

WEI, Qian, LUO, Changxin and LI, Yun. The applicability of the Teachers' Inclusive Education Attitude Scale on Chinese preservice physical education teachers. *Quality in Sport*. 2024;23:54849. eISSN 2450-3118.
<https://dx.doi.org/10.12775/QS.2024.23.54849>
<https://apcz.umk.pl/QS/article/view/54849>

The journal has been 20 points in the Ministry of Higher Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Higher Education and Science of 05.01.2024. No. 32553.

Has a Journal's Unique Identifier: 201398. Scientific disciplines assigned: Economics and finance (Field of social sciences); Management and Quality Sciences (Field of social sciences).

Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 r. Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398.

Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).

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The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 03.09.2024. Revised: 10.09.2024. Accepted: 10.09.2024. Published: 04.10.2024.

The applicability of the Teachers' Inclusive Education Attitude Scale on Chinese preservice physical education teachers

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Abstract

Purpose: This study aims to translate and culturally adapt the revised The Teachers' Attitudes Towards Inclusion Scale Adjusted (TAISA) into Chinese and to evaluate its reliability and validity among Chinese preservice physical educators.

Methodology: The English version of The Teachers' Attitudes Towards Inclusion Scale Adjusted (TAISA) was translated through a rigorous process that included a comprehensive literature review and consultations with subject matter experts. A survey was administered to 500 preservice physical educators in Chongqing. The adapted scale underwent thorough analysis, encompassing demographic frequency analysis, item analysis, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and evaluation of test-retest reliability.

Results: The analysis revealed that the Chinese version of The Teacher Attitude toward Inclusive Education Scale for Preservice Physical Educators (TAISA-P) retained the original three-factor structure, comprising positive affect, training and perceived competence, and negative affect. After the removal of four items, the final scale consisted of 17 items, with each dimension containing 5 to 6 items. Factor loadings ranged from 0.442 to 0.705, and the model demonstrated a χ^2/df ratio of 1.350, a root mean square error of approximation (RMSEA) of 0.066, a non-normed fit index (NNFI) of 0.825, a comparative fit index (CFI) of 0.946, an incremental fit index (IFI) of 0.948, and a goodness-of-fit index (GFI) of 0.834. The overall internal consistency reliability of TAISA-P was 0.759, with dimension-specific reliabilities of 0.835, 0.790, and 0.779. The test-retest reliability coefficient was 0.743 ($P < 0.001$).

Conclusion: The Teacher Attitude toward Inclusive Education Scale for Preservice Physical Educators (TAISA-P) demonstrates strong reliability and validity, thereby establishing it as a suitable instrument for assessing the attitudes of Chinese preservice physical educators toward inclusive education.

Keywords: Chinese preservice physical educators; Attitudes toward inclusive education; Scale revision; Reliability and validity assessment.

1. Introduction

Inclusive education emerged as a significant educational paradigm in the 1990s, advocating for equity and opposing discrimination and exclusion[1]. This approach emphasizes equal educational opportunities and rights for all children, particularly addressing

the diverse needs of students with disabilities. The fundamental principle of inclusive education is the recognition of every child's right to education, underscoring the importance of respecting individual differences[2]. Today, inclusive education has evolved into a distinct educational philosophy characterized by its unique attributes[3]. As it has developed, inclusive education has garnered widespread international recognition, prompting numerous countries to implement this philosophy in practice and engage in experimental research. A growing body of literature on inclusive education has emerged, complemented by regular seminars dedicated to the topic[4]. Several universities have established research centers specifically focused on inclusive education, furthering scholarship in this area[5]. The establishment of journals, such as the International Journal of Inclusive Education, has also contributed to the advancement of inclusive education[6]. Currently, the inclusion of students with disabilities in regular classrooms represents the primary theoretical and practical approach to special education in our country, serving as the foundational method for implementing inclusive education[7]. Nevertheless, many challenges and issues remain in this process, and we are still some distance from fully realizing the goals of inclusive education[8].

