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Construct Validity and Reliability: Perception of Teacher Competency Scale

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Abstract

Early childhood teacher competency ensures high-quality programs and fosters student development. This competency comprises four key aspects: pedagogical, personality, social, and professional skills. However, Indonesia still lacks a psychometrically validated, perception-based competency scale that fully aligns with both national policy standards and internationally recognised frameworks. To address this gap, this research aimed to develop a self-inventory model of teacher competency. A 60-item questionnaire was sent to 249 early childhood teachers. Construct validity was examined using Exploratory and Confirmatory Factor Analyses. Convergent validity was confirmed by significant factor loadings, Composite Reliability, and Average Variance Extracted values. Criterion-related validity was supported by positive correlations with established measures of creative adaptability, perceived social support, teacher efficacy, and work engagement scale. The final analysis identified seven teacher competency dimensions. This scale also correlates with the other four measuring instruments. Analysis of Cronbach's Alpha Coefficient, Composit Reliability Value, and Average Variance Extract assessed reliability. The scale was refined to 45 valid items. This was followed by Measurement Invariance with Multigroup Confirmatory Factor Analysis, to evaluate potential differences in perceptions among groups categorised by educational background and teaching experience in their comprehension of the item questionnaire. The results revealed no significant differences in perceptions across either group type regarding the measuring instrument. This new scale is expected to enhance future research, educator training, and the quality of early childhood education.

Keywords: early childhood education; reliability; teacher's competency; validity.

Abstrak

Kompetensi guru PAUD sangat penting untuk memastikan program berkualitas tinggi dan mendorong perkembangan siswa. Kompetensi ini mencakup empat aspek utama: keterampilan pedagogis, kepribadian, sosial, dan profesional. Namun, Indonesia masih kekurangan skala kompetensi berbasis persepsi yang divalidasi secara psikometrik dan sepenuhnya selaras dengan standar kebijakan nasional dan kerangka yang diakui secara internasional. Untuk mengatasi kesenjangan, penelitian ini bertujuan untuk mengembangkan model inventori diri kompetensi guru. Kuesioner berisi 60 item diberikan kepada 249 guru PAUD. Validitas konstruk diperiksa menggunakan Analisis Faktor Eksploratori dan Konfirmatori. Validitas konvergen dikonfirmasi oleh nilai-nilai pemuatan faktor yang signifikan, Reliabilitas Komposit, dan Ekstraksi Varians Rata-rata. Validitas terkait kriteria didukung oleh korelasi positif dengan ukuran-ukuran yang telah ditetapkan terkait adaptabilitas kreatif, dukungan sosial yang dirasakan, efikasi guru, dan skala keterlibatan kerja. Analisis akhir mengidentifikasi tujuh dimensi kompetensi guru. Skala ini juga berkorelasi signifikan dengan empat instrumen pengukuran lainnya. Reliabilitas dilakukan dengan analisis Koefisien Cronbach Alpha, Nilai Reliabilitas Konstruk, dan Ekstraksi Varians Rata-Rata. Skala telah disempurnakan menjadi 45 item valid. Selanjutnya, Invariansi Pengukuran dilakukan dengan Analisis Faktor Konfirmatori Multikelompok, untuk mengevaluasi potensi perbedaan persepsi dalam memahami item kuesioner di antara kelompok berdasarkan latar belakang pendidikan dan pengalaman mengajar. Hasil menunjukkan bahwa tidak ada perbedaan persepsi pada kedua jenis kelompok terhadap alat ukur ini. Pengukuran ini diharapkan dapat berkontribusi meningkatkan penelitian di masa mendatang, pelatihan untuk guru, dan kualitas pendidikan anak usia dini.

Kata kunci: *kompetensi guru; pendidikan anak usia dini; realibilitas; validitas.*

Introduction

Early childhood education is recognised as the cornerstone of lifelong learning, highlighting the crucial role of kindergarten teachers in laying the foundation for future educational endeavours (Leung, 2012). The pedagogic competency standards for early childhood education teachers necessitate proficiency in conducting assessments, evaluating learning processes and outcomes, setting assessment goals, and utilising assessment results to benefit early childhood development (Rahmat et al., 2021). Teachers who are considered professionals must emphasise specific competencies outlined in Ministerial Regulation 58 of 2009 regarding early childhood education standards. These competencies, including pedagogic, personality, social, and professional competence, are mandated in Permendikbud No. 137/2014 on National Standards for Early Childhood Education Teachers (Kementrian Pendidikan dan Kebudayaan, 2014), and consistently discussed in later studies (Latifa & Eliza, 2023).

Pedagogic competence involves the teacher's ability to manage learning processes; personality competence encompasses noble character, ethics, morals, and self-development; and social competence refers to the teacher's role within society (Latifa & Eliza, 2023), while professional competence related to specialized training and certifications to enhance early childhood educators' skills and knowledge significantly, emphasizing the importance of continuous professional development (Liu & Dzainudin, 2023). Aspiring early childhood teachers have reported feeling more competent in integrating digital technologies into their work, including direct interaction with children, program development, professional development, and public engagement (Stepić, 2022). Furthermore, the teacher competencies emphasise the importance of personal experiences in shaping teaching abilities (Sarikaya, 2022).

The pedagogical model in early childhood education should focus on promoting physical development among children, highlighting the importance of teachers, families, and institutions working together to support holistic child development (Isidori & Fazio, 2018). Competency and innovation in early childhood teachers positively impact children's learning activities and the development of both soft and hard skills (Djatmika, 2023). Strengthening the quality of early childhood education involves enhancing teachers' competencies to facilitate optimal student development (Dewi, 2021). The competency of early childhood educators, which includes knowledge, skills, and personality, has been summarised in six standards formulated by the National Association for the Education of Young Children (NAEYC, 2020). These standards consist of the teacher's ability to 1) stimulate growth and development, 2) build relationships with parent, family, and community, 3) observe, document, and assess abilities that support student and parent, 4) build an effective method for student and parent, 5) use content knowledge to develop a meaningful curriculum, and 6) identify and act as a professional in early childhood education. In this study, the term teacher competency refers to a comprehensive framework that integrates pedagogical, professional, personal, and social competencies. Each competency serves as a foundational domain for effective early childhood education, as outlined in Permendikbud No. 137 (2014) and consistent with NAEYC (2020) standards.

In Indonesia, early childhood education teacher competency faces several challenges that impact the quality of education provided to young children. The qualifications and professional standards the government sets may not consistently be effectively implemented in early childhood education institutions, leading to discrepancies in adherence to regulations (Latifa & Eliza, 2023; Nakajima et al., 2019). This lack of consistent application of standards can hinder the overall competency of teachers in the field. One significant issue lies in the multidisciplinary knowledge required of early childhood teachers, including expertise in mathematics and information technology (Rahminawati et al., 2020). However, challenges such as inadequate program quality, teachers' lack of preparedness, and the focus on math and literacy over holistic development can impact the overall effectiveness of early childhood education (Brinkman et al., 2017). Addressing these challenges is essential to ensure that early childhood teachers are well-equipped to support children's growth and learning effectively.

An initial study was undertaken to assess teacher competency through a qualitative examination employing the Behavioural Interview Technique (BEI) involving educators from diverse regions

(Rakhmania et al., 2023, 2024). The investigation delineates the tangible manifestations of teacher competence within pedagogical, personal, social, and professional realms. Findings reveal deficiencies in the comprehension of early childhood development theory and a lack of fundamental understanding of early childhood education principles. While curriculum knowledge has been augmented through instructional modules, challenges persist due to limited teaching resources and regulatory curriculum alterations, necessitating continual learning. Noteworthy efforts are directed towards fostering various facets of early childhood development, encompassing skills, cognitive abilities, acquisition, social, and ethical growth (Rakhmania et al., 2023, 2024).

Previous studies focused on examining specific areas, such as pedagogical or professional competency, The results indicate that the teachers have not yet effectively implemented pedagogical principles, particularly in conducting systematic learning assessments, nor have they consistently engaged in continuous professional development as educators (Elan et al., 2022; Mundia Sari & Setiawan, 2020). Recognizing the holistic nature of teacher proficiency (Panggabean & Himawan, 2016), this research endeavors to construct a nuanced competency measurement scale tailored to the Indonesian educational landscape. To ensure the validity and reliability of the developed scale, the study employs construct, convergent, and criterion-related validation methods. Construct validity is assessed through Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), which help to refine the scale and ensure that it accurately captures the intended dimensions of teacher competency (Taherdoost, 2016).

Convergent validity is achieved by analysing the correlations between the developed scale, while criterion-related validity is analysed by the correlations between the developed scale and other established instruments, such as scales for creative adaptability, perceived social support, teacher efficacy, and work engagement. The results confirm that it is a robust and reliable scale for assessing teacher competency in the Indonesian context. In this study, a Measurement Invariance (MI) test was also conducted to examine validity issues between groups based on educational background and teaching experiences. Measurement Invariance was performed using multigroup CFA to assess whether the model fit indices are applicable to two different groups (Hakim et al., 2024). For more details, Measurement Invariance ensures that a psychological test measures the intended attribute consistently across groups. If a test produces systematic variations based on irrelevant characteristics (e.g., gender, cultural background), it may indicate measurement bias, questioning the fairness and validity of the instrument (Millsap, 2011).

