Certification Expert, and Provincial Teaching Master	28	M
02	ZHY	College	Dean of a College Department, participated in the teacher professional certification of	33	F

			China		
03	SQH	College	Dean of a College Department, participated in the teacher professional certification of China	25	F
04	AXH	College	Dean of a College Department, participated in the teacher professional certification of China	25	F
05	PYF	Secondary school	Chief of the Municipal Education Department, renowned education teacher who once taught high school	33	M
06	ZYB	Secondary school	National renowned high school principal, national model teachers	25	M
07	BJM	Middle school	Middle school teaching and research team leader and class teacher	20	F
08	WH	Middle school	Middle school teaching and research team leader and class teacher	10	M
09	DCY	Primary school	Primary school principal	14	F
10	CQ	Primary school	Primary school teacher and class teacher	12	F
11	BRZ	Secondary school	Teacher training student representative, who had recently become a high school teacher	1	M

3.3 Research tools

The Delphi Expert Consultation Questionnaire and the Indicator Weighting Questionnaire were used to assess the teaching abilities of student teachers. During the Delphi process, an expert group was given three structured questionnaires in which they were required to rate the importance of each indicator and dimension on a 5-point Likert scale, with 1 being very unimportant and 5 being very important. The first questionnaire had an open-ended comment field for additional notes. The second questionnaire summarized individual responses and opinions from first questionnaires and included the mean (M), standard deviation (SD), and coefficient of variation (Cv) values of all members. A similar process was used to prepare the third questionnaire from the second questionnaire.

Table 2 shows an evaluation system for Chinese student teacher' teaching abilities constructed by the Delphi expert group. The evaluation system has four dimensions and 31 questions. The teacher ethics dimension consists of 4 items (question A1 to A4); the teaching skills dimension consists of 17 items (question B1 to B17); the educational ability dimension consists of 5 items (question C1 to C5); and the developmental ability dimension consists of 5 items (questionD1 to D5).

Table 2. *An evaluation item system for the teaching ability of Chinese student teachers*

Level 1 Projects (Dimensions)	Level 2 Projects (Items/questions)
A. Teacher ethics	A1 Strengthen moral education and nurture people
	A2 Teacher moral code
	A3 Professional identity
	A4 Caring for students
B. Teaching skills	B1 Familiarize oneself with curriculum standards
	B2 Analyze the learning situation
	B3 Define learning objectives
	B4 Design the teaching process
	B5 Prepare learning resources
	B6 Integrate learning resources
	B7 Design performance tasks
	B8 Create a learning environment
	B9 Organize teaching
	B10 Explain and demonstrate
	B11 Ask and answer questions
	B12 Manage and monitor teaching
	B13 Summarize and improve
	B14 Teach with information technology
	B15 Design evaluation tools
	B16 Implement teaching evaluation
	B17 Analyze evaluation results
C. Educational ability	C1 Moral education and psychological health Guidance
	C2 Classroom management
	C3 Parent-school communication
	C4 Educational activity planning
	C5 Educational activities guidance
D. Developmental ability	D1 Developmental planning
	D2 Reflection and improvement

D3 Learning to research	
D4 Communication skills	
D5 Collaborative learning	

The weights of each dimension were assessed using the relative weights obtained from an analytical hierarchy process using 17 scores ranging from 9:1 to 1:9 (Saaty, 2001).

3.4 Statistical tools

The statistical tools used in this study were the measures of central tendency (M, SD, and Cv) for Delphi data (Murry Jr& Hammons ,1995) and the Saaty (2001) Pairwise Comparison Matrix for the Analytic hierarchy process to calculate the weights. Study data was processed as follows:

a) Delphi data were imported into SPSS software, and the Cv, M, and SD of the importance scores (1, 2, 3, 4, and 5) of each indicator were calculated and presented to the experts. The preset benchmarks were "M ≥ 4.0" (higher than 80 when the 5-point scale was converted into a percentile scale) and "SD ≤ 1" (lower than 17 when converted into a percentile scale). If both benchmarks were not met, a question would be eliminated, and the experts' opinions would be consolidated to prepare the next questionnaire. The Cv values had to be less than 0.25, it indicates that the evaluation indicators have reached the corresponding coordination degree.

b) During an analytic hierarchy process, the experts first paired each of the 33 items to generate a pairwise comparison matrix and established the priorities for each item by judging them in pairs by calculating their relative weights, and examining whether their logical judgments were sequential. The consistency ratio was set as <0.10. Table 3 summarizes the several rounds of the Delphi and Analytic Hierarchy Process.

