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ORIGINAL RESEARCH

An Investigation of the Pre-Service Teachers' Emotional Awareness in China

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Purpose: Emotional awareness, fundamental to emotional intelligence, involves recognizing and describing emotions in oneself and others, critically influencing mental health and relationships. Therefore, this study aimed to analyze the emotional awareness of pre-service teachers in Chinese through the revised emotional awareness scale (LEAS).

Participants and Methods: The two-stage study included 455 pre-service teachers for LEAS revision (Study 1) and 773 pre-service teachers (randomly sampled) alongside in-service teachers as a contrast group (Study 2).

Results: The revised LEAS showed a strong reliability (total $\alpha = 0.888$; self/others-awareness $\alpha = 0.860/0.822$) and validity, with self/others-awareness subscales highly correlated ($r = 0.797$) and strongly linked to total scores ($r = 0.937/0.925$). In addition, the criterion-related validity test found that the LEAS was significantly and positively correlated with the TMMS and QYEI. Pre-service teachers' mean emotional awareness score (2.730) was below the theoretical midpoint (3). Females scored higher than males, awareness increased with academic grade, and liberal arts students outperformed science peers. In-service teachers had higher self/others-awareness than pre-service groups, but total scores of senior pre-service teachers matched in-service levels.

Conclusion: The revised LEAS exhibited good reliability and validity and could be used as an effective tool to measure emotional awareness. Pre-service teachers' emotional awareness ability, in general, is low to medium and needs improvement. Pre-service teachers' emotional awareness differed significantly by gender, grade, and profession. The cultivation of emotional awareness is very important and necessary for teachers and is more important for pre-service teachers.

Keywords: pre-service teacher, emotional awareness, LEAS, investigation, China

Introduction

Emotional Awareness is regarded as the skill most fundamental to emotional intelligence. It refers to an individual's ability to recognize and describe their own emotions as well as those of other people.[1,2] In several prominent models of emotional intelligence, researchers have incorporated the dimension of emotional awareness. This encompasses the ability to perceive emotions,[3] the capacity to both perceive and express emotions,[4] self-awareness,[5] and emotional self-awareness.[6] Despite their differences, these concepts generally converge on defining emotional awareness as a kind of ability. This ability significantly affects an individual's mental health.[7–9] High emotional awareness enables an individual to establish a good parent–child relationship.[10,11] It also enables people to cope calmly with stressful events,[12] regulating emotions effectively[13] and using strategies of emotional expression[14] that improve work efficiency,[15] job satisfaction,[16] quality of life[17] and happiness.[18,19]

However, low emotional awareness can promote development of irrational beliefs,[20] negative emotions, such as anxiety[21,22] and depression,[23,24] or even some physical and mental diseases.[25,26] These problems include eating disorders[27] and substance dependence.[28,29] One study found evidence that individuals who grew up in more harsh and unpredictable environments (eg, abuse/neglect) had less awareness for their own emotions and the emotions of others.[30] Given the importance of the emotional awareness to an individual's physical and mental health, there has been a great deal of research on the emotional awareness of different populations. Unfortunately, studies on emotional awareness have

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been largely confined to special groups, such as spinal cord injury patients,[31] patients with anxiety disorders,[31] anorexia,[32] PTSD,[33] schizophrenia,[34] alexithymia[35,36] and autism.[37] Research of emotional awareness in normal populations has been largely neglected Studies of emotional awareness in normal populations are urgently needed.

Many studies have suggested that teaching is an emotional practice[38] that calls for higher emotional competence[39] or skill.[40] Not only must teachers manage various emotions in daily life like other people, but the characteristics of their profession also require more emotional labor at work.[41] While initial research on emotional competence primarily centered on children, as the scope of research has expanded, an increasing body of evidence demonstrates that emotional competence is an essential professional attribute for teachers in the 21st century.[42] For example, Ersay found that higher emotional awareness in preschool teachers was positively correlated with label feeling, emotional regulation, and problem focus responses to children's negative emotions, whereas high levels of emotional awareness were negatively correlated with punishment responses.[43] Several studies have highlighted that teachers play a pivotal role in children's development. Teachers' emotional competencies not only directly influence children's emotional abilities but also indirectly impact their social-emotional and academic growth through effective teaching practices.[44] Moreover, teachers' emotional competencies are essential professional attributes required to manage the complexities of educational tasks and interpersonal interactions.[45] Therefore, emotional awareness is particularly important for teachers. High emotional awareness helps teachers actively regulate their emotions to maintain mental health and can promote positive interactions to build harmonious teacher–student relationships.