The rationale for this study is grounded in the critical need for a contextually relevant scale to assess teacher competency in early childhood education in Indonesia. Given the increasing emphasis on the quality of early childhood education as one of the main factors of national development, ensuring that teachers possess the necessary competencies is essential. However, it is difficult to accurately assess teacher skills and identify areas where further training and support are needed without a standardised and reliable measure of teacher competency. By developing a Perception of Teacher Competency Scale specifically designed for the Indonesian context, this study seeks to address this gap and provide a valuable scale for educators, policymakers, and researchers working to improve the quality of early childhood education in Indonesia. The study offers novelties from existing research on teacher competencies. First, the Perception of Teacher Competency Scale (PTCS) is designed specifically for early childhood educators, aligning the theory of competency (Spencer & Spencer, 1993) with government regulation about competency standards (Permendikbud 137, 2014) and international standards from NAEYC (2020). No previous study in Indonesia has fully aligns with both national and international standards for the ECE competency scale.

Second, this study is among the first in Indonesia not only to develop a perception-based scale of ECE teacher competency, but also to examine measurement invariance across provinces (West Java, Central Java, and East Java). Methodologically, it advances the field by integrating multiple layers of validation. Construct validity through EFA and CFA. Criterion-related validity was supported by correlations with related constructs, including teacher efficacy, perceived social support, and creative adaptability. In addition, measurement invariance testing was conducted using multigroup CFA to ensure that the scale functioned equivalently across groups with different educational backgrounds and teaching experiences.

Third, this research also uniquely began with conducting interviews with early childhood teachers, school principals, and several key figures in the field of early childhood education to gain a comprehensive understanding of the competencies from the perspectives of those directly involved in early childhood education. This preliminary quantitative approach ensured that the developed scale reflects real-world context and practical insights, bridging the gap between theoretical standards and actual practices. Fourth, by addressing both theoretical alignment and empirical validation across diverse provincial contexts, the study provides a deeper and more contextually grounded understanding of ECE teacher competency measurement, an aspect that has rarely been addressed in similar studies in Indonesia.

The scope of this study is focused on the development and validation of the Perception of Teacher Competency Scale for Early Childhood Education in Indonesia. Perception-based measures are widely used in educational research to capture teacher's self-assessment rather than observed performance (Panggabean & Himawan, 2016; Spencer & Spencer, 1993). The Perception of Teacher Competency Scale for Early Childhood Education measures teachers' self-perception of their competencies in various domains, focusing on how they evaluate their own abilities based on their experiences, rather than directly assessing their objective performance or actual competencies (Mulyadi et al., 2023). This study aims to develop and validate a Perception of Teacher Competency Scale designed for early childhood education in Indonesia. By providing a reliable and valid measure of teacher competency, this study seeks to contribute to the ongoing efforts to enhance the quality of early childhood education in Indonesia. The findings of this study have the potential to inform policy decisions, guide professional development initiatives, and ultimately improve educational outcomes for young children across the country. Considering the government's priority is improving the quality of education to achieve Sustainable Development Goal 4.2, which is access to quality education for all children (Siami et al., 2025).

Methods

The Perception of Teacher Competency Scale (PTCS) was designed to capture teachers' self-assessment of their competencies, focusing on their perception rather than on pedagogical, personality, social, and professional dimensions. The study employed a quantitative approach to construct, validate, and test the scale's reliability, focusing on competencies critical to early childhood education. The process involved multiple stages, including item generation, data collection, factor analysis, and validation, to create a comprehensive scale (Kline, 2016; Kyriazos, 2018) reflective of the Indonesian educational context. This study employed a cross-sectional survey design. A more detailed explanation of the participants, instruments, and analyses will be elaborated in the following sub-sections.

Participants

Participants were 249 early childhood educators teaching children aged 5 to 6 years in formal institutions across West Java, Central Java, and East Java. These provinces were selected to represent Indonesia's diverse cultural, socio-economic, and educational contexts. This study is a cross-sectional design and uses convenience sampling to gather the respondents. Data was taken in February-March 2024. The selection criteria ensured participants were relevant to the study's focus, providing a robust dataset for developing the Perception of Teacher Competency Scale (PTCS). The study's design and participant selection were integral to creating a reliable and culturally appropriate scale for evaluating teacher competencies in Indonesia's early childhood education sector. Participant demographics are presented in Table 1.

Table 1. Participant Demographics

Demographics	Description	Number	Percent (%)
Gender	Male	1	0.40
	Female	248	99.60
Total		249	100
Education	ECE Degree	106	42.57
	Non-ECE Degree (High School and Non-ECE)	143	57.43
Total		249	100
Experience	Below 10 years	89	35.74
	Over 10 years	160	64.26
Total		249	100
Age (years old)	Below 20	74	29,7
	20 – 30	78	31,3
	31 - 40	72	28,9
	Above 40	25	10
Total		249	100

Source: Personal Data (2024).

Instruments

The study utilised a specially designed questionnaire to capture the various dimensions of teacher competency, developed through a comprehensive review of existing literature, government standards outlined in Permendikbud No. 137 (2014), and empirical findings from previous studies on early childhood teacher competency (Rakhmania et al., 2023, 2024). The questionnaire assessed a range of competencies, including personality traits, attitudes, values, and pedagogical knowledge, aiming to obtain valid and reliable data from respondents. The primary objective was to ensure that the scale accurately reflected the essential competencies for effective early childhood education (Taherdoost, 2016). The definition of the competency construct is presented in Table 2. The resulting competency construct is used to create the scale presented in Table 3.

Table 2. Definitions of Early Childhood Teacher Competency

Construct	Conceptual Definitions	Operational Definitions
Pedagogical competency	The ability to understand students' physical, moral, social, emotional, cultural, and intellectual characteristics, grasp learning theories and principles, and be familiar with the curriculum.	A high score in the pedagogical construct indicates mastery of early childhood development, learning theory, educational principles, and curriculum knowledge.
Personality competency	Ability to adhere to Indonesian religious, legal, social, and cultural norms, exhibit honesty, noble character, role modeling, strong work ethic, responsibility, pride in the profession, and uphold the professional code of ethics.	A high score from the personality construct shows that teacher can act under applicable rules and be a role model for student.
Social competency	Ability to be inclusive, objective, communicative, and adaptable.	A high score indicates the teacher excels in inclusivity, objectivity, communication, and adaptation.
Professional competency	Ability to master material, student competency standards, develop content, be reflective, and use technology.	A high score indicates the teacher effectively masters material, student standards, content development, and technology.

Source: Permendikbud No. 137 (2014)

The Perception of Teacher Competency Scale (PTCS) is structured based on four dimensions in Table 2, including pedagogic, personality, social, and professional competencies. The initial version of the instrument consisted of 115 items. The content validation process was conducted in two stages of expert judgment and one stage of elicitation testing. In the first stage, expert judgment was carried out by seven experts, comprising three academics and four early childhood education (ECE) practitioners. This stage resulted in 99 valid items. Subsequently, an elicitation test was conducted with eight ECE teachers, consisting of four senior teachers (with more than five years of teaching experience) and four junior teachers (with less than five years of teaching experience). The elicitation confirmed the validity of the 99 items. A second round of expert judgment was then conducted by two experts in psychometrics, which resulted in a refined set of 60 valid items.

The final blueprint was constructed to represent all core dimensions of early childhood teacher competency, based on theoretical and empirical literature. Each dimension is assessed using specific items that reflect distinct aspects of the dimension. Therefore, in Table 3, the 'Dimension' column refers to the broader competency areas, while the 'item' column refers to the actual statements that assess these competencies. Respondents are asked to rate each item based on their self-perception of competency in the respective area. A Likert scale from 1 to 4 is used, where 1 = Very Unable, 2 = Unable, 3 = Capable, and 4 = Very Capable. All items in the Perception of Teacher Competency Scale (PTCS) are favourable, meaning that higher scores consistently reflect higher levels of perceived competency across all dimensions.

