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Development and Standardization of Pre-Service Teacher Teaching Effectiveness Scale (PSTTES-AAS): A Psychometric Study

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ABSTRACT

The present study reports the development and standardization of the Pre-Service Teacher Teaching Effectiveness Scale (PSTTES-AAS), a 58-item instrument designed to assess teaching effectiveness of pre-service teachers across four core dimensions: Subject Matter Competence (SMC), Classroom Management Competence (CMC), Classroom Interactional Competence (CIC), and Relationship Management Competence (RMC). The scale was constructed following a rigorous psychometric approach encompassing expert validation, item analysis, and standardization on a sample of 250 pre-service teachers from various colleges of Haryana, India. Reliability was established through multiple methods: Cronbach's Alpha (α = 0.994), Test-Retest (r = 0.988), and Split-Half using the Spearman-Brown formula (r = 0.843), all significant at the 0.01 level. Internal consistency coefficients ranged from 0.810 to 0.963. Construct validity was confirmed through inter-correlations among dimensions (r = 0.728 to 0.892). z-Score norms were developed to categorize teaching effectiveness into seven levels from Extremely Low to Extremely High. The scale demonstrates excellent psychometric properties and is a reliable, valid instrument for assessing pre-service teacher effectiveness in Indian higher education contexts.

Keywords: Teaching Effectiveness, Pre-Service Teachers, Scale Development, Psychometric Properties, Classroom Competence, Reliability, Validity, Standardization

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1. Introduction

Teachers represent the most vital stakeholder in any educational institution. Their quality, competence, and effectiveness directly shape the academic achievement, personality development, and character formation of students. Among educators, pre-service teachers — those undergoing professional training — occupy a particularly formative stage where habits of effective teaching are established. Assessing and developing teaching effectiveness at this stage is therefore of critical importance to educational quality and reform.

Teaching effectiveness has been broadly defined in the literature as the timely achievement of instructional objectives, progress of students, and the satisfaction level of teachers (Toor, 2014). It encompasses the relationship between the dispositions of a teacher, their teaching style, classroom acts, and the resultant effect on students' learning. According to Shoaib and Hanif (2018), effective teaching is that which successfully achieves the learning of students as intended by the teacher. Beyond professional skill, the personal competence of a teacher — kindness, punctuality, warmth, and patience — also plays a significant role in inspiring students.

Devamma (2018) emphasized that the activeness, competence, and resourcefulness of a teacher are central determinants of teaching effectiveness. Awasthi and Bihari (2014) similarly highlighted classroom factors such as teaching expectations, organizational techniques, and use of multimedia as key contributors. Gupta and Verma (2021) synthesized these perspectives, concluding that teaching effectiveness is fundamentally about the impact of professional and personal competence of a teacher on students' achievement levels.

Given this complexity, valid and reliable measurement instruments are essential. Assessment allows educators, administrators, and trainers to identify weaknesses, plan remediation, and monitor development over time (Pagani & Seghieri, 2002). Despite the availability of several international and national tools, there remained a gap in instruments specifically calibrated for the Indian pre-service teacher context, incorporating all key competency dimensions with robust psychometric properties. This paper addresses that gap by reporting the development and standardization of the Pre-Service Teacher Teaching Effectiveness Scale (PSTTES-AAS).

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2. Review of Related Literature

Several instruments have been developed to measure teaching effectiveness, both internationally and in India. Passi and Lalitha (1994) developed the General Teaching Competency Scale with 21 items across five dimensions: planning, presentation, closing, evaluation, and managerial skills. Kumar and Mutha (1999) constructed a 69-item self-administrating Teacher Effectiveness Scale assessing information sourcing, motivation, professional knowledge, and skills.