As early as the previous century, researchers began to assert that emotional awareness is important for teachers.[1] A worrying development is that the situation regarding teachers is not satisfactory: from 1978 to 2010, a cross-sectional study over time showed that kindergarten teachers, primary, and secondary schools' teachers in our country exhibited levels of depression, anxiety, and other emotional problems that increased year by year.[46,47] This situation has led to reports of corporal punishment by teachers and abuse of students that are often found in newspapers; some teachers have committed suicide or homicide, which is not uncommon. Clearly, the development of teachers' own qualities, especially the training and development of their affection quality, needs attention,[48] making it a critical issue for current education research in our country.[49] Especially in the post-pandemic world of today, alongside the challenges posed by AI technology to traditional education models, researchers have identified an emotional crisis in the era of artificial intelligence and have emphasized the urgent need to cultivate emotional literacy.[50] To identify effective strategies for enhancing teachers' emotional competencies, several countries, research institutions, and scholars have initiated explorations through project-based interventions. For instance, in 2006, Brackett and Caruso introduced the "Emotionally Intelligent Teacher" training program, which is designed to assist educators in cultivating the competencies necessary for effective emotional management and application within an educational environment.[51] Another example is the implementation of mindfulness-based practices and training, which are primarily designed to alleviate teacher stress, enhance well-being, and address issues related to emotional regulation and prosocial behavior.[44] Furthermore, the United States has implemented the CARE for Teachers program, which offers comprehensive resources and tools designed to assist K-12 teachers and administrators in enhancing their skills related to stress management, burnout prevention, and invigorating the teaching environment.[45]

However, a limited number of these programs are specifically designed for pre-service teachers. Mainstream scholars in the field of teacher emotion research, such as Jennings et al, predominantly concentrate on early childhood and basic education. Consequently, the current focus of research on teacher emotional competence is primarily centered on educators in early childhood and primary school settings.[52] As a result, research on pre-service teachers has predominantly remained at a theoretical level for an extended period.[53,54] Although a few studies have assessed pre-service teachers according to the general characteristics of emotional intelligence,[55] the foundation of emotional intelligence—emotional awareness—has not been studied in depth. Hence, cultivating pre-service teachers' affection quality from the origin—pre-service training of teachers—has important theoretical significance and practical value for teachers' professional standards and professional development.

Therefore, the present study is intended to survey pre-service teachers perceived emotional ability in order to reveal their objective status and obtain empirical information to inform better development of pre-service teachers' emotional awareness. This research included two main parts: revising the levels of the emotional awareness scale and testing its

reliability and validity in pre-service teachers; the other part used the revised levels of the emotional awareness scale to examine pre-service teachers' status.

Revision of Levels of Emotional Awareness Scale in Pre-Service

Based on the analysis of the differences between Chinese and Western cultures, the levels of the emotional awareness questionnaire were revised to develop an effective measurement tool to investigate pre-service teachers' emotional awareness.

Object

The sample size calculation is based on existing research on the determination of sample size in social surveys.[56] In this study, we set significance level α = 0.05, Z = 1.96, P = 0.105, E = 0.05, N = 2.6158 million. The sample size was calculated as follows: (1) The formula based on a single independent variable is:

$$n = \frac{p(1-p)}{\frac{E^2}{Z^2} + \frac{p(1-p)}{N}}$$

where n represents the required sample size, Z is the critical value corresponding to significance level α in the standard normal distribution, p represents the occurrence rate of the normal school students in the young people of the same age and level of education, N is aspiring educators in teacher education programs,[57,58] and E is the permissible estimation error.[56]

$$n = \frac{0.105(1-0.105)}{\frac{0.05^2}{1.96^2} + \frac{0.105(1-0.105)}{2615800}} \approx 144$$

(2) Taking into account the potential loss to follow-up and invalid responses, the sample size was adjusted as follows:[59]

$$n_{real} = \frac{n}{1 - dropout\,rate} = \frac{144}{0.8} = 180$$

(3) To ensure the objectivity and comprehensiveness of the survey data, a total of 500 questionnaires were distributed.

Participants returned 455 completed questionnaires, with an effective questionnaire recovery rate of 91%. Among the participants, 147 were male (32.31%), and 308 were female (67.69%), with ages ranging from 16 to 25 years old, the mean age of participants was 20.41 years (SD = 7.56). Educational attainment varied, with 88 personnel (19.34%) hold college degrees, 261 (57.36%) possess bachelor's degrees, and 106 (23.30%) have obtained master's degrees.

Tools

Levels of Emotional Awareness Scale (LEAS)

The research used the Levels of Emotional Awareness Scale (LEAS) compiled by Lane et al. The questionnaire[60] included 20 situations involving two people ("yourself" and others) to elicit one of four kinds of feelings (anger, fear, happiness, and sadness). For each question item, participants answered two questions: "What do you feel?" and "What do you think the other person feels?" Followed by the main trial in accordance with "LEAS scoring manual", participants' responses were assessed using a 0–5 scale to calculate emotional awareness. Five Chinese psychology graduate students and three English-speaking graduate students translated the LEAS into Chinese. After reference on the Japanese version of Levels of Emotional Awareness Scale,[61] we modified the description of the situation used in the instrument to suit Chinese cultural characteristics. For instance, the first situation: a neighbor asks you to assist in repairing furniture. As you begin hammering nails while the neighbor watches, instead of striking the nail, you accidentally hit your own finger. How would you feel at that moment? How might the neighbor feel? The original author intended to evoke a sense of anger; however, in Chinese culture, assisting a neighbor does not typically elicit such emotions. Therefore, changing the neighbor to a stranger better aligns with the intended emotional response.