Today, most experts seem to advocate for physical education as an important factor in society, which, along with other cultural domains, serves as an education on the significant value of the body, positioning it as a necessary paradigm for human development[9]. In the context of physical education, the quality of education and developmental opportunities provided to students with special needs often remains inadequate, especially during the compulsory education phase. During this critical period, these students frequently encounter neglect or are overlooked, leading to suboptimal instructional quality. The attitudes of educators toward inclusive education are pivotal for the successful realization of its goals[10]. The fundamental principle of inclusive education is to recognize learner diversity as a valuable resource that enriches the educational environment, rather than viewing it as a challenge. This educational paradigm requires that all educators, including preservice physical educators, embrace the belief in the potential success of every student. They must equip themselves with the knowledge and attitudes necessary to support individualized educational plans effectively. Physical education serves as an essential component of inclusive education, embodying principles that actively oppose exclusion and discrimination while fostering the participation of all students in physical activities[11,12,13]. Despite advancements in promoting inclusive education in China, significant operational challenges persist. These challenges include insufficient educator attitudes and competencies related to inclusion, as

well as a dearth of inclusive school environments[14]. To enhance the implementation of inclusive education, it is imperative to adopt multiple strategies. This includes strengthening training programs for preservice physical educators to deepen their understanding and practical skills pertaining to inclusive education. Additionally, a transformation in traditional pedagogical perspectives and methodologies is essential[15]. Cultivating a positive attitude among Chinese preservice physical educators is essential for enhancing their self-efficacy and professional competence — both of which are fundamental for the effective implementation of inclusive educational practices[16].

The proactive and supportive attitudes of educators play a crucial role in facilitating the engagement and motivation of students with special educational needs, thereby enabling them to realize their full potential and achieve desired educational outcomes. Research indicates that caring for children with disabilities presents numerous challenges, often resulting in stress that manifests as negative emotions, including fear[17]. Consequently, it is imperative to cultivate a positive attitude among caregivers. Conversely, negative or unsupportive attitudes can marginalize these students, depriving them of equitable learning opportunities and adversely impacting their educational achievements and overall well-being. Despite the recognized importance of attitudes toward inclusive education, research specifically examining the attitudes of Chinese preservice physical educators remains limited. Existing studies predominantly focus on educators in other disciplines, overlooking the unique context of physical education. Furthermore, the psychometric properties of current measurement tools designed to evaluate attitudes toward inclusive education among Chinese preservice physical educators have not been rigorously assessed. Therefore, it is imperative to quantitatively evaluate these attitudes and validate appropriate measurement instruments tailored for this demographic[18]. This study aims to introduce a revised Teachers' Attitudes Towards Inclusion Scale Adjusted (TAISA) to measure and evaluate the inclusive education attitudes of Chinese preservice physical educators. The significance of this research lies in its potential to fill the existing gap in understanding inclusive education attitudes within this population and to provide both a theoretical and practical foundation for enhancing the participation and development of students with special educational needs in physical education settings.

2. Study Participants and Methods

2.1 Study Participants

This study enrolled 500 preservice physical educators from universities in Chongqing. A total of 480 questionnaires were collected through both paper-based and online formats,

utilizing QR codes, which resulted in a response rate of 96%. After excluding invalid responses, 469 questionnaires were retained, yielding an effective response rate of 94%. The collected data were then randomly divided into two subsets for subsequent analyses: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) of the attitudes toward inclusive education scale among preservice physical educators. Sample One was designated primarily for EFA, while Sample Two was reserved for CFA.

2.2 Research Instruments

2.2.1 The Teachers' Attitudes Towards Inclusion Scale Adjusted (TAISA)

The TAISA, developed by Costello and Boyle, comprises 21 items organized into three dimensions. Respondents rate each item on a 6-point Likert scale, ranging from 1 (strongly disagree) to 6 (strongly agree). The 21 items reflect three distinct aspects: Positive Affect (PA: items 13, 15, 16, 17, 18, and 19), Training and Competence (TAPC: items 1, 3, 4, 5, 6, 8, and 10), and Negative Affect (NA: items 2, 7, 9, 11, 12, 14, 20, and 21) [19].