VanTassel-Baska et al. (2005) developed the Classroom Observation Scale-Revised, targeting planning, thinking strategies, problem-solving, and research strategies. Calaguas (2013) designed a 107-item Teacher Effectiveness Scale in the Philippine context, measuring personality, knowledge, student relations, teaching style, and classroom management. Chamyal (2019) standardized a 74-item Teaching Effectiveness Scale assessing classroom management, instructional skill, personal fitness, scholarship, professional preparation, self-improvement efforts, and interest in work.

Gupta and Verma (2022) constructed and standardized the Teaching Effectiveness Observation Scale (TEOS) covering lesson planning, execution, classroom management, professional and personal competence, and lesson closure. While these instruments offer considerable coverage, most either focus on in-service teachers, lack multi-dimensional depth for pre-service contexts, or lack systematic validation in Indian higher education settings. The PSTTES-AAS was developed to address these limitations by constructing a comprehensive, validated, and normed scale specifically for pre-service teachers.

3. Objectives of the Study

The present study was undertaken with the following objectives:

1. To construct a valid and reliable scale for measuring teaching effectiveness of pre-service teachers.
2. To conduct item analysis to identify discriminating items for inclusion in the final scale.
3. To establish the reliability of the PSTTES-AAS through multiple methods.
4. To determine the validity of the scale through face and construct validity procedures.
5. To develop standardized norms for interpretation of scores on the PSTTES-AAS.

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4. Theoretical Framework and Dimensions of the Scale

The PSTTES-AAS is grounded in a competency-based theoretical framework that recognizes teaching effectiveness as a multi-dimensional construct. Four major dimensions were identified from the literature:

4.1 Subject Matter Competence (SMC)

Subject Matter Competence relates to a teacher's knowledge and skill in planning lessons, using technology appropriately, making use of teaching aids, providing clear explanations, asking effective questions, and evaluating student learning (Ball & McDiarmid, 1989). SMC is further subdivided into three sub-dimensions:

Preparation: The process by which a teacher determines instructional objectives and evaluates their own knowledge with respect to content, strategies, and resources (Reed & Michaud, 2010).

Explanation: Presenting subject matter in its simplest form to maximize understanding. Wragg and Brown (1993) defined successful explaining as 'giving understanding to another'.

Professional Competence: A range of qualities including personality traits, attitudes, beliefs, knowledge of learners, and knowledge of self (Liakopoulou, 2011). Professional qualities have a significant impact on teaching effectiveness (Gupta & Verma, 2021).

4.2 Classroom Management Competence (CMC)

CMC encompasses the strategies needed to maintain discipline, promote positive interactions, organize resources (time, space, activities), and handle interruptions (Nessipbayeva, 2012). Effective classroom management creates conditions conducive to learning.

4.3 Classroom Interactional Competence (CIC)

CIC involves the ability to use interaction as a tool for mediating and facilitating learning. Walsh (2013) defined it as 'a teacher's and learner's ability to use interaction as a tool for mediating and assisting learning.' Moorhouse, Li, and Walsh (2021) extended this to e-classroom contexts.

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4.4 Relationship Management Competence (RMC)

The quality of teacher-student relationships has significant implications for teaching effectiveness (Bienkowska, 2015; Omar et al., 2018; Barton, 2019). RMC captures a teacher's ability to build and sustain positive, supportive relationships with students, colleagues, and the broader school community.

5. Methodology

5.1 Item Writing and Expert Validation

A pool of 98 items was initially generated through extensive review of published scales, research papers, and books related to teaching effectiveness. Items were written in English and administered to a panel of 20 experts from Education, Psychology, Sociology, and Language disciplines to assess relevance and clarity. Based on expert feedback, a second draft of 80 items was prepared.

5.2 Item Analysis

The 80-item second draft was administered to a randomly selected sample of 250 pre-service teachers. Total scores were ranked in descending order; the upper 27% and lower 27% of respondents formed the criterion groups. Independent samples t-tests were conducted for each item. Items showing significant t-values at the 0.05 and 0.01 levels were retained. Items that were non-significant (NS) were dropped.