Trait Meta-Mood Scale (TMMS)

The study used the Trait Meta-Mood Scale revised by Qi Yan et al.[62] The scale consisted of a total of 26 items, uses 5-point Likert scale and is constituted of three subscales of "emotional attention", "emotional discrimination" and "emotional recovery". The total scale and subscales of consistency reliability are 0.689, 0.640, 0.629, and 0.586, respectively.[62]

Questionnaire on Youth's Emotional Intelligence (QYEI)

The Questionnaire on Youth's Emotional Intelligence includes 20 items, which uses 6–point Likert scale and is constituted of the five factors "emotional contagion", "emotion cognition", "emotional experience", "emotional evaluation" and "emotion control". The total questionnaire's internal consistency coefficient was 0.826, and the subordinate factor of the internal consistency coefficient was from 0.584 to 0.825. It exhibited good structure validity, and all the fitting index is above 0.9.[63]

Scoring Method

First, we invited two researchers to study the LEAS scoring manual and perform some practice. When two of them became proficient, they tested the participants' answers independently and calculated perceived yourself and somebody else, and detected two total scores. Specifically, it included three steps: (1) we scored the vocabulary and phrases representing emotional reactions (0–3 points): 0 point for no emotion words, 1 point for physical reaction, 2 points for general mood, 3 points for specific emotions; (2) to perceive yourself or somebody else in scoring (0–4 points), when there is only one of the two is 3 points, meter high marks. When there are two or more than 3 points, if its meaning repeats, mark three points; if its meaning does not repeat, mark four points; (3) to detect the total score (0 to 5 points), when there is only one of the two is 4 points, meter the highest scores; when two or more are 4 points; if its meaning repeats, it is scored 4 points; if its meaning does not repeat, it is scored 5 points. The following is an example of the 20th item of the scale (see Table 1).

Program

With the cooperation of pre-service teacher counselors, the researchers used meeting time to provide a questionnaire to pre-service teachers. The response time to complete the questionnaire was approximately 30 min. Questionnaires were returned to the researchers upon completion. All data were analyzed using SPSS 22.0.

Results

Reliability Analysis

Different raters independently scored participants' answers according to the instructions provided in the LEAS scoring manual. The results showed that the two researchers in emotional awareness level scores and subordinate two-factor

Table 1 Example for Scoring the Answer to LEAS

You and your friends are working hard in order to win the Best Performance Award. Results published one day indicate that your friend received a prize. Could you tell me what's your feeling, and what's your friend's feeling?	
Level 0	I am not working hard enough to win.
Level 1	I feel uncomfortable
Level 2	I want to break something.
Level 3	We both feel happy.
Level 4	I am very sad, but I also feel happy for a friend
Level 5	I am frustrated that I did not win, but I feel happy for my friend's winning. He is worthy of the prize and should be happy and proud, but he may also be a bit worried about my feelings.

Table 2 The Correlation Coefficient Between LEAS and the Relevant Questionnaire Measuring Tools

	Perceive Oneself	Perceive Others	Total Scores
Emotional notice	−0.05	−0.08	−0.08
Emotional discrimination	0.14**	0.16**	0.16**
Emotional recover	0.04	0.06	0.04
Trait Meta-Mood	0.06	0.06	0.06
Emotional cognition	0.09	0.12*	0.11*
Emotional contagion	−0.05	−0.02	−0.07
Emotional experience	0.14**	0.18**	0.16**
Emotional evaluation	0.10*	0.10*	0.10*
Emotional regulation	−0.01	0.03	−0.01
Emotional intelligence	0.07	0.10*	0.07

Notes: *$p < 0.05$; **$p < 0.01$.

correlation coefficients were 0.892, 0.905, and 0.840, respectively. Hence, the revision level of the LEAS has good reliability among raters.

The LEAS and its two internal consistency coefficients are 0.888, 0.860, and 0.822, respectively. The revision level of the emotional awareness scale exhibited good homogeneity and reliability.

Validity Analysis

The size of the correlation coefficient between the total score and all the factors was used to examine the construct validity of the questionnaire. The correlation coefficient of perceived themselves and others on the LEAS was 0.797, and the correlation coefficients of the two factors and awareness scores were 0.937 and 0.925, respectively. The findings indicated that the full questionnaire and two simple versions exhibited good construct validity.

The TMMS and QYEI as criterion were used to check the criterion validity of the emotional awareness questionnaire. The results showed (Table 2), the total score in emotional awareness standard and two subordinate factors exhibited significant positive correlation with "emotional discrimination" in TMMS ($p < 0.01$); with respect to QYEI, the total score in emotional awareness and two subordinate factors both exhibited significant positive correlation with "emotional experience" and "emotional evaluation"; awareness of others "feelings" of emotional awareness and scores in QYEI were significantly correlated ($p < 0.05$). This finding indicates that there is a relevance between the revised LEAS and school questionnaire.

An Investigation of Pre-Service Teachers' Emotional Awareness

Design

Using the revised LEAS as an investigative tool, pre-service teachers served as research subjects. Gender, grade, ARTS, and other aspects of individual background were used to assess pre-service teachers as characteristics presenting differences in emotional awareness. In addition, we extracted parts of the primary and secondary schools serving teachers as a control to learn more about pre-service teachers' differences in emotional awareness to provide inspiration for pre-service teachers' emotional awareness.