Table 3. *The Delphi and Analytic Hierarchy Process*

Steps	Research Process	Research Results
1	Literature review & involvement of experts in research	Preparation of the Delphi item questionnaire, preliminary construction a teaching ability evaluation system: 4 primary items, 35 secondary items
2	The first round of the Delphi study: a broad exploratory round	Optimization of the newly developed evaluation system: 4 primary evaluation indicators, 33 secondary indicators
3	The second round of the Delphi study: further exploration of perceptions and level of agreement	Optimization of the newly developed evaluation system: 4 primary evaluation indicators, 31 secondary indicators

4	The third (and last) round of the Delphi study: accuracy and consensus building	Selecting items for the newly developed evaluation system for student teachers training abilities: 4 primary evaluation items, 31 secondary items
5	Analytical Hierarchy Process	Setting the weight coefficients of primary and secondary evaluation indicators

4.Results

4.1 Identifying evaluation areas and indicators

4.1.1. Analysis of each indicator during the first round of the Delphi process

After a review of the literature, developed the first questionnaire which consisted of four primary indicators and 35 secondary indicators, and open-ended fields for experts to fill in. Open-ended questions were used to enhance the reliability and validity of the Delphi process in the first round based on the ideas of Swank & Houseknecht, (2019) (Swank & Houseknecht, 2019). Subsequently, the questions were revised, split, or combined. The comments made in the blank fields of the questionnaire were summarized as shown below.

(i) A suggestion to include "capacity observations" for each indicator regarding self and care for students to teacher ethics.

(ii) A recommendation to sort out the logical relationship between the indicators of teaching skills as regards:

a) Clarifying the logic of teaching skills.

b) Highlighting the ability to prepare and integrate teaching resources.

c) enhancing teaching abilities using information technology.

(iii) A suggestion to add "professional development and growth capacity" indicators to developmental ability.

(iv) A proposition to delete overlapping indicators such as "Learning to research" under the "teaching skills" and "development ability" frameworks.

After summarizing the experts' opinion, the language of each indicator was revised, and the indicators "learning research" under the "teaching skills" and "development ability" dimensions were deleted leaving four primary indicators and 33 secondary indicators for the subsequent round.

4.1.2 Analysis of each indicator during the second round of the Delphi process

The second round of the process investigated the appropriateness of the remaining four primary indicators and 33 secondary indicators. Statistical analysis of the four primary evaluation indicators indicated M values greater than 3.9 and the SD values less than 1 (0.647, 0.688, 0.775, and 0.701, respectively for dimensions A, B, C and D, respectively), indicating that the experts' opinions were concentrated. The Cv values were less than 0.25 (0.15, 0.15, 0.19, and 0.18,

respectively for dimensions A, B, C and D, respectively), indicating a high degree of coordination among the experts. The experts did not propose any modification to the first-level evaluation items; thus, all the first-level evaluation items were retained for the next round (Table 4).

Analysis of the 33 secondary indicators showed that two questions (A5 and A6) in the dimension "teacher ethics" did not meet the benchmark criteria implying that expert opinions on these questions were divergent; thus, A5 and A6 were deleted (See Table 5). Three evaluation indicators, one question within the teaching skills dimension (B3) and two questions within the developmental ability dimension (D1 and D2), did not meet the benchmark criteria; their wording was therefore adjusted based on experts' suggestions. B3 "Teaching Design" was revised to "Determine Teaching Objectives" based on experts' suggestions to distinguish it from B4 and B5. D1 "Lifelong learning" was revised to "developmental planning" to denote the competency of "professional development and growth" in the competency overview. D2 "Evaluation and Reflection" was revised to "Reflection and Improvement" to denote the connotation and extension of the teaching ability assessed by this question. Therefore, the primary indicators remained unchanged, whereas the secondary indicators were modified (A5 and A6 were deleted and the content of the questions B3, D1 and D2 were modified) leaving 31 questions for the subsequent round.

4.1.3 Analysis of each indicator during the third round of the Delphi process
In the third round of the expert consultation, the M value of the four first level indicators were greater than 4, whereas their SD values were 0.688, 0.405, 0.674, and 0.405, for A, B, C and D respectively, indicating that the opinion of the experts was concentrated. The Cv values were 0.15, 0.08, 0.15, and 0.10 for A, B, C and D respectively, implying the concentrated opinion of the experts and a high degree of coordination among them. The experts also did not propose any modification to the first-level evaluation items; thus, all the first-level evaluation items were retained (see Table 4).