Following item analysis, 22 items were eliminated, yielding a final scale of 58 items. The following table illustrates the distribution of items across dimensions in each draft:

Table 1: Distribution of Items Across Drafts

S.No.	Dimension	First Draft	Second Draft	Final Scale
1	Subject Matter Competence (SMC)	45	39	30
2	Classroom Management Competence (CMC)	18	16	10
3	Classroom Interactional Competence (CIC)	18	13	9
4	Relationship Management Competence (RMC)	17	12	9

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S.No.	Dimension	First Draft	Second Draft	Final Scale
	Total	**98**	**80**	**58**

5.3 Final Scale and Scoring

The final 58-item scale uses a 5-point Likert-type format with responses: Strongly Disagree (1), Disagree (2), Undecided (3), Agree (4), and Strongly Agree (5). Total scores range from 58 to 290, with higher scores indicating greater teaching effectiveness. The dimension-wise item distribution is as follows:

Table 2: Final Scale — Dimension-wise Distribution of Items

S.No.	Dimension / Sub-dimension	Item Numbers	No. of Items
1	Subject Matter Competence (SMC)	1–30	30
	a) Preparation	1–9	9
	b) Explanation	10–23	14
	c) Professional Competence	24–30	7
2	Classroom Management Competence (CMC)	31–40	10
3	Classroom Interactional Competence (CIC)	41–49	9
4	Relationship Management Competence (RMC)	50–58	9
	Total	**—**	**58**

5.4 Sample for Standardization

For standardization purposes, the scale was administered to 250 pre-service teachers drawn from various government and private colleges of Haryana, India. The sample was selected using random sampling and included both male and female teachers.

6. Results and Discussion

6.1 Reliability

Reliability of the PSTTES-AAS was assessed through four methods, all yielding highly significant coefficients:

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Table 3: Summary of Reliability Coefficients

Method	Coefficient	Significance Level
Test-Retest Method	r = 0.988	0.01
Split-Half (Spearman-Brown)	r = 0.843	0.01
Cronbach's Alpha	α = 0.994	0.01

The Cronbach's Alpha of 0.994 indicates an 'Excellent' level of internal consistency, confirming that the items consistently measure the construct of teaching effectiveness. Dimension-wise test-retest reliability coefficients were also high: SMC = 0.879, CMC = 0.801, CIC = 0.880, and RMC = 0.892, all significant at the 0.01 level.

Internal consistency was further examined by computing correlations between each dimension's score and the total scale score. The resulting coefficients (SMC = 0.963, CMC = 0.867, CIC = 0.851, RMC = 0.810) were all significant at the 0.01 level, indicating strong coherence across dimensions.

6.2 Validity

Face validity was established through expert judgment. A panel of 20 experts from Education, Psychology, Sociology, and Language assessed each item for relevance and appropriateness. Expert consensus was taken as evidence of face validity.

Construct validity was examined through inter-correlations among the four dimensions and among individual items. The inter-dimension correlation matrix is presented below:

Table 4: Inter-Correlations Among Dimensions (Significant at 0.01 level)**

Dimension	SMC	CMC	CIC
Classroom Management Competence (CMC)	0.746**	—	—
Classroom Interactional Competence (CIC)	0.728**	0.747**	—
Relationship Management Competence (RMC)	0.747**	0.892**	0.865**

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All inter-dimension correlations ranged from 0.728 to 0.892, indicating strong construct validity. These high positive correlations suggest that the dimensions, while distinct, collectively measure the broader construct of teaching effectiveness.