Object

Pre-service teachers: Overall, random sampling was used to select 800 students, from comprising both associate and undergraduate levels, who were selected from conventional public teacher education institutions, with 773 valid subjects. Among them were 342 males and 431 females; 188 freshmen, 214 sophomores, 176 junior,195 senior year; 442 liberal arts students, 330 science students; 334 were only children and 439 had siblings; 331 people were from towns, 422 people from the countryside.

The newly recruited teachers included 123 primary and secondary teachers as controls; among them, there were 25 males and 98 females; 98 college degrees, 25 of which are bachelor's degrees.

Tools

Study 1 used the revised LEAS.

Program

With the cooperation of pre-service teacher counselors, the researchers conducted class meetings to administer the questionnaire. The questionnaire response time was approximately 30 min. In total, 800 questionnaires were returned. We eliminated 27 invalid questionnaires, resulting in a total of 773 questionnaires. The effective response rate was 96.6%. All data were analyzed using SPSS software (version 16.0).

Results

General Characters of Pre-Service Teachers' Emotional Awareness

The survey found that, in general, the pre-service teachers' emotional awareness scored an average of 2.730, which is below the theoretical value "3". Hence, pre-service teachers' emotional awareness was not optimistic. In terms of subordinate dimensions, the results showed that the average scores for perceived themselves and somebody else were 2.224 and 2.224, respectively. To further investigate the differences between various factors, the use of single-factor repeated-measures analysis of variance showed significant differences in pre-service teachers on different factors (F = 119.015, $p < 0.001$, η^2= 0.134). Specific performance in the "aware of their own" dimension scored significantly higher than the average "aware of others" average score dimension, indicating that internal emotional awareness of pre-service teachers can differ.

Because there have been no other domestic investigations of emotional awareness, this study compared the results of this survey with those of studies on similar-aged students in other countries. This comparison used previous results (Igarashi et al, 2011; Lane, 1988) that conducted a one-sample t-test on the survey data. According to the results (Table 3), the survey of pre-service teachers' emotional awareness and its subordinate factors was significantly higher than that of same-age Japanese college students ($p < 0.001$), but lower than that of college students in the United States ($p < 0.001$).

Gender Differences in Pre-Service Teachers' Emotional Awareness

Respectively, we used the total score of emotional awareness, perceived themselves, and others' scores as the dependent variable, with gender as an independent variable, an independent samples t-test, and the amount of effect. The results showed that pre-service teachers differed significantly according to gender, in emotional awareness score and the average score on two factors ($d > 0.2$); females scored significantly higher than males ($p < 0.001$) (see Table 4).

Table 3 One-Sample t-Test of Japan and the United States the Same Age College Students in Survey

	(China) This Survey (n = 773)		Japan (n = 344)		USA (n = 83)		t_1	d_1	t_2	d_2
	M	*SD*	*M*	*SD*	*M*	*SD*				
Perceive oneself	2.23	0.59	2.04	0.55	2.82	0.46	8.70***	0.34	−28.125***	−1.298
Perceive others	2.10	0.59	1.84	0.48	2.60	0.44	12.10***	0.54	−23.613***	−1.138
Total scores	2.73	0.62	2.50	0.47	3.18	0.46	10.17***	0.48	−20.044***	−0.982

Notes: t_1 and d_1 are the amount compared with the Japanese data statistics, and t_2 and d_2 are the amount statistics compared with the United States data statistics; ***$p < 0.001$.

Table 4 Gender Differences in Pre-Service Teachers' Emotional Awareness

	Male (n = 342)		Female (n = 431)		t	*d*
	M	*SD*	*M*	*SD*		
Perceived oneself	2.15	0.59	2.29	0.57	−3.27**	0.24
Perceived others	2.01	0.60	2.16	0.57	−3.53***	0.26
Total scores	2.57	0.62	2.86	0.59	−6.71**	0.50

Notes: **$p < 0.01$, ***$p < 0.001$.

Table 5 Grade Differences in Pre-Service Teachers' Emotional Awareness

	Freshman (n = 188)		Sophomore (n = 214)		Junior (n = 176)		Senior (n = 195)		*F*	*η*2
	M	SD	M	SD	M	SD	M	SD		
Perceived oneself	2.06	0.65	2.52	0.47	2.17	0.67	2.40	0.50	12.44***	0.05
Perceived others	1.88	0.63	2.08	0.48	2.08	0.68	2.33	0.49	20.22***	0.07
Total scores	2.40	0.63	2.68	0.47	2.76	0.70	3.07	0.49	43.85***	0.15

Notes: ***$p < 0.001$.

Grade Differences in Pre-Service Teachers' Emotional Awareness

The results showed that different grades (from freshman to senior) of pre-service teachers' emotional awareness and subordinate factor scores differed significantly ($F = 44.609$, $p = 0.001$, $\eta^2 = 0.174$) (see Table 5). Further analysis of variance showed that the total LEAS score and the average score of the two affiliated factors showed significant differences in grades ($F = 12.443$, $p = 12.443\ 01$, $\eta^2 = 0.046$, $F = 20.219$, $p = 0.001$, $\eta^2 = 0.073$, $F = 43.387$, $p = 0.001$, $\eta^2 = 0.146$). Figure 1 illustrates a general trend of increasing emotional awareness ability and its subordinate factors among pre-service teachers as grade-level advances. A multiple-comparison analysis found that (see Table 6), in the total scores and perception of other dimensions, there was no significant difference between the sophomore and junior students ($p > 0.05$), while the others had significant differences in every grade ($p < 0.001$ or $p < 0.01$), while there was no significant difference between freshmen and sophomore and junior students ($p > 0.05$), while the rest had significant differences in age ($p < 0.001$ or $p < 0.01$).