2.2.2 Demographic Questionnaire

Alongside the TAISA, a demographic questionnaire was administered to collect personal information from Chinese preservice physical educators. This instrument comprised five sections: gender, academic year, experience with students with special needs, exposure to special education courses, and understanding of inclusive education. The purpose of the demographic questionnaire was to obtain essential background information regarding the participants.

2.2.3 Translation and Back-Translation of the Scale

To ensure the scientific integrity, appropriateness, and fluency of The Teacher Attitude toward Inclusive Education Scale for Preservice Physical Educators (TAISA-P), two proficient graduate students in English independently translated the original English version into Chinese. A professor with expertise in special education subsequently reviewed the translations and provided constructive feedback. Following this, two additional graduate students undertook a back-translation of the Chinese version into English, systematically addressing any discrepancies in phrasing between the revised questionnaire and the original instrument[20]. Through iterative translation and back-translation processes, the items were refined for clarity and comprehensibility, ensuring fidelity to the original English meaning while adhering to Chinese linguistic norms. For example, "additional support needs" was

translated as “特殊需求” (special needs), and "mainstream classes" was rendered as “普通班级” (regular classes).

2.3 Statistical Analysis

Data were analyzed using SPSS version 27.0 for item analysis, exploratory factor analysis, reliability analysis, and correlation analysis. Confirmatory factor analysis of the questionnaire was conducted utilizing AMOS version 29.0.

3. Results

3.1 Frequency Analysis of Demographic Variables

Table 1 presents the demographic characteristics of the study participants, highlighting the distribution of responses. Mean values represent the central tendencies, while standard deviations indicate the variability within the sample. The frequency analysis demonstrates a distribution that largely meets the requirements for robust sampling. Notably, the gender composition reveals that 71.4% of the participants are male, compared to 28.6% who are female, indicating a predominant representation of male preservice physical educators in this study.

Table 1. Statistical analysis table of demographic variables (n=469)

Variable	Option	Frequency	Percentage	Mean	Standard Deviation
Gender	Male	334	71.4	2.88	1.478
	Female	135	28.6		
Grade	Senior	187	39.8	1.93	1.119
	Junior	151	32.1		
	Sophomore	103	21.9		
	Freshman	28	5.9		

3.2 Item Analysis

Item analysis is a critical method for validating the reliability of scales and questionnaire items[21]. As illustrated in the subsequent table, the original scale consisted of 21 items, utilizing a six-point Likert scoring system. Items 2, 7, 9, 11, 13, 14, and 21 were reverse-scored; these items were adjusted to reflect a scoring range of 1 to 6 before analysis. Total scores were ranked, with the upper 27% categorized as the high-score group (≥ 88 points) and

the lower 27% identified as the low-score group (≤ 76 points). An independent samples t-test was employed to compare scores on each item between these two groups. The analysis revealed no significant differences for items 5, 8, 15, and 20, resulting in their exclusion from the scale. In contrast, the remaining 17 items exhibited significant score differences ($p < 0.001$).

Table 2. Critical ratio item analysis table (n=469)

Title	t	Title	t
Q1	8.54	Q12	4.958
Q2	5.544	Q13	4.976
Q3	7.443	Q14	4.665
Q4	6.205	Q15	1.644
Q5	0.139	Q16	5.096
Q6	5.217	Q17	3.574
Q7	6.827	Q18	6.988
Q8	0.955	Q19	6.764
Q9	6.525	Q20	0.839
Q10	6.466	Q21	6.036
Q11	4.281		

According to established standards for correlation analysis of total scores, correlation coefficients should ideally range between 0.4 and 0.8; coefficients outside this range are considered inappropriate for questionnaire analysis. Correlation analysis performed on the remaining items relative to the total score yielded coefficients ranging from 0.442 to 0.705, all significant at the 0.01 level. Consequently, no additional items warranted removal from the scale. Detailed results are presented in the accompanying table.