Table 4. Statistical values and screening thresholds of the indicators at the second and third round of expert consultation

Profile/Indicator Points/Statistical Values	M2	SD2	Cv2	M3	SD3	Cv3
A. Teacher ethics	4.27	0.647	0.15	4.55	0.688	0.15
B. Teaching skills	4.45	0.688	0.15	4.82	0.405	0.08
C. Educational ability	4.00	0.775	0.19	4.36	0.674	0.15
D. Developmental ability	3.91	0.701	0.18	4.18	0.405	0.10

Note: M2 represents the mean value of the second-round Delphi process; SD2 represents the standard deviation of the second-round Delphi process; Cv2 represents the coefficient of variation of the second-round Delphi process; M3 represents the mean value of the third-round Delphi process; SD3 represents the standard deviation of the third-round Delphi process; Cv3 represents the coefficient of variation of the third-round Delphi process.

The M values of the second-level indicators were greater than 3.75, and the SD values ranged from 0.467–0.924 indicating that the opinion of the experts was relatively concentrated. The Cv values ranged from 0.099–0.212 indicating a high degree of coordination among the experts. The experts also did not propose any modification to the second-level evaluation items; thus, all 31 second-level evaluation items were retained. (See Table 5).

After three rounds of the Delphi process, the evaluation item system constructed by the expert group covered four dimensions and 31 questions, with each dimension containing 4, 17, 5, and 5 questions, respectively with most M values and SD values of each dimension and items above 4.0 and below 0.70, respectively. Additionally, when comparing the results of the three Delphi questionnaires in general and across various dimensions, the mean values increased and their standard deviations decreased (with the exception a few questions that a higher standard deviation due to revisions), indicating that Delphi expert members had reached a consensus on various dimensions and indicators.

Table 5. Indicator screening thresholds during the second and third rounds of expert consultation

Profile/Indicator Points/Statistical Values	M2	SD2	Cv2	M3	SD3	Cv3
A. Teacher ethics	4.27	0.647	0.15	4.55	0.688	0.15
A1 Strengthen moral education for nurturing people	4.2	0.75	0.18	4.2	0.7	0.18
A2 Teacher moral code	4.4	0.92	0.21	4.5	0.52	0.12
A3 Professional identity	4.2	0.87	0.21	4.4	0.81	0.19
A4 Caring for students	4.1	0.94	0.23	4.3	0.47	0.11
A5 Self-cultivation	3.6	1.21	0.34	×	×	×
A6 Mastering the laws and methods of education and teaching	3.6	1.04	0.29	×	×	×
B. Teaching skills	4.45	0.688	0.15	4.82	0.405	0.08
B1 Familiarizing oneself with the curriculum standards	4.5	0.82	0.18	4.6	0.51	0.11
B2 Analyze the learning situation	4.4	0.67	0.15	4.6	0.51	0.11
B3 Define learning objectives	3.9	0.83	0.21	4.5	0.82	0.18
B4 Designing the teaching process	4.1	0.83	0.20	4.4	0.81	0.19
B5 Prepare learning resources	4.2	0.87	0.21	4.3	0.79	0.18
B6 Integrate learning resources	4.5	0.69	0.15	4.5	0.52	0.12
B7 Design performance tasks	4.0	0.78	0.19	4.1	0.54	0.13
B8 Create a learning environment	4.2	0.75	0.18	4.5	0.69	0.16
B9 Organize teaching	4.0	0.78	0.19	4.5	0.82	0.18