Professional Differences in Pre-Service Teachers' Emotional Awareness

According to the results (see Table 7), the total scores of different professional pre-service teachers in emotional awareness as well as average score of perceived oneself and others were significantly different. In addition, students in the liberal arts scored significantly higher than science students ($p < 0.001$).

Differences in Emotional Awareness of Pre-Service Teachers and in-Service Teachers

A comparison of the averages of pre-service and in-service teachers' emotional awareness showed that pre-service teachers' emotional awareness and its subordinate factors had significant differences ($d > 0.2$), and pre-service teachers' scores were lower than those of in-service teachers ($p < 0.001$) (see Table 8).

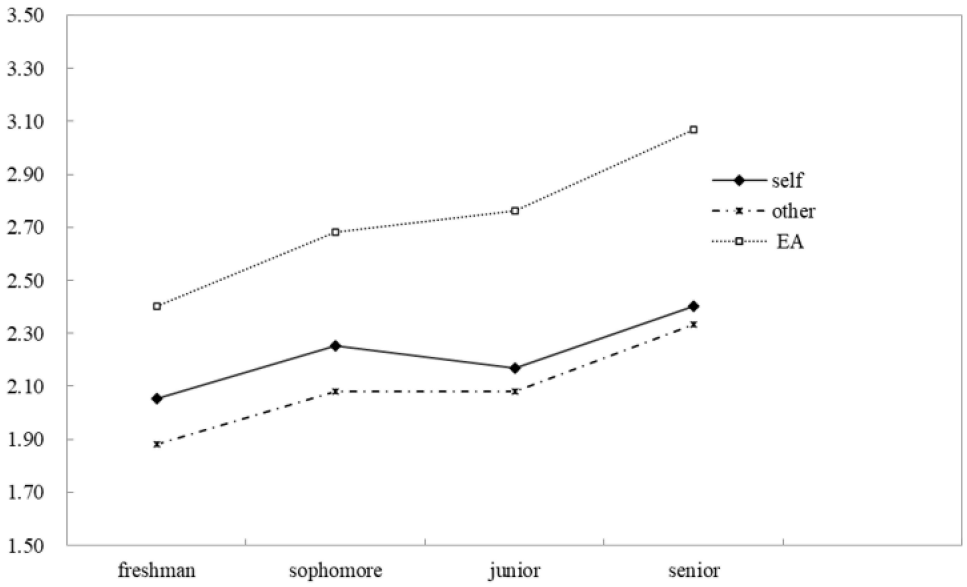

Figure 1 The trend of pre-service teachers' emotional awareness across different grade levels.

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Table 6 Multiple Comparative Analysis of Grade Differences in Pre-Service Teachers' Emotional Awareness

Grade	Grade	Perceived Oneself	Perceived Others	Total Scores
Freshman	Sophomore	−0.20**	−0.20**	−0.28***
	Junior	−0.12	−0.20**	−0.37***
	Senior	−0.35***	−0.45***	−0.67***
Sophomore	Junior	0.07	−0.01	−0.09
	Senior	−0.15	−0.25***	−0.39***
Junior	Senior	−0.22**	−0.25***	−0.30***

Notes: **$p < 0.01$, ***$p < 0.001$.

Table 7 Professional Differences in Pre-Service Teachers' Emotional Awareness

	Liberal Arts (n = 442)		Science (n = 330)		*t*	*d*
	M	*SD*	*M*	*SD*		
Perceived oneself	2.27	0.60	2.17	0.57	2.31*	0.17
Perceived others	2.15	0.60	2.03	0.58	2.73**	0.20
Total scores	2.83	0.63	2.60	0.59	5.34***	0.40

Notes: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Table 8 Differences in Emotional Awareness Between in-Service and Pre-Service Teachers

	Pre-Service (n = 773)		In-Service (n = 123)		*t*	*d*
	M	*SD*	*M*	*SD*		
Perceived oneself	2.23	0.59	2.68	0.40	−10.60***	1.12
Perceived others	2.10	0.59	2.56	0.39	−11.23***	1.19
Total scores	2.73	0.62	3.20	0.48	−9.47***	0.97

Notes: ***$p < 0.001$.