Table 3. Item and total score correlation analysis table (n=469)

Question	r	Question	r
Q1	0.677	Q12	0.551
Q2	0.524	Q13	0.583
Q3	0.701	Q14	0.556
Q4	0.705	Q16	0.569
Q6	0.569	Q17	0.442
Q7	0.676	Q18	0.581

Q9	0.601	Q19	0.670
Q10	0.697	Q21	0.589
Q11	0.529		

3.3 Validity Analysis

3.3.1 Exploratory Factor Analysis

Exploratory factor analysis was conducted on all items using SPSS version 27.0. Initial assessments of the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity yielded a KMO coefficient of 0.843 and a Bartlett's test p-value of <0.001, both of which met the prerequisites for conducting exploratory factor analysis. The findings are summarized in the table below.

Table 4. KMO and Bartlett test results table (n=234)

KMO Sampling Adequacy Measures	0.843	
Bartlett's Test of Sphericity	Approx. Chi-Square	809.914
	Degrees of Freedom	136
	Significance	0.000

Utilizing principal component analysis, a scree plot was generated, which facilitated the derivation of a rotated component matrix. To maintain consistency in the number of factors extracted between the Chinese version of the scale and the original version, this study specified the extraction of three factors. As illustrated in Figure 1, each of the three factors demonstrated eigenvalues exceeding 1, thereby supporting their extraction.

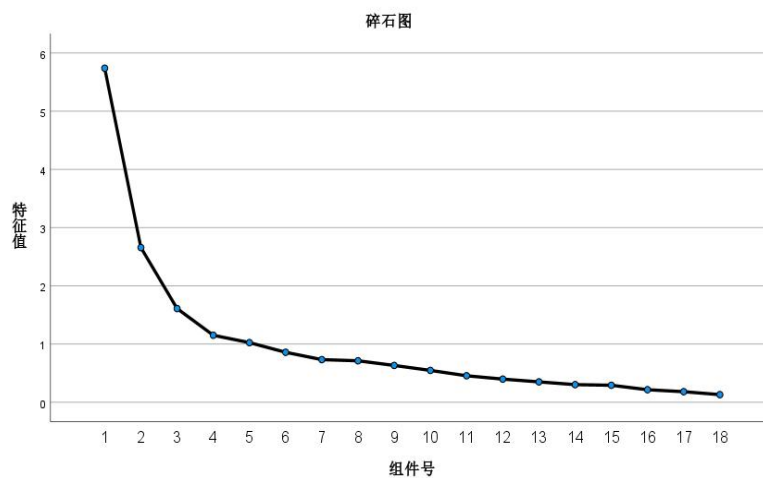


Figure 1. Lithotriptic plan

An exploratory factor analysis utilizing the maximum variance method identified three distinct factors: Factor 1, Positive Affect (PA), which comprised six items; Factor 2, Training and Perceived Competence (TAPC), consisting of five items; and Factor 3, Negative Affect (NA), which included six items. The rotated component matrix following the initial axis rotation indicated that Positive Affect (PA) encompassed items Q10, Q13, Q16, Q17, Q18, and Q19; Training and Perceived Competence (TAPC) comprised items Q1, Q3, Q4, Q6, and Q12; and Negative Affect (NA) included items Q2, Q7, Q9, Q11, Q14, and Q21.

Table 5. Rotated component matrix table

Question Number	Positive Affect (PA)	Training and Perceived Competence (TAPC)	Negative Affect (NA)
Q10	0.795		
Q13	0.771		
Q16	0.821		
Q17	0.745		
Q18	0.765		
Q19	0.774		
Q1		0.678	
Q3		0.792	
Q4		0.835	
Q6		0.742	
Q12		0.836	
Q2			0.792
Q7			0.832
Q9			0.79
Q11			0.799
Q14			0.736
Q21			0.687

3.3.2 Confirmatory Factor Analysis

Building upon the results of the exploratory factor analysis, a confirmatory factor analysis was conducted on the revised scale. Maximum likelihood estimation was utilized to assess model fit, as illustrated in the figure below.