Table 3. The Perception of Teacher Competency Scale (PTCS) Blueprint

Dimension	Code	Item (Statement)	Number of Item
Pedagogical: Master children development	P1	Teaching gymnastic to student.	22
	P2	Train student to jump into sports activities.	
	P3	Carry out pre-writing activities by training student to crumple paper.	
	P4	Carry out pre-writing activities by training student to make curved and straight lines.	
	P5	Organize activities for student.	
	P6	Introducing the concept of God by telling stories and discussions.	
	P7	Introducing the concept of God by teaching how to worship.	
	P8	Teaching good/bad, right/wrong, polite/impolite behavior by giving examples in everyday life.	
	P9	Teaching good/bad, right/wrong, polite/impolite behavior with stories and discussions in class.	
	P10	Teach student to take care of themselves at school (for example: wear shoes, and visit the toilet without help).	
	P11	Inviting student to pray for a sick friend.	
	P12	Teaching student to solve problems.	
	P13	Dealing with student who have tantrums in class.	
	P14	Training student to express feelings, such as liking or disliking something.	
	P15	Teaching regional arts, introducing traditional clothes and food to introduce social and cultural diversity in Indonesia.	
	P16	Train student's tolerance by introducing Indonesian customs and culture.	
	P17	Teaching the concept of numbers 1-10.	
	P18	Teaching student to count concrete objects.	
	P19	Teaching science with color mixing experiments.	
	P20	Read stories to student in class.	
	P21	Training student for presentations.	
	P22	Training student to communicate with other people.	
Pedagogical: Master early childhood theories	P23	Applying the psychosocial development theory put forward by Erik Erikson to the learning process.	2
	P24	Stimulating intelligence based on 9 types according to Howard Gardner's theory.	
Pedagogical: Master the curriculum	P25	Implementing the Kurikulum Merdeka.	2
	P26	Implementing Kurikulum 2013.	
Personality: Behave in accordance with Indonesian religious, legal,	K1	Be honest.	7
	K2	Become a mediator of conflicts.	
	K3	Helping co-workers when problems are encountered.	
	K4	Choose a good social environment.	

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Dimension	Code	Item (Statement)	Number of Item
social and cultural norms	K5	Resolving conflicts with student's parent.	
	K6	Become a mediator when there is a conflict between student's parent.	
	K7	Separating personal problems from my duties as teacher.	
Personality: Be a role model	K8	Carrying out all main duties as a teacher.	
	K9	Carrying out additional duties as a teacher.	
	K10	Join teacher community.	4
	K11	Actively included in activities and management in teacher community that I join.	
Social: Inclusive	S1	Taking a special method for children with special needs.	
	S2	Creating an Individual Education Program for special needs.	2
Social: Objective	S3	Create additional activities to facilitate active student to channel energy.	
	S4	Taking a personal method to student who is extremely passive (silent) in class.	3
	S5	Facilitate activities for auditory, visual and kinesthetic children.	
Social: Good communication skill	S6	Communicate with parent of student by communicating via social media/letter.	
	S7	Communicate with parent face to face (distribution of report cards, student pick-up and drop-off, and parenting activities).	5
	S8	Communicate with colleagues during meetings and discussions.	
	S9	Communicate with coworkers during breaks.	
	S10	Communicate and coordinate with headmaster.	
Professional: Master Learning Materials	F1	Understand the Early Childhood Education curriculum used.	2
	F2	Read lots of sources about early childhood.	
Professional Master student competency	F3	Observe all student in the class to understand the characteristics of each student.	2
	F4	Understanding student through Development History Report.	
Professional: Developed Taught Materials	F5	Create learning media that suits learning objectives.	
	F6	Making learning media with cheap materials that are around me.	
	F7	Create a daily learning implementation plan that is adapted to the local cultural context.	5
	F8	Create a daily learning implementation plan that is tailored to the planned theme.	
	F9	Create a rubric for developmental achievements/indicators in the Daily Learning Implementation Plan.	

Dimension	Code	Item (Statement)	Number of Item
Professional: Master Classroom Management	F10	Create varied activities to increase the enthusiasm level of student.	2
	F11	Conduct ice breaking before learning activities begin.	
Professional: Master technology	F12	Using the internet to prepare learning media.	2
	F13	Using videos and internet-based applications in learning activities.	
		Total	60

Sources: Personal Data (2024)

Data Collection

The study followed several key steps: developing and refining a questionnaire through pilot testing and expert feedback for clarity and relevance; distributing the final version online to participants in various locations for efficiency; and providing clear instructions to ensure honest and reflective responses. Data was collected over a set period, with follow-up reminders to increase response rates. Ethical guidelines were strictly observed, with approval from the Indonesian Scientific Psychology Consortium Ethics Committee (Ethics No. 088/2023 Ethics/KPIN). Participants were informed about the study's purpose, their voluntary participation, and their right to withdraw without penalty. Informed consent was obtained, and confidentiality, anonymity, and data security were maintained. Data was collected online across several Indonesian regions over a three-week period, with weekly reminders sent to boost response rates. The questionnaire underwent two stages of validation: nine experts reviewed the content for clarity and relevance (Aiken, 1980), and eight ECE teachers assessed face validity, prompting refinement based on clarity and appropriateness (Johnson, 2021).

Data Analysis

The study employed rigorous statistical methods to assess the validity and reliability of the Teacher Competency Scale. Construct validity was measured using both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). Convergent validity was evaluated based on factor loadings, Composite Reliability (CR), and Average Variance Extracted (AVE), while criterion-related validity was evaluated through correlation tests through correlations with external measures, including teacher efficacy, perceived social support, creative adaptability (Ho & Frampton, 2010; Rozdi et al., 2016), and work engagement (Choochom, 2016; Kristiana et al., 2019; Sasmoko et al., 2020). Furthermore, a validity test was conducted to assess measurement invariance across different groups using multigroup CFA to ensure equivalence. Internal reliability was measured using Cronbach's alpha, with values from 0.43 to 0.94, depending on data distribution (Lievens & De Soete, 2015). EFA and CFA were conducted with JASP software version 0.18.3, with EFA identifying factors using the Kaiser-Meyer-Olkin (KMO) and Bartlett's test. Items with factor loadings below 0.5 were removed, and CFA confirmed validity through model convergence, fit indices, significance of parameter estimates, and measurement invariance (Ingarianti et al., 2019).

Measurement invariance evaluates whether latent constructs are comparable across groups based on three levels: configural, metric, and scalar. Configural invariance indicates that the overall model consistent across different groups, meaning the same pattern of relationships among latent constructs applies to each. The next step is to examine metric invariance, which imposes stricter constraints by requiring that factor loading remain equal across groups. If supported, it suggests that the observed variables represent the same latent constructs in an equivalent manner across groups. Finally, scalar variance requires that the intercepts of the observed indicators are equal across groups. This ensures that differences in latent reflect true variations rather than systematic measurement bias (Steinmetz et al., 2009; Xu and Tracey, 2017). Thus, measurement invariance evaluates are interpreted groups at three

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level of structural consistency (configural invariance), equality of factor loadings (metric invariance), and intercepts (scalar invariance).

The instrument was independently developed to enable Exploratory Factor Analysis (EFA) for identifying specific factors in this context. EFA was conducted separately for pedagogical, personality, social, and professional competencies due to their distinct nature, alignment with ECE competency guidelines Permendikbud No. 137 (2014), NAEYC (2020) and prior research (Rakhmania et al., 2023, 2024). Combining these domains in a single EFA might yield dimensions outside the established ECE theory, and the research preference was to examine each domain's factor structure independently.

Results and Discussion

The study involves designing and testing a 60-item self-inventory questionnaire administered to 249 early childhood teachers in Java. The analysis of the data collected from this sample includes both Exploratory Factor Analysis and Confirmatory Factor Analysis to assess the internal structure of the scale, as well as external validation methods to examine the correlations between the developed scale and other related measures. Additionally, validity was evaluated using Multigroup Confirmatory Factor Analysis (CFA) to assess the consistency of perceptions regarding the measurement instrument across the two groups. The final scale, consisting of 45 valid items, is intended to serve as a reliable and valid scale for assessing teacher competency in early childhood education settings in Indonesia.

Validity and Reliability

Instrument Reliability

Instrument reliability, indicated by Cronbach's alpha coefficients, r, was subsequently performed for each domain, with results presented in Table 4.

Table 4. Instrument Reliability Before EFA and CFA

Construct	Mean	Standard Deviation	Cronbach α	KMO's Test	Bartlett's Test
Pedagogical	78.44	7.80	0.95	0.92	P < .001
Personality	34.10	3.27	0.90	0.87	P < .001
Social	30.29	2.90	0.86	0.84	P < .001
Professional	38.14	3.93	0.88	0.86	P < .001

Sources: Personal Data (2024).

The table summarizes the reliability and validity of constructs measuring teacher competencies in Pedagogical, Personality, Social, and Professional domains. It includes mean scores, standard deviations, Cronbach's alpha, Kaiser-Meyer-Olkin (KMO) measures, and Bartlett's Test of Sphericity results. In the Pedagogical domain, items with factor loadings below 0.5 were removed, resulting in a mean score of 78.44 and a standard deviation of 7.80. The Cronbach's alpha is 0.95, indicating excellent internal consistency. The KMO measure is 0.92, and Bartlett's Test of Sphericity has a p-value of less than 0.001, confirming suitability for factor analysis.