6.3 Descriptive Statistics

Dimension-wise descriptive statistics are presented in the table below:

Table 5: Dimension-wise and Full Scale Descriptive Statistics (N=250)

S.No.	Dimension	Mean	SD
I	Subject Matter Competence (SMC)	105.32	14.87
II	Classroom Management Competence (CMC)	34.98	5.76
III	Classroom Interactional Competence (CIC)	30.28	4.97
IV	Relationship Management Competence (RMC)	32.22	5.21
	Total Scale	**202.80**	**30.81**

6.4 Norms

z-Score norms were developed to enable interpretation of raw scores. The full scale mean is 202.80 (SD = 30.81). The following table presents the norm-referenced categories for interpreting teaching effectiveness levels:

Table 6: Norms for Interpretation of Teaching Effectiveness Levels

S.No.	Raw Score Range	z-Score Range	Grade	Level
1	266 & above	+2.05 & above	A	Extremely High
2	243 to 265	+1.30 to +2.01	B	High
3	220 to 242	+0.55 to +1.27	C	Above Average
4	188 to 219	-0.48 to +0.52	D	Average
5	165 to 187	-1.22 to -0.51	E	Below Average
6	148 to 164	-1.77 to -1.26	F	Low
7	147 & below	-1.76 & below	G	Extremely Low

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7. Discussion

The PSTTES-AAS demonstrates exceptional psychometric properties that make it a highly suitable instrument for assessing pre-service teacher teaching effectiveness in the Indian context. The Cronbach's Alpha of 0.994 is notably high, surpassing the 0.70 threshold recommended for research instruments and reaching the 'excellent' benchmark (> 0.90) for applied assessment. Such high internal consistency indicates that the 58 items cohesively measure the underlying construct.

The four-dimensional structure of the scale — SMC, CMC, CIC, and RMC — aligns well with current theoretical understanding of teaching effectiveness. The inclusion of Subject Matter Competence with sub-dimensions of preparation, explanation, and professional competence reflects the comprehensive nature of teacher knowledge as conceptualized by scholars such as Ball and McDiarmid (1989). The addition of Classroom Interactional Competence is especially relevant in contemporary educational discourse, given the growing emphasis on dialogic learning and student-centered pedagogies (Walsh, 2013).

The high inter-dimension correlations (0.728 to 0.892) confirm construct validity while also suggesting that the dimensions are facets of a coherent overall construct rather than independent attributes. This finding is consistent with the view that effective teaching requires an integrated application of multiple competencies simultaneously. The highest correlation was observed between CMC and RMC (r = 0.892), suggesting that classroom management and relationship building are particularly closely linked — a finding that aligns with Barton's (2019) argument that classroom management is fundamentally relational.

The development of z-Score norms with seven interpretive categories provides practitioners with a nuanced framework for evaluating teaching effectiveness. The norm mean of 202.80 with SD of 30.81 suggests moderate-to-above-average performance in the standardization sample, which may reflect the motivated nature of pre-service teachers who have voluntarily chosen the teaching profession.

8. Educational Implications

The PSTTES-AAS has significant implications for teacher education programs, educational administrators, and researchers:

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For teacher educators, the scale provides a validated diagnostic tool to identify specific competency gaps in pre-service teachers. Rather than relying on general impressions, supervisors and mentors can use structured feedback across the four dimensions to guide targeted professional development.

For educational administrators and policy makers, the scale's normative framework enables benchmarking of teaching effectiveness across institutions and cohorts. Longitudinal use of the scale can help track the development of teaching competence across the pre-service training period.

For researchers, the scale opens avenues for investigating relationships between teaching effectiveness and variables such as gender, subject specialization, type of institution, academic achievement, emotional intelligence, and personality traits. The comprehensive psychometric documentation provides a solid base for cross-cultural adaptation and comparative research.

9. Conclusion

The Pre-Service Teacher Teaching Effectiveness Scale (PSTTES-AAS) is a psychometrically sound, comprehensive, and practically useful instrument for measuring teaching effectiveness among pre-service teachers. With 58 items distributed across four well-defined dimensions and supported by excellent reliability coefficients, strong construct validity, and standardized normative data, the scale fulfills the need for a rigorous measurement tool in the Indian teacher education context. The scale's structured multi-dimensional approach can meaningfully contribute to both formative and summative assessment of pre-service teacher competence, ultimately serving the goal of enhancing the quality of teaching and learning in schools.

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