To compare emotional awareness between pre-service and in-service teachers, the dependent variables were the same as those above. Grades (freshman to senior encoded as 1,2,3,4, and in-service teachers were coded as 5) were independent variables for a single-factor analysis of variance. The results showed that different grades of pre-service teachers' emotional awareness and subordinate factor scores were significantly different ($F = 48.736$, $p = 0.000$, $\eta^2 = 0.178$). The LEAS score and average score for the two subordinate factors differed significantly by grade ($F = 51.804$, $p = 0.000$, $\eta^2 = 0.108$; $F = 26.892$, $p = 0.001$, $\eta^2 = 0.136$; $F = 34.995$, $p = 0.001$, $\eta^2 = 0.189$) (see Table 9). Figure 2 shows

Table 9 Comparison of Emotion Awareness Among in-Service Teachers and Pre-Service Teachers Across Different Grade Levels

	Perceived Oneself		Perceived Others		Total Scores	
	M	SD	M	SD	M	SD
Freshman	2.06	0.65	1.88	0.63	2.40	0.63
Sophomore	2.52	0.47	2.08	0.48	2.68	0.47
Junior	2.17	0.67	2.08	0.68	2.76	0.70
Senior	2.40	0.50	2.33	0.49	3.07	0.49
Pre-service	2.68	0.40	2.56	0.39	3.20	0.48
F	26.89***		34.99***		51.80***	
$\eta 2$	0.108		0.136		0.189	

Notes: ***$p < 0.001$.

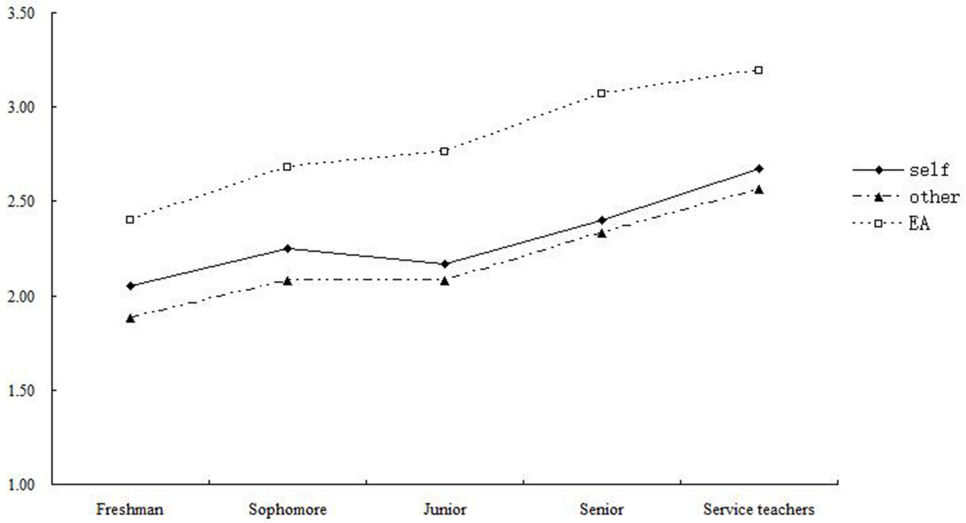

Figure 2 The trend of emotion awareness from pre-service teachers to in-service teachers.

that there was an increase in emotional awareness and its subordinate dimensions, beginning with freshman students and ending with in-service teachers. Multiple comparison results showed that in perceiving oneself and others, in-service teachers' were significantly higher than pre-service teachers' in each grade ($p < 0.001$), and pre-service teachers' total score of emotional awareness was significantly higher than freshman, sophomore, and junior year teachers, but not significantly different from senior teachers ($p > 0.05$) (see Table 10).

Discussion

"How to cultivate the teachers in the 21st century" has the common issues both eastern and western (Kang 2012).[64] Currently, China is paying more attention to teachers' emotional intelligence. Some researchers found that teachers' emotional characteristics exerted an important influence on educational quality and suggested that paying attention to training teachers' emotional intelligence and developing optimization strategies would be helpful.[48] Therefore, from the origin of teachers' training—pre-employment training as a start and the foundation of emotional intelligence—emotional awareness as the entry point, we investigated pre-service teachers' emotional awareness. It not only enriches the research field of emotional awareness, but also provides inspiration for the development of teachers and pre-service teachers' emotional intelligence.

Revise LEAS Applied to Chinese Pre-Service Teachers

To assess emotional awareness in the present study, we mainly adopted LEAS,[60] which previously has been translated into many versions in different countries.[61,65] Because of its cumbersome scoring, some researchers used two factors of

Table 10 Multiple Comparative Analysis of Emotional Awareness Among in-Service Teachers and Pre-Service Teachers Across Various Grade Levels

	Grade	Perceived Oneself	Perceived Others	Total Scores
In-service	Freshman	0.62***	0.68***	0.79***
	Sophomore	0.42***	0.48***	0.51***
	Senior	0.22**	0.48***	0.43***
	Junior	0.27***	0.23**	0.12

Notes: **$p < 0.01$, ***$p < 0.001$.

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"emotional cognitive disorders" and "emotional disorders described" in Alexithymia Scale (TAS) or "emotional notice" and "emotional discrimination" in TMMS to measure emotional awareness.[66,67] However, the latter only partially reflects the definition of the concept of emotional awareness but not all content of emotional awareness.