B10 Explain and demonstrate	4.2	0.60	0.14	4.4	0.81	0.19
B11 Ask and answer questions	4.0	0.63	0.13	4.2	0.6	0.14
B12 Manage and monitor teaching	4.2	0.87	0.21	4.3	0.79	0.18
B13 Summarize and improve	4.1	0.83	0.20	4.6	0.69	0.15
B14 Teach using information technology	4.1	0.54	0.16	4.5	0.52	0.12
B15 Design evaluation tools	4.0	0.89	0.22	4.4	0.92	0.21
B16 Implement teaching evaluation	4.0	0.78	0.19	4.5	0.52	0.12
B17 Analyze evaluation results	4.3	0.47	0.11	4.5	0.69	0.16
C. Educational ability	4	0.775	0.19	4.36	0.674	0.15
C1 Moral education and psychological health guidance	4.4	0.67	0.15	4.4	0.81	0.19
C2 Classroom management	4.4	0.67	0.15	4.6	0.52	0.12
C3 Parent-school communication	4.3	0.79	0.18	4.6	0.69	0.15
C4 Educational activity planning	4.2	0.87	0.21	4.5	0.69	0.16
C5 Educational activities guidance	4.1	0.70	0.17	4.3	0.47	0.11
D. Developmental ability	3.91	0.701	0.18	4.18	0.405	0.10
D1 Development planning	3.9	0.94	0.24	4.7	0.47	0.1
D2 Reflection and improvement	3.9	0.54	0.21	4.6	0.51	0.11
D3 Learning to research	4.2	0.87	0.21	4.4	0.51	0.12
D4 Communication skills	4.0	0.63	0.16	4.6	0.51	0.11
D5 Collaborative learning	4.2	0.87	0.14	4.5	0.69	0.16

Note: The "×" table was deleted during the third Delphi construction

4.2 Determining the weights of each indicator

The weights of each indicator were obtained in two steps, namely matrix group establishment and consistency test. The estimated weight coefficients of each indicator are presented in Table 6 with higher values indicating a higher priority in the order of the teaching ability.

Table 6. Final weighting coefficient values of the teaching ability of student teachers

Tier 1 Projects	Weights	Secondary project content	Weights
A. Teacher ethics	0.196	A1 Strengthen moral education to nurture people	0.0402
		A2 Teacher moral code	0.0470
		A3 Professional identity	0.0421
		A4 Caring for students	0.0666
B Teaching skills	0.445	**Teaching design level**	
		B1 Familiarize oneself with the curriculum standards	0.0174
		B2 Analyze the learning situation	0.0169
		B3 Define learning objectives	0.0154
		B4 Designing the teaching process	0.0194
		B5 Prepare learning resources	0.0107
		B6 Integrate learning resources	0.0144
		B7 Design performance tasks	0.0179
		B8 Create a learning environment	0.0169
		Teaching implementation level	
		B9 Organize Teaching	0.0111
		B10 Explain and demonstrate	0.0420
		B11 Ask and Answer questions	0.0322
		B12 Manage and monitor teaching	0.0313
		B13 Summarize and improve	0.0329
		B14 Teach using information technology	0.0355
		Teaching evaluation level	
		B15 Design evaluation tools	0.0427
		B16 Implement teaching evaluation	0.0478
		B17 Analyze evaluation results	0.0405
C. Educational ability	0.180	C1 Moral education and psychological health guidance	0.0297
		C2 Classroom management	0.0410
		C3 Parent-school communication	0.0432
		C4 Educational activity planning	0.0373
		C5 Educational activities guidance	0.0290
D. Developmental ability	0.179	D1 Development planning	0.0406
		D2 Reflection and improvement	0.0483
		D3 Learning to research	0.0392
		D4 Communication skills	0.0283
		D5 Collaborative learning	0.0227

5. Discussion

This study developed a comprehensive evaluation system for Chinese student teachers' teaching abilities to guide the evaluation of teacher ethics, teaching skills, educational ability, and developmental ability. From a practical standpoint, a multidimensional perspective decomposes the evaluation of student teachers' teaching abilities into highly visible goals for both teachers and students, increases the opportunities to achieve these goals in practice, and provides researchers with "parameters" to investigate. In addition, the evaluation system provides developmental feedback for student teachers via the use of a self-evaluation system.

The present study relied on expert consensus to construct an evaluation system for Chinese student teachers' teaching ability that included four constructs and 31 item points. Although there is no consensus within academic community regarding what specific elements constitute the teaching abilities of student teachers, the newly developed evaluation system integrates teaching abilities with emotional values, teaching practice, and professional development required in the teaching profession. The evaluation system hence forms a comprehensive view of teaching abilities that is consistent with relevant literature, guidelines, and standards (Dervenis et al., 2022; Qin Z & Chen L, 2021; Swank et al., 2021), as well as with the current Chinese teacher professional certification .