In the Personality domain, item K9 was removed. The mean score is 34.10 with a standard deviation of 3.27. Cronbach's alpha is 0.90, and the KMO measure is 0.87, with Bartlett's Test of Sphericity also showing a p-value of less than 0.001, supporting factor analysis. The Social domain has a mean score of 30.29 and a standard deviation of 2.90. Cronbach's alpha is 0.86, and the KMO measure is 0.84, with Bartlett's Test of Sphericity showing a significant p-value of less than 0.001. In the Professional domain, items F8, F9, F10, and F12 were removed. The mean score is 38.14 with a standard deviation of 3.93.

Cronbach's alpha is 0.88, and the KMO measure is 0.86. Bartlett's Test of Sphericity also indicates a p-value of less than 0.001, validating factor analysis. Overall, the instrument demonstrates strong reliability and validity across all domains, with high Cronbach's alpha values and suitable KMO and Bartlett's Test results, confirming its robustness for further analyses.

Construct Validity

EFA was carried out with varimax orthogonal rotation, eigenvalues above 1, and the factoring method using maximum likelihood. The results in the Pedagogical, Personality, and Social Construct domains identified two distinct factors, whereas the Professional domain identified a single factor. The Perception of Teacher Competency Scale (PTCS) has seven dimensions with 45 valid items and an acceptable Goodness of Fit (GoF), as presented in Table 5.

Table 5. Parameter Fit Indices Perception of Teacher Competency

Model	Parameter Fit							
	X2(df)	X2/df	P-value	GFI	CFI	TLI	RMSEA	SRMR
Before Modification Indices								
Pedagogical	335.60 (103)	3.25	<.001	0.99**	0.91*	0.89	0.09*	0.06**
Personality	165.48 (34)	4.86	<.001	0.99**	0.86	0.85	0.13	0.05**
Social	134.59 (34)	3.95	<.001	0.99**	0.90*	0.87	0.19	0.06**
Professional	153.15 (27)	5.67	<.001	0.99**	0.86	0.81	0.14	0.06**
After Modification Indices								
Pedagogical	238.08 (101)	2.35*	<.001	0.99**	0.94*	0.93*	0.07**	0.05**
Personality	74.05 (31)	2.38*	<.001	0.99**	0.96**	0.94*	0.07**	0.04**
Social	79.13 (31)	2.55*	<.001	0.99**	0.95**	0.93*	0.07**	0.06**
Professional	61.47 (25)	2.46*	<.001	0.99**	0.96**	0.94*	0.07**	0.04**

Recommendation: p>0,05; $\frac{X^2}{df} \leq 2$ good fit**, 2 – 3 acceptable fit*; CFI, TLI, GFI ≥ 0.95 good fit**, ≥ 0.90 acceptable fit*; RMSEA ≤ 0.08 good fit**, 0.09-0.10 acceptable fit*; SRMR≤ 0.08 good fit**

Sources: Personal Data (2024)

The Perception of Teacher Competency Scale (PTCS) underwent multiple iterations of confirmatory factor analysis (CFA) to refine item quality and improve model fit. Poorly performing items—those with low factor loadings and high modification indices—were systematically removed, resulting in enhanced fit indices across all constructs. For instance, eliminating two items from the pedagogical dimension reduced RMSEA from 0.087 to 0.067. Overall, RMSEA values for the revised models fell below 0.08, and CFI and TLI values exceeded 0.90, indicating an acceptable to good fit. The X^2/df ratios for all constructs improved to the 2.35–2.55 range, while SRMR values also dropped to acceptable levels. These refinements are consistent with best practices in scale development and confirm that the modifications were both necessary and effective (Kline, 2016; Whittaker, 2012). Although the chi-square statistic remained significant due to sample size sensitivity (Hu & Bentler, 1999), the overall improvements indicate a theoretically coherent and statistically robust measurement model.

Criterion-Related Validity

Criterion-related validity was evaluated by examining correlations between the PTCS dimensions and established external measures, including teacher efficacy, perceived social support, and creative adaptability. The Shapiro-Wilk test for normality revealed that the data did not follow a normal distribution ($p < 0.001$). Consequently, Spearman's correlation was employed for non-parametric analysis. The results of these correlations across seven Likert scale dimensions (Table 6.) provide evidence of the PTCS's criterion-related validity.

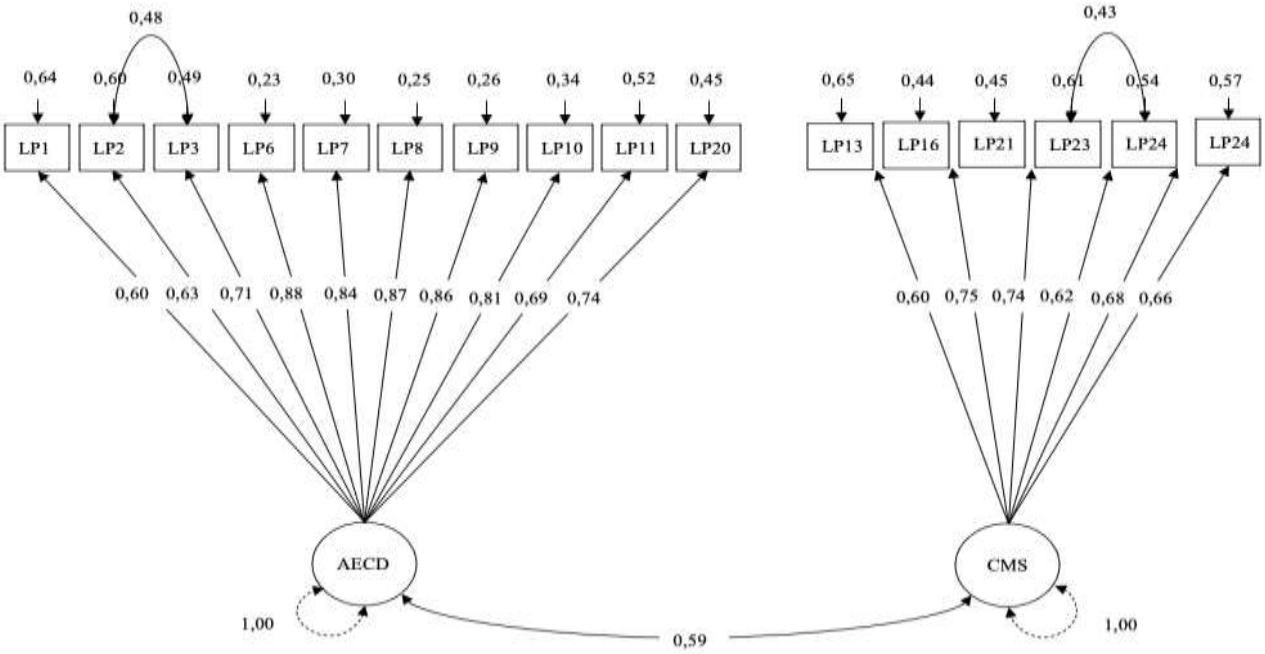
Table 6. Correlation Coefficient of Perceived ECE Teacher Competency with Creative Adaptation Ability, Perception of Social Support, and Teacher Efficacy

Variable	1	2	3	4	5	6	7	8	9	10	11
Aspects Of Early Childhood Development	0.09	0.19**	-0.02	0.14*	0.11	0.19**	0.17**	0.37***	0.43***	0.43***	0.17*
Classroom Mastery Strategy	0.12	0.26***	0.12	0.11	0.08	0.10	0.10	0.38***	0.31***	0.41***	0.19**
Become A Role Model	0.05	0.14*	-0.03	0.17**	0.13*	0.25***	0.20***	0.30***	0.37***	0.38***	0.23***
Participation In Teacher Community	0.11	0.14*	-0.01	0.16*	0.01	0.12	0.16*	0.26***	0.23***	0.31***	0.15*
Establishing Interpersonal Relationships	0.12	0.23***	0.04	0.07	0.02	0.06	0.15*	0.36***	0.31***	0.37***	0.15***
Ability To Facilitate Student	0.14*	0.29***	0.04	0.05	0.03	0.03	0.13*	0.37***	0.47***	0.42***	0.17**
Teacher Professionali-sm	0.09	0.24***	-0.02	0.11	0.08	0.19**	0.21***	0.42***	0.47***	0.51***	0.17**

1-3: Creative Adaptability (1. Behavioral Adaptability; 2. Cognitive Adaptability; 3. Emotional Adaptability), 4-7: Perception of Social Support (4. Principal Support; 5. Colleague Teacher Support; 6. Family Support; 7 . Peer Support), 8-10: Teacher Efficacy (8. Classroom Management; 9. Student Engagement; 10. Instructional Strategies), 11. Work Engagement. * $p < .05$, ** $p < .01$, *** $p < .001$