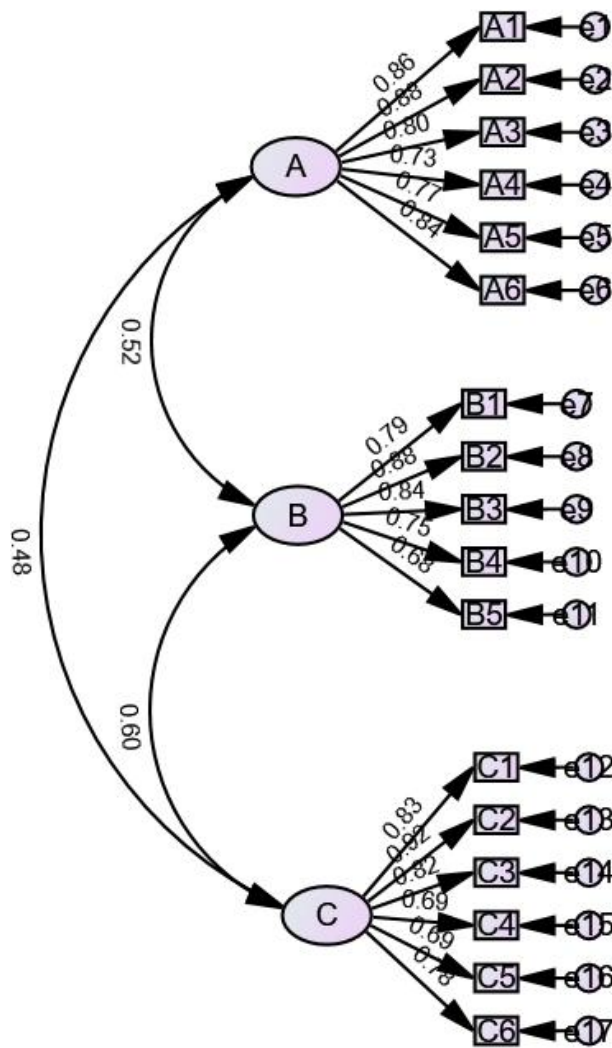


Figure 2. Confirmatory factor analysis standardized path map

According to Hou et al, a structurally sound model should satisfy the following criteria: the ratio of the chi-square value to degrees of freedom (χ^2/df) should be less than 5, with fit indices—root mean square error of approximation (RMSEA), non-normed fit index (NNFI), comparative fit index (CFI), incremental fit index (IFI), and goodness-of-fit index (GFI)—exceeding 0.8[22]. In this analysis, the χ^2/df was 1.350, RMSEA was 0.066, NNFI was 0.825, CFI was 0.946, IFI was 0.948, and GFI was 0.834, indicating satisfactory model fit indices. Comprehensive results are presented in the accompanying table.

Table 6. Model fitting index table (n=234)

Fit Index	χ^2 / df	RMSEA	NNFI	CFI	IFI	GFI
Value	1.350	0.066	0.825	0.946	0.948	0.834

3.3.3 Correlation Analysis

To assess the structural validity of the scale, a correlation analysis was conducted. The correlation coefficients are presented in the table below. The overall scale exhibited coefficients of 0.754, 0.751, and 0.789 corresponding to the respective dimensions. The inter-factor correlation coefficients were 0.426, 0.364, and 0.354, indicating robust structural validity for the scale.

Table 7. Table of correlation analysis results

	Factor 1	Factor 2	Factor 3	Total Scale
Factor 1	1			
Factor 2	0.426	1		
Factor 3	0.364	0.354	1	
Total Scale	0.754	0.751	0.789	1

3.4 Reliability Analysis

The Teacher Attitude toward Inclusive Education Scale for Preservice Physical Educators (TAISA-P) was evaluated for reliability using Cronbach's alpha and test-retest reliability as metrics. The results are summarized in the table below.