The development of teaching abilities among student teachers is a multi-level refinement process. Teachers can use the developed evaluation competency indicators to determine what key areas should be cultivated within the students' teaching abilities. The four indicators of the first-level dimension in order of importance are teaching skills, teacher ethics, educational ability, and developmental ability which align with the learning progression development direction. The teaching skills and the constructed the instructional design, instructional implementation, and instructional evaluation item systems concur with the student-centered concept and conform to the constructivist approach of teaching wherein students are viewed as active and self-regulated learners (Boz & Cetin-Dindar, 2021). Teaching skills were accorded the highest weight consistent with published literature. Dervenis, et al.   (2022) conducted a systematic review of higher education teachers' abilities using the PRISMA method. Teaching skills were commonly identified as necessary and important in the teaching ability for both pre-service and higher education teachers (Dervenis et al., 2022). Among the secondary indicators of teaching skills, "designing expressive tasks" ranked highest within the teaching design dimension, "explaining and demonstrating" ranked highest within the teaching implementation dimension, and "implementing teaching evaluation" ranked highest within the teaching evaluation dimension possibly because these items

are directly related to student achievement in China. Therefore, educators should develop strong teaching skills that result in quality teaching (Metzler & Woessmann, 2012). Other study findings also suggest that participants' perceptions are rooted in the Chinese educational context.

The omission of 33% of the items after three rounds of Delphi process from the teacher ethics dimension could be attributed to the semantic ambiguity of some indicator expressions, or the spiritual trait dimension which was difficult to evaluate either quantitatively or qualitatively. Additionally, such an omission may have been due to the inclusion of a variety of experts, such as educational administrators and educational policymakers, who may not have been familiar with student teachers. Thus, observing teaching practices of student teachers is required to refine study data. Within the teacher ethics dimension, "caring for students" was ranked highest suggesting that teachers' attitudes influence their commitment to their own responsibilities, behavior toward their students, and their perceptions about their professional growth (Chen & Rovegno, 2000).

There were no significant differences between the weights accorded to the educational and development ability indicators possibly because many items were rated as equally important or intermediate by the participating experts, and almost all abilities on the original Delphi list were considered important. Teachers' educational ability and development abilities promote effective and meaningful interactions between teachers and students (Iqbal et al., 2019; Theall & Franklin, 2001). Within the educational ability dimension, "classroom management" and "parent-school communication" indicators were ranked highest because classroom teachers in China are mainly responsible mainly student discipline in the classroom and parent-school communication. Among the developmental ability indicators, the "reflection and improvement" indicator was highly prioritized concurrent with the third stage of professional development, "being a teacher as a person" which is considered as the highest goal of being an effective teacher (Meng et al., 2016).

The proposed evaluation system can help teachers identify key capacities in teacher training, assist in teaching, improve the curriculum, guide the development of talent nurturing programs, plan teaching practices, and facilitate remedial processes where necessary (Swank & Houseknecht, 2019). Moreover, the evaluation system can provide student teachers with developmental feedback, aide in self-evaluation and professional growth and development (Swank, 2014), and increase their capacity for self-directed learning, self-reflection on personal strengths and areas of growth, and personal obligations for their development as educators.

6.Conclusion

This study used the Delphi method to establish an evaluation item system with 4 constructs and 31 questionnaire items to address the problems and dilemmas in evaluating the teaching ability of Chinese student teachers. The Delphi technique indicated that student teachers' teaching abilities includes teacher ethics, teaching skills, educational ability, and developmental ability. Universities, teachers, and student teachers should re-examine the rationality and developments of current student teachers' evaluation systems to set the standards of teaching practice. The study also employed an Analytic Hierarchy Process to prioritize specific indicators of student teachers' training abilities.

The Analytic Hierarchy Process ranked teaching abilities in descending order as follows: teaching skills, teacher ethics, educational ability and developmental ability. Among the secondary indicators, "caring for students" was ranked highest within the teacher ethics dimension, "implementing teaching evaluation" was ranked highest within the teaching skills dimension, "parent-school communication" was ranked highest within the educational ability dimension, "reflection and improvement" was ranked highest within developmental ability dimension .Teachers can correctly grasp the order and focus of cultivating specific teaching ability indicators through the overall weight value of the evaluation system.

7. Recommendation

The newly developed evaluation system that assesses the teaching ability of Chinese student teachers is a theoretical model and tool that can be used in routine practice. However, selecting different experts to participate in Delphi groups based on the same criteria may not yield the same results. Therefore, future research should obtain the perspectives of a wider variety of teaching experts on suitable indicators for evaluating teaching ability. Furthermore, researchers should focus on specific aspects of competencies' assessment by modeling specific domains.

8. References

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