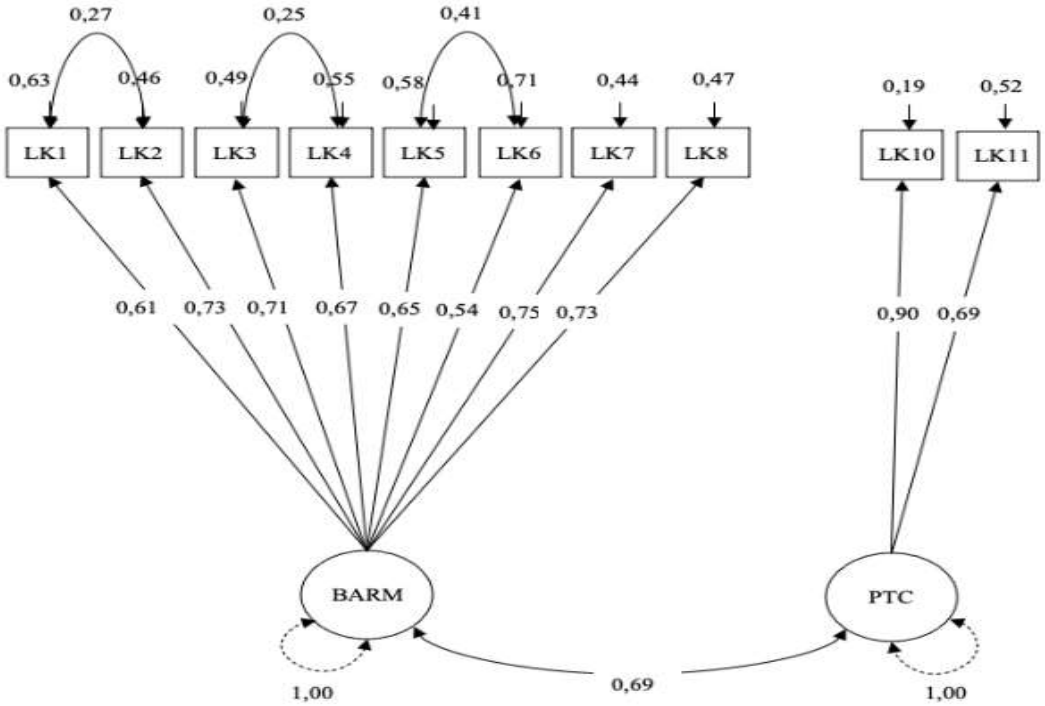
Sources: Personal Data (2024)

In the criterion-related validity test, correlations with the creative adaptability measure indicate that class mastery strategies, interpersonal relationship skills, and the ability to facilitate professionalism are linked with teacher competency perception. Early childhood development aspects and role modeling show moderate and low correlations, respectively. Correlations with social support measures reveal low correlations between developmental aspects, teacher community participation with principal support, and a moderate correlation with role modeling. Colleague support is correlated only with role modeling but has a significant link to family support. Factor analysis results are as follows: Pedagogical Competency includes Aspects of Early Childhood Development and Classroom Mastery Strategies (Figure 1), Personality Competency includes Being a Role Model and Teacher Community Participation (Figure 2), Social Competency includes Interpersonal Relationships and the Ability to Facilitate Students (Figure 3), and Professional Competency includes Teacher Professionalism (Figure 4).



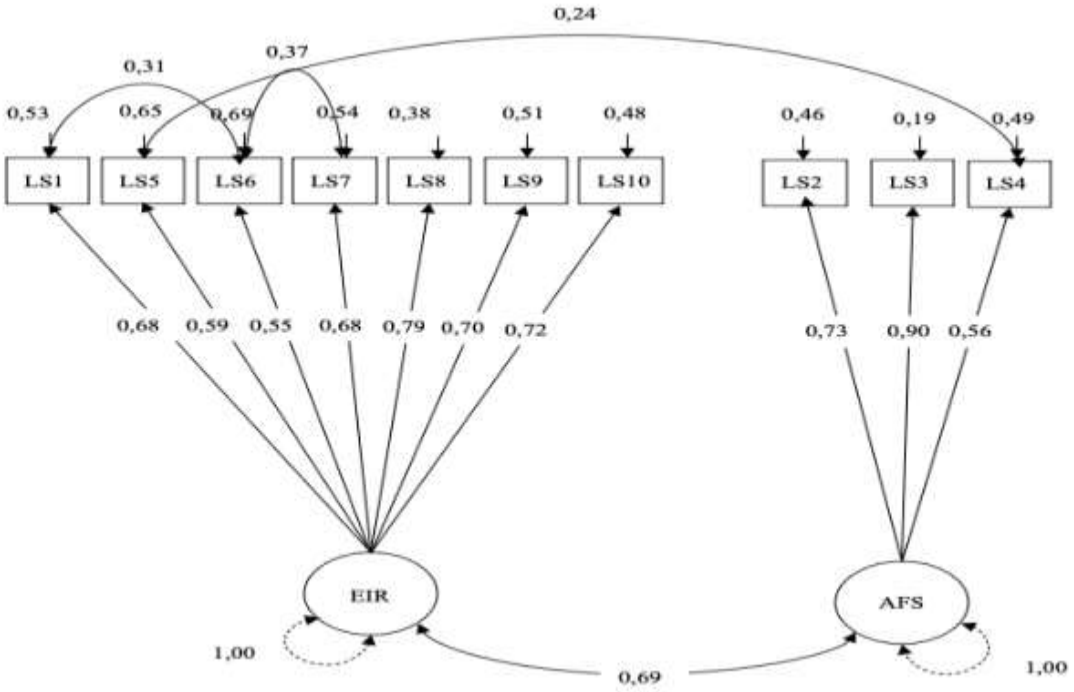
Sources: Personal data (2024).

Figure 1. Factor Analysis Finding in Pedagogical Competency



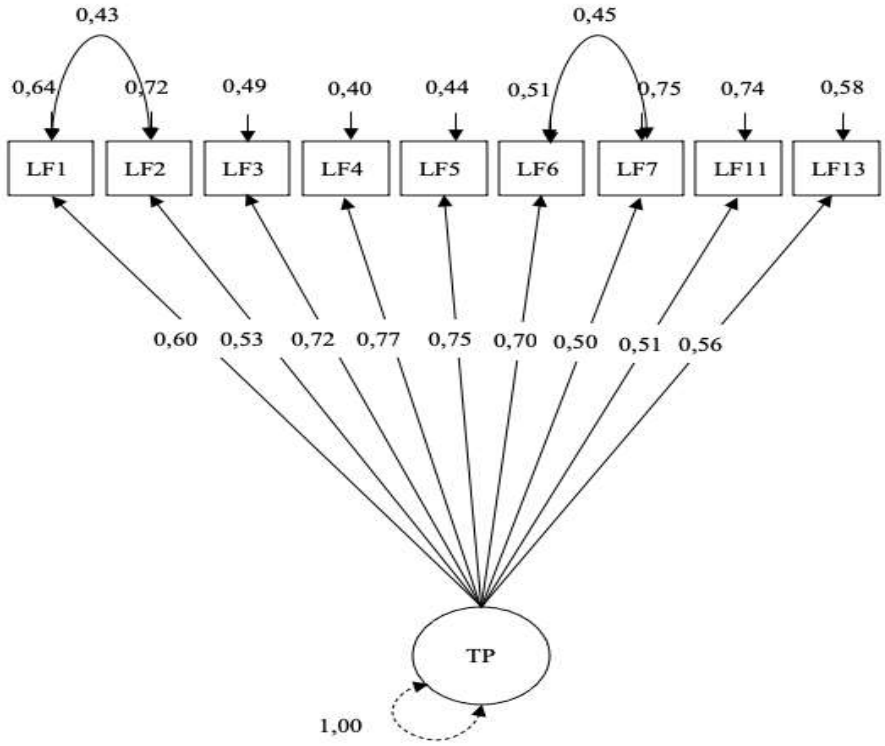
Sources: Personal data (2024).

Figure 2. Factor Analysis Finding in Personality Competency



Sources: Personal data (2024).

Figure 3. Factor Analysis Finding in Social Competency



Sources: Personal data (2024).

Figure 4. Factor Analysis Finding in Professional Competency

Convergent Validity and Reliability Test

Convergent validity in the CFA was evaluated using Composite Reliability (CR) and Average Variance Extracted (AVE). A CR value of ≥ 0.7 is considered good, while 0.6–0.7 is acceptable, and the recommended AVE value is ≥ 0.5 according to Hair et al. (2019). The CR and AVE values for the PTCS model are between 0.94 and 0.99 and 0.74 and 0.82, respectively, confirming strong convergent validity. Internal consistency reliability was demonstrated by Cronbach's α for constructs that range from 0.69 to 0.93, and the Kaiser-Meyer-Olkin results from 249 respondents range from 0.50 to 0.92, with only the teacher community participation dimension at the threshold due to fewer items. The dimension of teacher community participation initially showed a lower Kaiser-Meyer-Olkin (KMO) value of 0.50, which may be attributed to the limited number of items (n = 2) included in the scale. Recognising the importance of this domain, the items were retained in the model due to their theoretical relevance and acceptable factor loadings above 0.50. However, future studies are encouraged to expand this dimension with additional items to enhance the reliability and sampling adequacy of the construct. The Bartlett test shows $P < 0.001$, indicating variable correlation. The instrument validity and reliability tests produced 45 valid items (Table 7). The original instrument and scoring guide are available in the Appendix.