Table 8. Internal consistency reliability of the scale

Factor	Factor One	Factor Two	Factor Three	total scale
α Coefficient	0.835	0.790	0.779	0.759

For the finalized 17-item Teacher Attitude toward Inclusive Education Scale for Preservice Physical Educators (TAISA-P), specifically designed for physical education teacher candidates, the internal consistency reliability of the overall scale was determined to be 0.759. The internal consistency reliabilities for the individual dimensions were 0.835, 0.790, and 0.779, respectively. These reliability coefficients substantiate the TAISA-P scale as a dependable psychological measurement tool.

Additionally, a sample of 200 Chinese preservice physical educators participated in a retest after a two-week interval, yielding a test-retest reliability coefficient of 0.743.

4. Analysis and Discussion

This study presents the Chinese version of the Teachers' Attitudes Toward Inclusion Scale Adjusted (TAISA), originally developed by Costello and Boyle, and specifically revised for Chinese preservice physical educators. In the adaptation process, items that were deemed unsuitable for this demographic were excluded, resulting in a measurement tool that aligns with the psychometric characteristics relevant to Chinese preservice physical educators. To delineate the target population and distinguish it from the original English version, this modified instrument is designated as the Teacher Attitude toward Inclusive Education Scale for Preservice Physical Educators (TAISA-P).

The findings indicate that the TAISA-P exhibits strong structural validity and internal consistency. The original scale's positive affect (PA) dimension included items Q13, Q15, Q16, Q17, Q18, and Q19, while the training and perceived competence (TAPC) dimension comprised items Q1, Q3, Q4, Q5, Q6, Q8, and Q10. The negative affect (NA) dimension encompassed items Q2, Q7, Q9, Q11, Q12, Q14, Q20, and Q21. The revised TAISA-P consists of 17 items and demonstrates robust reliability and validity, establishing it as an effective tool for assessing attitudes among Chinese preservice physical educators.

Importantly, the positive affect (PA) dimension of the Chinese version incorporates items Q10, Q13, Q16, Q17, Q18, and Q19; the training and perceived competence (TAPC) dimension features items Q1, Q3, Q4, Q6, and Q12; and the negative affect (NA) dimension is represented by items Q2, Q7, Q9, Q11, Q14, and Q21.

4.1 Validity of the TAISA-P

Validity pertains to the extent to which a research instrument accurately reflects its intended psychological or behavioral constructs, encompassing content validity, construct validity, and criterion-related validity[23]. The results of the item analysis in this study reveal statistically significant differences in the critical ratios of the revised items ($P < 0.001$), with correlation coefficients between individual items and the total scale exceeding 0.4, indicating moderate correlation and demonstrating good discriminative power. Exploratory factor analysis confirmed that the dimensions of the new TAISA-P scale largely align with those of the original version. The exploratory factor analysis yielded a chi-square to degrees of freedom ratio (χ^2/df) of 1.350, an RMSEA of 0.066, a Non-Normed Fit Index (NNFI) of 0.825,

a Comparative Fit Index (CFI) of 0.946, an Incremental Fit Index (IFI) of 0.948, and a Goodness of Fit Index (GFI) of 0.834, all indicating satisfactory model fit indices.

4.2 Reliability of the TAISA-P

Internal consistency was assessed across all samples ($n = 469$), revealing Cronbach's alpha coefficients of 0.835 for the positive affect dimension, 0.790 for training and perceived competence, and 0.779 for negative affect. The test-retest reliability, measured over a two-week interval, yielded a coefficient of 0.743 ($P < 0.005$).

Overall, the three dimensions of the Teacher Attitude toward Inclusive Education Scale for Preservice Physical Educators (TAISA-P) demonstrate high internal consistency, corroborated by both exploratory and confirmatory factor analyses that affirm the scale's robust structural validity. Furthermore, the test-retest reliability was statistically significant ($P < 0.05$).

However, this study acknowledges certain limitations, notably its exclusive focus on preservice physical educators from Chongqing, which may affect the generalizability of the findings. Future research should consider expanding the sample size and scope to further validate the reliability and applicability of the scale.