We considered the basis of cultural differences in revising the LEAS and examined its applicability in providing effective measurement tools to study pre-service teachers' emotional awareness. In the present study, the LEAS-revised inter-rater reliability was greater than 0.85, and the internal consistency coefficient was greater than 0.9. These results were consistent with reported previously.[60]

In the regard of validity, the questionnaire's total score and two factors were significantly positively correlated with "emotional discrimination" in TMMS and "emotional experience" and "emotional evaluation" in QYEI, while "perceive others" also has a significant positive correlation between "emotional awareness" and emotional total scores. The conceptual definition of "emotional discrimination" and "emotional recognition" has an intersecting part with emotional awareness, which both include the recognition of emotion. "Emotional experience" and "emotional evaluation" as the other sub-components of Emotional Intelligence, it is also consistent that Lane considered that "emotional awareness is the foundation of Emotional Intelligence".

Therefore, from the aspect of the concept of emotional awareness or the aspect of function, the results showed that the revised LEAS has good associated validity with school standards. Based on these indicators, the revised LEAS meets the psychometric requirements for reliability and validity, and can be used to assess pre-service teachers in China.

To Reveal the Current Pre-Service Teachers' Characteristics of Emotional Awareness

Pre-Service Teachers' Emotional Awareness is Intermediate, and Improvement is Urgently Needed

The survey revealed that the total score for pre-service teachers' emotional awareness was 2.730. The results, compared with American and Japanese college students of similar age, showed that American college students' performance was lower than that of the same age group (3.178) but higher than that of Japanese college students of the same age (2.503). These results may be related to the emotional expression of individuals from different social backgrounds. Igarashi et al found that Japanese, because of the influence of social background, tend to be more moderate than Americans in terms of emotional expression and depression, and that they use reduced vocabulary to express emotions.[61] China and Japan belong to the eastern culture; similarly, Chinese people's emotional expression style tends to be mild and suppressed. The Chinese used fewer words describing mood to get a lower score of pre-service teachers' emotional awareness in this survey.

We compared scores obtained in the survey with the theoretical median level "3" in the five-rating level set in the questionnaire. The results showed that the score of 63.8% pre-service teachers' emotional awareness was less than three points and that 30.1% scored more than three points. In addition, we also examined differences between the score of "perceive themselves" and "perceive others" that were two subordinate factors of pre-service teachers' emotional awareness. The score of "perceive themselves" (2.224) was significantly higher than the score of "perceive others" (2.096), a result consistent with previous research.[61] This result indicates that pre-service teachers' emotional awareness was unbalanced in terms of internal factors. This may be in accordance with the characteristics of individual emotional processing. Compared to others' emotional progression, individuals have the advantage of self-emotional processing. In addition, compared with "perceive themselves", when individuals perceive others' emotions, one needs to use empathy, which inevitably produces deviation. It also may be another reason why the score of "perceive others" is lower. In summary, current pre-service teachers' emotional awareness still needs attention, and its internal factors are unbalanced in development.

Females Ranked Higher Than Males in Emotional Awareness

The results of the survey indicated that pre-service teachers' emotional awareness and its subordinate factors differed significantly according to gender ($p < 0.001$, $d > 0.2$). Females ranked higher than males, and the previous result that " females are superior than males" was consistent across communities and cultures.[68,69] This difference has also been verified by a large number of neuroimaging studies.[70] Simultaneously, the results are consistent with the basis of emotional awareness of other emotional activities (empathy and emotional intelligence). For example,

female's empathy is higher than the male,[71] while female's emotional intelligence is higher than male's.[72] This finding may be associated with the emotional characteristics of male and female.

Females are generally believed to exquisite, easy to grasp the emotional subtle changes in themselves and others, and have more emotional recognition technique,[73] while male is coarser, easy to ignore, or does not care about changes in himself and others' emotions. In addition, some studies have attempted to explain such differences based on physical factors, such as the anatomy of the gray matter in the female brain structure and edge of the cortex.[74] Psychological and physiological gender differences may be responsible for the greater emotional awareness capability of females than males.

Emotional Awareness Substantially Increases with Grade

The survey found that scores for emotional awareness and its subordinate factors (perceived themselves and perceived others) were lowest for freshmen and highest for seniors and generally increased according to grade. Multiple comparison analysis found that in addition to the difference between the sophomore and junior groups not being significant, other grade differences were significant. This finding may be related to pre-service teachers' focus on college life and required pre-service teachers' qualities. The foci of university and high-school life differ.

In high school, priority is given to learning with less emphasis on interpersonal communication, and academic achievement is relatively relaxed. Interpersonal communication is becoming increasingly important in university life. Freshmen, recently coming from high school, possess fewer interpersonal skills. Meanwhile, pre-service teachers need to acquire psychological knowledge in order to improve their enthusiasm. This will undoubtedly need to be aware of students' emotions to adjust teaching methods to improve students' interest. In the three-month internships, seniors' performance was particularly evident, while seniors' emotional awareness was significantly higher than that of pre-service students in other grades.

Students in the Arts Exhibit Greater Emotional Awareness Than Science Students, and There is an Interaction with Gender

The survey revealed that the total scores for emotional awareness and the two subordinate factors differed significantly. Liberal arts students scored significantly higher than science students, but only the total scores for emotional awareness and "perceive others" differed significantly. At the same time, there were differences according to gender; in the liberal arts, the performance of female emotional awareness and subordinate factors was higher than that of men. Furthermore, among the science students, the difference between the sexes was not significant. The reason for this result might be the different sex ratios in these disciplines; in liberal arts, there are more females than males, and science has more males than females. As a result, professional differences lead to gender differences.