Table 7. Final Items

Item Code	Dimension	Item (Statement)	Factor Loading
P1	Aspects Of Early Childhood Development	Teaching gymnastic to student.	0.56
P2		Train student to jump into sports activities.	0.61
P3		Carry out pre-writing activities by training student to crumple paper	0.70
P6		Introducing the concept of God to student by telling stories and discussions.	0.83
P7		Introducing the concept of God by teaching how to worship.	0.85
P8		Teach good/bad, right/wrong, polite/impolite behavior to student by giving examples in everyday life.	0.86
P9		Teaching good/bad, right/wrong, polite/impolite behavior to student with stories and discussions in class.	0.82
P10		Teach student to take care of themselves at school (for example: wear shoes, and visit the toilet without help).	0.77
P11		Invite student to pray for a sick friend.	0.61
P20		Read stories to student in class.	0.67
P13	Classroom Mastery Strategy	Dealing with student who have tantrums in class.	0.53
P16		Train student's tolerance by introducing Indonesian customs and culture.	0.61
P21		Train student for presentations.	0.67
P23		Applying the psychosocial development theory put forward by Erik Erikson to the learning process.	0.75
P24		Stimulating intelligence based on 9 types according to Howard Gardner's theory.	0.76
P25		Implementing the Merdeka's Curriculum.	0.60
K1	Become A Role Model	Be honest.	0.58

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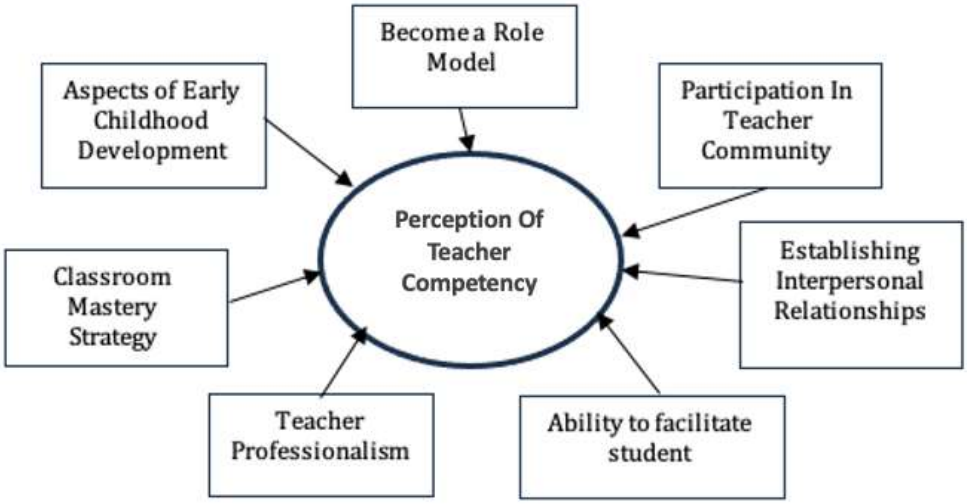
K2		Become a mediator of conflicts.	0.68
K3		Helping co-workers when problems are encountered.	0.77
K4		Choose a good social environment.	0.68
K5		Resolving conflicts with student's parent.	0.63
K6		Become a mediator when there is a conflict between student's parent.	0.51
K7		Separating personal problems from my duties as teacher.	0.65
K8		Carry out all main duties as teacher.	0.59
K10	Participation In Teacher Community	Join teacher community.	0.96
K11		Actively included in activities and management in teacher community that I join.	0.57
S1	Establishing Interpersonal Relationships	Taking a special method for student with special needs.	0.62
S5		Facilitate activities for auditory, visual and kinesthetic student.	0.52
S6		Communicate with parent through social media/letter.	0.61
S7		Communicate with parent face to face (distribution of report cards, student pick-up and drop-off, and parenting activities).	0.70
S8		Communicate with colleagues during meetings and discussions.	0.78
S9		Communicate with coworkers during breaks.	0.70
S10		Communicate and coordinate with headmaster.	0.68
S2	Ability To Facilitate Student	Creating an Individual Education Program for special needs.	0.73
S3		Create additional activities to facilitate active student to channel energy.	0.88
S4		Taking a personal method to student who is extremely passive (silent) in class.	0.56
F1	Teacher Professionalism	Understand the Early Childhood Education curriculum used.	0.64
F2		Read lots of sources about early childhood.	0.58
F3		Observe student in class to understand the characteristics of each student.	0.70
F4		Understanding student through Development History Report.	0.73
F5		Create learning media that suits learning objectives.	0.74
F6		Making learning media with cheap materials that are around me.	0.74
F7		Create a daily learning implementation plan that is adapted to the local cultural context.	0.57
F11		Conduct ice-breaking before learning activities begin.	0.52
F13		Using videos and internet-based applications in learning activities.	0.65

Sources: Personal Data (2024)

This study focuses on developing and validating a measurement scale to assess teacher competence, particularly in early childhood education. The conceptual framework, as depicted in the diagram, highlights several key dimensions that contribute to the perception of teacher competence, such as Aspects of Early Childhood Development, Classroom Mastery Strategies, Become a Role Model, Teacher Community Participation, Interpersonal Relationships, Ability to Facilitate Students, and Teacher Professionalism. These dimensions align with the broader constructs of pedagogical, personality, social, and professional competencies as presented in Figure 5.



Sources: Personal data (2024).

Figure 5. Perception of Teacher Competency Scale Framework

The statistical analysis, including confirmatory factor analysis (CFA), reveals that the model achieved an acceptable fit, with parameters such as X2/df, GFI, CFI, TLI, RMSEA, and SRMR all within acceptable ranges. Although the chi-square test resulted in a significant p-value, this outcome is attributed to the small sample size, a common issue in factor analysis. Despite this, the model's overall fit was deemed satisfactory after modifications, indicating that the constructs and their corresponding dimensions are valid representations of teacher competence.

Measurement Invariance

Measurement invariance testing was conducted on two groups: educational background and work experience. The educational background of participants was categorised into two groups: (1) Early Childhood Education (ECE) degree holders and (2) Non-ECE degree holders, who had a high school diploma or a degree in a field other than ECE. This classification follows government qualifications, which mandate that early childhood education (ECE) teachers must hold at least a degree in early childhood teacher education or psychology (Putri Nazidah, 2021). For work experience, previous research categorises employment duration into two groups: (1) less than 10 years, considered new or intermediate, and (2) more than 10 years, classified as experienced (Jayanti & Dewi, 2021; Noli et al., 2021). Table 8 presents the measurement invariance testing results for the educational background group across four competency factors: pedagogic (edu-pedagogic), personality (edu-personality), social (edu-social), and professional (edu-professional).

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Table 8. Measurement Invariance of Educational Background Groups

Statistic Testing	GoF	Edu-Pedagogic	Edu-Personality	Edu-Social	Edu-Professional
Configural	X2 (df)	389.48 (202)	146.45 (62)	125.83 (62)	138.21 (50)
	X2/df	1.97**	2.30*	2.03*	2.76*
	p-value	< .001	<.001	< .001	< .001
	GFI	0.99**	0.99**	0.99**	0.99**
	CFI	0.93*	0.93*	0.94*	0.91*
	TLI	0.91*	0.89	0.91*	0.86
	RMSEA	0.09	0.10	0.09	0.12
	SRMR	0.07**	0.05**	0.06**	0.06**
	AIC	2852.75	1770.56	1962.14	1633.09
Metric	X2 (df)	394.11 (216)	150.78 (70)	133.05 (70)	146.21 (58)
	X2/df	1.82**	2.15*	1.90**	2.52*
	p-value	< .001	< .001	< .001	< .001
	GFI	0.99**	0.99**	0.99**	0.99**
	CFI	0.93*	0.93*	0.94*	0.91*
	TLI	0.92*	0.91*	0.92*	0.88
	RMSEA	0.08**	0.10*	0.09*	0.11
	SRMR	0.06**	0.06**	0.07**	0.07**
	AIC	2829.38	1758.89	1953.35	1625.09
Scalar	X2 (df)	407.45 (230)	158.67 (78)	140,20 (78)	164,34 (66)
	X2/df	1.77**	2.03*	1.80**	2.49*
	p-value	< .001	< .001	< .001	< .001
	GFI	0.99**	0.99**	0.99**	0.99**
	CFI	0.93*	0.93*	0.94*	0.90*
	TLI	0.93*	0.92*	0.93*	0.89
	RMSEA	0.08**	0.09*	0.08**	0.11
	SRMR	0.07**	0.06**	0.07**	0.08**
	AIC	2814.72	1750.78	1944,51	1627.22

Recommendation: p>0.05; $\frac{X^2}{df} \leq 2$ good fit**, 2 – 3 acceptable fit*; CFI, TLI, GFI ≥ 0.95 good fit**, ≥ 0.90 acceptable fit*; RMSEA ≤ 0.08 good fit**, 0.09-0.10 acceptable fit*; SRMR≤ 0.08 good fit**.