In conclusion, inclusive education has emerged as a pivotal focus in international research. As future educators, preservice physical educators must possess a comprehensive understanding of the principles of inclusive education. Therefore, the TAISA-P scale serves as a valuable tool for assessing and investigating the attitudes of Chinese preservice physical educators toward inclusive education, providing empirical support for future studies on educators' attitudes regarding inclusive practices.

5. Conclusion

The Chinese version of the Teacher Attitude toward Inclusive Education Scale for Preservice Physical Educators (TAISA-P) demonstrates strong structural validity and significant test-retest reliability ($P < 0.05$). Consequently, it serves as a robust instrument for measuring and assessing attitudes toward inclusive education among preservice physical educators in China.

Disclosure:

Authors' contribution:

Selecting the topic, Qian Wei and Yun Li

Data analysis and organization, Qian Wei and Changxin Luo

setting the framework, writing, Qian Wei

unifying and revising the manuscript, Qian Wei

Gather, categorize and analyze information, Changxin Luo

Review, Changxin Luo and Yun Li

revise the full text, Yun Li

All authors have read and agreed with the published version of the manuscript

Funding statement:

The study was funded by Southwest University Scientific Research Projects Consigned by Enterprises (No. 2408086).

Institutional review board statement:

Not applicable.

Informed consent statement:

Informed consent was obtained from all subjects involved in the study.

Data availability statement:

《教师全纳教育态度量表修订版》英文版

Teachers' Attitudes Towards Inclusion Scale Adjusted

FOR ALL THE FOLLOWING QUESTIONS PLEASE INDICATE WHETHER YOU DISAGREE OR AGREE WITH THE STATEMENT BY SELECTING A SCORE TO REPRESENT YOUR VIEW

(Strongly Agree) 6 6 4 3 2 1 (Strongly Disagree)

- * (1) Students with additional support needs should be educated in a mainstream school.
- * (2) Educating children with additional support needs in mainstream classes has a detrimental effect on the other children in the class.
- * (3) I feel that my teacher-training programme is preparing me adequately for working with all children irrespective of disability.
- * (4) I feel competent to work with students who have varying levels of difficulties.

- * (5) Students with additional support needs have the social skills required to behave appropriately in the classroom.
- * (6) The presence of students with additional support needs in my mainstream class will have only a minimal effect upon my implementation of the standard curriculum.
- * (7) Including children with additional support needs in the classroom can adversely affect the learning environment of the class.
- * (8) A lot of the learning strategies employed in the classroom are applicable to all students not just those with additional support needs.
- * (9) Some children have difficulties that mean that they should not be educated in mainstream schools.
- * (10) I will be able to make a positive educational difference to students with additional support needs in my classroom.
- * (11) Student peers will reject students with additional support.
- * (12) Students performing at a level more than 3 years below their chronological age should still be educated in mainstream classes.
- * (13) Children with Social and Emotional Behavioural Difficulties should be educated in the mainstream class only if there is sufficient support in place for the class teacher.
- * (14) It is not beneficial for children with additional support needs to be educated in mainstream schools.
- * (15) It is my job, as a teacher, to provide alternative materials for students who have additional support needs (e.g., printed sheets of work from the whiteboard) .
- * (16) The daily or weekly formative assignments that are given to students to assess the class should be adapted for children with additional support needs.
- * (17) The teacher should usually attempt to ensure that all the children in the class,

irrespective of levels of difficulty or ability, are able to participate in the class as much as is possible.

* (18) With appropriate support, I could teach all students (including additional support needs) in the same class.

* (19) A teacher, if given what are regarded to be appropriate resources, could teach the vast majority of children with additional support needs.

* (20) Children with additional support needs learn best when grouped with others with similar needs.

* (21) I do not support the policy of inclusion no matter how much extra support the teacher is given in the class.

The Source of the TAISA Questionnaire: https://link.springer.com/chapter/10.1007/978-981-16-5908-9_2Not applicable.

Acknowledgments:

Thanks to the other authors for their contributions to this paper, and gratitude to Southwest University Scientific Research Projects Consigned by Enterprises

Conflict of interest:

The authors declare no conflict of interest.

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