As described above, the cause of the difference is the emotional and physiological characteristics of the different genders. It seems possible that liberal arts students are more nuanced and able to grasp subtle changes in their emotions, whereas science students might be understood as less sensitive, more easily overlooked, or perhaps not caring about subtle changes in themselves and others' emotions.

In-Service Teachers' Emotional Awareness is Higher Than That of Pre-Service Teachers

To further investigate the characteristics of pre-service teachers' emotional awareness, we assessed the recently hired teachers. We found that these recently hired teachers' emotional awareness scored an average of 3.195, which is equivalent to US data. In-service teachers on the emotional awareness and its subordinate factor are all significantly higher than that of pre-service teachers. From the teachers' emotional awareness development trend, we found that in perceiving oneself and others, in-service teachers are significantly higher than the grade of pre-service teachers, but on the emotional awareness total scores, pre-service teachers are significantly higher than freshman and sophomore and junior grade three, while it is not significantly different between seniors. The results indicated that the cultivation of emotional awareness is very important and necessary for teachers and is more important for pre-service teachers.

Based on perceiving others emotions, a good relationship can be established between teachers and students. Research has shown that emotional awareness for individual's physical and mental health[8] and good interpersonal relationship form[75,76] both had a vital significance. In addition, current pre-service teachers' emotional awareness is not high. The

mood of the incumbency teachers perceive ability is not too high. Our survey found that the current pre-service teachers' emotional awareness has not yet reached theoretical median level 3, while in-service teachers will be just over the theory of value of level 3. Although it has a social and cultural background factor, after a practice of senior pre-service teachers in emotional awareness scores, there was no significant difference between in-service teachers. This shows that in-service teachers' emotional awareness is not high, which will affect their mental health in relation to abuse, suicide, or homicide between students and teachers. Therefore, from the source of teacher training-the cultivation of the pre-service teachers, and to enhance the basis of emotional intelligence—emotional awareness, will be particularly important and urgent.

Drawing upon international best practices, we propose several recommendations for enhancing pre-service teachers' emotional awareness, focusing on three key areas: curriculum instruction, quality assurance, and policy support. Firstly, it is suggested that teacher training institutions integrate the development of emotional competencies into the teacher education curriculum. Specifically, curriculum modules tailored to the localization of pre-service teachers' emotional competency training should be designed, with a focus on fostering emotional awareness. We can draw valuable insights from the "contextual learning" program implemented in Australia and the GESL curriculum adopted in Singapore. Research has demonstrated that these initiatives have significantly enhanced pre-service teachers' emotional competence and deepened their understanding of how to adapt teaching strategies to the social-emotional development characteristics of adolescents.[77,78] Secondly, it is recommended that educational and scientific research institutions collaborate with primary and secondary schools as well as kindergartens in the development of pre-service teachers' emotional competencies. Concurrently, empirical studies should be conducted to assess the efficacy of the curriculum and establish a practical framework for bridging the gap between pre-service and in-service teachers. For instance, San Jose State University in the United States has proactively established partnerships with local educational institutions, collaboratively designed a comprehensive pre-service teacher training program, and undertaken a series of research initiatives.[79] Thirdly, it is recommended to formulate targeted policy measures in the areas of teacher training, professional certification, qualification recognition, and evaluation to promote the professional, standardized, and sustainable development of pre-service teachers' emotional competence. For example, a nationwide survey of educators reveals that all states and the District of Columbia incorporate emotional competence into their teacher certification criteria to ensure that pre-service teachers acquire the requisite emotional knowledge and skills necessary for becoming fully qualified educators.[80]

Limitation

The use of the revised LEAS has several limitations. First, consistent with self-report questionnaires, the development and validation of the LEAS relied solely on self-report data. However, the emotional awareness level scale is a measurement evaluated by others, and many studies have found that this measurement has good reliability and validity. Future research should consider this method to address the limitations of self-report methods. Second, the data collected in this series of studies adopted a cross-sectional design predominantly. Although this method was appropriate for developing and validating a measurement, future studies should consider longitudinal research in a larger sample, which can better depict the changes in teachers' emotional awareness as teachers' self-professional development. Since development is an ongoing process, future research is encouraged to examine other forms of validity and reliability. Furthermore, how are teachers' emotions perceived within Chinese cultural traditions? In what ways do teacher emotions in this specific socio-cultural context differ from those in Western societies? It may be that only through the aforementioned comparison and reflection can we gain a deeper and more accurate understanding of ourselves.

Conclusion

The revised LEAS exhibited good reliability and validity and could be used as an effective tool to measure emotional awareness. Pre-service teachers' emotional awareness ability, in general, is low to medium and needs improvement. Pre-service teachers' emotional awareness differed significantly by gender, grade, and profession. The cultivation of emotional awareness is very important and necessary for teachers and is more important for pre-service teachers.

Ethics Approval

The study was approved by the Suzhou City University Ethics Committee. Informed consent was obtained from all participants for being included in the study. The guidelines outlined in the Declaration of Helsinki were followed.

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Disclosure

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