Sources: Personal Data (2024).

The results show insignificant p-values ($p < 0.001$) due to sample size effect, requiring other fit indices for interpretation. The χ^2/df ratios fall within acceptable thresholds, indicating adequate model fit. GFI, CFI, and TLI values generally demonstrate an acceptable fit across most competency factors, though minor declines are observed in professional competency during scalar invariance testing. RMSEA and SRMR mostly meet good or acceptable fit criteria, with slight deviations in professional competency. AIC values either decrease or fluctuate slightly across invariance levels, with bold numbers identifying the best-fitting models. Overall, the models fit well across groups, with minor inconsistencies in professional competency. This suggests that adding constraints (metric and scalar) does not significantly degrade the model's fit and, in some cases, may improve.

In conclusion, measurement invariance testing confirms that the Perception of Teacher Competency Scale (PTCS) demonstrates acceptable configural, metric, and scalar invariance for this group. This result indicates that perceptions of this measuring instrument do not significantly differ between teachers with and without ECE degrees, affirming its applicability across both groups. Table 9. presents the measurement invariance testing results for the teaching experience group.

Table 9. Measurement Invariance of Teaching Experience Groups

Statistic Testing	GoF	Exp-Pedagogic	Exp-Personality	Exp-Social	Exp-Professional
Configural	X2 (df)	389,08 (202)	145.79 (62)	13.33 (8)	120.66 (50)
	X2/df	1.92**	2.35*	1.66**	2.40*
	p-value	< .001	< .001	0.10**	< .001
	GFI	0.99**	0.99**	1.00	0.99**
	CFI	0.93*	0.93*	0.98**	0.93*
	TLI	0.91*	0.90*	0.96**	0.89
	RMSEA	0.09*	0.10	0.07**	0.11
	SRMR	0.06**	0.06**	0.04**	0.06**
	AIC	2821,21	1696.48	1189.21	1571.43
Metric	X2 (df)	415,05 (206)	163.01 (70)	141.46 (70)	132.35 (58)
	X2/df	1.92*	2.33*	2.02*	2.28*
	p-value	< .001	< .001	< .001	< .001
	GFI	0.99**	0.99**	0.99**	0.99**
	CFI	0.92*	0.92*	0.93*	0.92*
	TLI	0.91*	0.90*	0.91*	0.90*
	RMSEA	0.09*	0.10	0.09*	0.10
	SRMR	0.08**	0.08**	0.08**	0.07*
	AIC	2819.19	1697.70	1903.47	1567.11
Scalar	X2 (df)	438.45 (230)	181.55 (78)	159.15 (78)	153.01 (66)
	X2/df	1.91*	2.33*	2.04*	2.32*
	p-value	< .001	< .001	< .001	< .001
	GFI	0.99**	0.99**	0.99**	0.99**
	CFI	0.92*	0.91*	0.92*	0.91*
	TLI	0.91*	0.90*	0.91*	0.90*
	RMSEA	0.09*	0.10	0.09*	0.10
	SRMR	0.08**	0.08**	0.08**	0.07**
	AIC	2814.58	1700.25	1905.16	1571.78

Recommendation: p>0.05; $\frac{X^2}{df} \leq 2$ good fit**, 2 – 3 acceptable fit*; CFI, TLI ≥ 0.95 good fit**, ≥ 0.90 acceptable fit*; RMSEA ≤ 0.08 good fit**, 0.09-0.10 acceptable fit*; SRMR≤ 0.08 good fit**.

Sources: Personal Data (2024)

The results in Table 9. examine measurement invariance for teaching experience groups across four factors: pedagogic (exp-pedagogic), personality (exp-personality), social (exp-social), and professional (exp-professional). The analysis includes configural, metric, and scalar invariance, with multiple fit indices used for evaluation. The results in Table 9 show that measurement invariance is achieved at the factor pedagogic, personality, and professional competency, confirming that the instrument reliably

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assesses these factors across teaching experience groups. This ensures its suitability for comparing competency perceptions between novice and experienced teachers.

For social competence, the initial configural test in the multigroup CFA could not be conducted. To address this, items were sequentially removed until the configural model yielded valid results. The eliminated items were S4, S5, S6, S8, and S9. The results presented in Table 9 for the exp-social configural test reflect these modifications. Interestingly, no further item modifications were necessary for metric and scalar tests, allowing these analyses to proceed with the original 10-item social competence scale. The retained items primarily assessed face-to-face communication with parents, communication with the principal, and teacher attitudes toward students with special needs.

In contrast, eliminated items involved communication with colleagues and indirect communication with parents. These findings imply that both novice and experienced teachers see direct communication and response to kids with special needs as the paramount part of social competency. The conclusion of this study is to properly measure instructors' social competency based on teaching experience, utilising only the five viable items to achieve a fair and reliable assessment across both groups.

Implication

The implications of this study are significant for both educational research and practice. The validated measurement scale offers a comprehensive framework for assessing teacher competence, particularly in early childhood education. This scale can be used by educational administrators, policymakers, and teacher training programs to identify areas where teachers excel and where they may need additional support or professional development. For educational practitioners, the study emphasises the importance of a multifaceted approach to teacher competence. While traditional metrics of teaching effectiveness often focus on classroom management and content knowledge, this study highlights the critical role of interpersonal skills, professional ethics, and community engagement. By recognising and fostering these dimensions, schools and educational institutions can support the development of well-rounded, competent teachers who are better equipped to meet the diverse needs of their students.

The study also has implications for teacher training programs. The seven dimensions identified in this research provide a clear framework for developing curriculum and training modules that address the full spectrum of competencies required for effective teaching. For example, teacher training programs can include specific modules on early childhood development, strategies for community engagement, and techniques for establishing strong interpersonal relationships with students and colleagues. By aligning training programs with these competencies, educators can ensure that new teachers are well-prepared for the classroom challenges. Furthermore, the study's findings could inform policy decisions related to teacher evaluation and professional development. The validated measurement scale offers a more nuanced and comprehensive way to assess teacher performance, going beyond traditional evaluation metrics like student test scores. By incorporating a broader range of competencies into teacher evaluations, policymakers can create more holistic and fair systems for assessing teacher effectiveness and identifying areas for growth.

Limitation

Despite its contributions, this study has limitations, primarily the small sample size, which restricts the generalizability of the findings. Although model fit indices were acceptable, the insignificant chi-square result suggests that the sample may have been too small to detect significant differences, potentially causing Type II errors. Future research should replicate this study with a larger and more diverse sample to better confirm the measurement scale's validity and reliability. The scale demonstrates strong potential as a reliable tool for assessing teacher competencies across different levels of teaching experience, with three out of four factors meeting strict measurement invariance requirements. However, to improve its applicability, the social competency factor requires further investigation and potential

revision. This step will ensure the scale provides a comprehensive and unbiased measurement of all four competency dimensions across diverse teaching populations.

Another limitation is the study's focus on early childhood education, which may limit the applicability of the findings to other educational contexts. The competencies for effective teaching in early childhood may differ from those required in primary, secondary, or higher education. Thus, the measurement scale may need adaptation for other educational settings, and further research is needed to assess its applicability across different age groups and contexts. Additionally, reliance on self-reported data introduces potential bias, as teachers might have responded in socially desirable ways rather than accurately reflecting their competencies. Despite using validated instruments and statistical controls, response bias cannot be entirely ruled out. Lastly, the study's cross-sectional design provides only a snapshot of teacher competence at a single point in time. Competence likely evolves throughout a teacher's career, so a longitudinal study would better capture these changes. Future research should consider a longitudinal approach to track shifts in teacher competence and explore how different dimensions interact and evolve.

Conclusion

This study develops and validates a scale for assessing teacher competence in early childhood education. The scale covers seven dimensions: 1) Aspects of Early Childhood Development, Classroom Mastery Strategies, 2) Becoming a Role Model, Teacher Community Participation, Interpersonal Relationships, and 3) Ability to Facilitate Students, and Teacher Professionalism. Despite a small sample size, statistical analysis confirms the scale's validity and reliability. Compared to previous research, this scale offers a detailed breakdown relevant to early childhood educators, underscoring a holistic approach to teacher competence that includes pedagogical skills, ethics, interpersonal skills, and community involvement. The study suggests that educational evaluations and training programs should adopt a comprehensive framework reflecting these diverse competencies. However, limitations such as a small sample size, focus on early childhood education, potential response bias, and cross-sectional design highlight the need for further research. Future studies should replicate these findings with larger samples, assess the scale’s applicability in various educational contexts, and explore a longitudinal approach better to understand the development of teacher competence over time.

The proposed model aligns with the Indonesian National Standards for Early Childhood Education, specifically Permendikbud No. 137 in 2014, which defines four core teacher competencies: pedagogic, professional, personal, and social. The model is also align with the six standards formulated by the National Association for the Education of Young Children (NAEYC), particularly in the areas of professional responsibility, developmentally effective teaching, and reflective practice. These alignments enhance the tool’s practical relevance for teacher education programs, certification processes, and ongoing professional development within the Indonesian context. Additionally, the inclusion of measurement invariance testing across provinces contributes to policy formulation by ensuring that assessments are valid and applicable across diverse regional contexts. Overall, this research contributes to the field by offering a validated scale that captures the multifaceted nature of teacher competence and sets the stage for future research aimed at enhancing teacher effectiveness, particularly in early childhood education. The final scale, streamlined from 60 to 45 items, satisfies psychometric standards of construct validity, convergent validity, criterion-related validity, and reliability, and has been endorsed by educational authorities to enhance professionalism among Early Childhood Education (ECE) teachers. By producing a perception-based contextually grounded instrument, this study not only addresses a critical gap in the current literature but also provides a transferable framework that can be adapted for broader educational contexts.

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Conflict of Interest

The authors declare that there are no conflicts of interest related to the research, authorship, and/or publication of this article. The research was conducted independently, without any influence or bias from external funding sources, institutions, or commercial entities. All findings, interpretations, and conclusions represent the unbiased academic work of the authors.

Authors Contribution

The first author was responsible for conceptualisation, data curation, formal analysis, investigation, methodology, project administration, resources, validation, visualisation, as well as writing the original draft and reviewing and editing the manuscript. The second author contributed to the conceptualisation, data curation, methodology, project administration, validation, visualisation, and review and editing of the manuscript. The third author provided contributions in conceptualisation, funding acquisition, methodology, project administration, validation, visualisation, writing, review, and editing. All authors have reviewed and approved the final version of the manuscript.

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Appendix

Instrument (Original Version With English Translation)

Instruksi (Versi Bahasa Indonesia):

Nilailah setiap pernyataan berdasarkan bagaimana Anda menilai kompetensi Anda sendiri di area tersebut. Gunakan skala 1 sampai 4, di mana:

1 = sangat tidak mampu,

2 = tidak mampu,

3 = mampu,

4 = sangat mampu.

Setiap pernyataan di Tabel A. dimulai dengan kata "Saya mampu…"

Instruction (English Version):

Please rate each statement based on how you perceive your own competency in the respective area. Use the scale from 1 to 4, where:

1 = I feel very unable/incompetent.

2 = I feel unable/incompetent.

3 = I feel capable.

4 = I feel very capable.

Each statement in Tabel A. began with the words "I am able to.."

Table A. Original Version and English Translation of Perception of Teacher Competence Scale

Dimension	Code	Original Version (Bahasa Indonesia)	English Translation
Aspek Perkembangan Anak Usia Dini (Aspects of early childhood development)	P1	*Mengajarkan senam kepada siswa.*	Teaching gymnastic to student.
	P2	*Melatih siswa untuk melompat dalam kegiatan olah raga.*	Train student to jump into sports activities.
	P3	*Melakukan kegiatan pra menulis dengan melatih siswa meremas kertas.*	Carry out pre-writing activities by training student to crumple paper.
	P6	*Mengenalkan konsep Tuhan kepada siswa dengan bercerita dan diskusi.*	Introducing the concept of God to student by telling stories and discussions.
	P7	*Mengenalkan konsep Tuhan dengan mengajarkan tata cara beribadah.*	Introducing the concept of God by teaching how to worship.
	P8	*Mengajarkan perilaku baik/buruk, benar/salah, sopan/tidak sopan kepada siswa dengan memberi contoh dalam kehidupan sehari-hari.*	Teach good/bad, right/wrong, polite/impolite behavior to student by giving examples in everyday life.
	P9	*Mengajarkan perilaku baik/buruk, benar/salah, sopan/tidak sopan kepada siswa dengan cerita dan diskusi di kelas.*	Teaching good/bad, right/wrong, polite/impolite behavior to student with stories and discussions in class.

	P10	*Mengajarkan siswa untuk mengurus diri sendiri di sekolah (misal: pakai sepatu sendiri, ke toilet sendiri).*	Teach student to take care of themselves at school (for example: wear shoes, and visit the toilet without help).
	P11	*Mengajak siswa untuk mendoakan teman yang sakit.*	Invite student to pray for a sick friend.
	P20	*Membacakan cerita untuk siswa di kelas.*	Read stories to student in class.
Strategi Penguasaan Kelas (Classroom Mastery Strategy)	P13	*Mengatasi siswa yang tantrum di kelas.*	Dealing with student who have tantrums in class.
	P16	*Melatih sikap toleransi siswa dengan memperkenalkan adat istiadat dan budaya Indonesia.*	Train student's tolerance by introducing Indonesian customs and culture.
	P21	*Melatih siswa untuk presentasi.*	Train student for presentations.
	P23	*Menerapkan teori perkembangan psikososial yang kemukakan oleh Erik Eriksson untuk proses pembelajaran.*	Applying the psychosocial development theory put forward by Erik Erikson to the learning process.
	P24	*Menstimulasi kecerdasan anak berdasarkan 9 jenis kecerdasan anak sesuai dengan teori Howard Gardner.*	Stimulating intelligence based on 9 types according to Howard Gardner's theory.
	P25	*Menerapkan Kurikulum PAUD Merdeka*	Implementing the Merdeka's Curriculum.
Menjadi Suri Tauladan (Become A Role Model)	K1	*Untuk selalu bersikap jujur.*	Be honest.
	K2	*Menjadi penengah jika ada siswa yang bertengkar.*	Become a mediator of conflicts.
	K3	*Membantu rekan kerja saat mereka menghadapi masalah.*	Helping co-workers when problems are encountered.
	K4	*Memilih lingkungan sosial yang baik.*	Choose a good social environment.
	K5	*Mengatasi konflik saya dengan orang tua siswa.*	Resolving conflicts with student's parent.
	K6	*Menjadi penengah saat terdapat konflik antar orang tua siswa.*	Become a mediator when there is a conflict between student's parent.
	K7	*Memisahkan antara masalah pribadi dengan tugas saya sebagai guru.*	Separating personal problems from my duties as teacher.
	K8	*Menjalankan semua tugas utama sebagai guru.*	Carry out all main duties as teacher.
Berpartisipasi dalam Komunitas Guru (Participation in Teacher Community)	K10	*Mengikuti komunitas guru.*	Join teacher community.
	K11	*Aktif terlibat dalam kegiatan dan kepengurusan di komunitas guru yang saya ikuti.*	Actively included in activities and management in teacher community that I join.
	S1	*Melakukan pendekatan khusus untuk Anak Berkebutuhan Khusus*	Taking a special method for student with special needs.

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Menjalin Hubungan Interpersonal (Establishing Interpersonal Relationships)		*(ABK).*	
	S5	*Memfasilitasi kegiatan untuk anak-anak auditori, visual dan kinestetik.*	Facilitate activities for auditory, visual and kinesthetic student.
	S6	*Berkomunikasi dengan orang tua/wali siswa dengan komunikasi melalui sosial media/surat/buku penghubung.*	Communicate with parent through social media/letter.
	S7	*Berkomunikasi dengan orang tua/wali siswa saat tatap muka (pembagian rapor, antar jemput siswa, kegiatan parenting, dll).*	Communicate with parent face to face (distribution of report cards, student pick-up and drop-off, and parenting activities).
	S8	*Berkomunikasi dengan rekan kerja saat rapat dan diskusi.*	Communicate with colleagues during meetings and discussions.
	S9	*Berkomunikasi dengan rekan kerja saat istirahat.*	Communicate with coworkers during breaks.
	S10	*Berkomunikasi dan melakukan koordinasi dengan atasan.*	Communicate and coordinate with headmaster.
Kemampuan untuk Memfasilitasi Siswa (Ability To Facilitate Student)	S2	*Membuat Program Edukasi Individual untuk Anak Berkebutuhan Khusus (ABK).*	Creating an Individual Education Program for special needs.
	S3	*Membuat kegiatan tambahan untuk memfasilitasi siswa yang aktif agar dapat menyalurkan energinya.*	Create additional activities to facilitate active student to channel energy.
	S4	*Melakukan pendekatan personal kepada siswa yang terlalu pasif (diam) di kelas.*	Taking a personal method to student who is extremely passive (silent) in class.
Profesionalisme Guru (Teacher Professionalism)	F1	*Memahami kurikulum pendidikan anak usia dini yang digunakan.*	Understand the Early Childhood Education curriculum used.
	F2	*Membaca banyak sumber mengenai anak usia dini.*	Read lots of sources about early childhood.
	F3	*Mengamati semua siswa di kelas hingga mengenal karakteristik tiap siswa.*	Observe student in class to understand the characteristics of each student.
	F4	*Memahami siswa melalui Riwayat Perkembangan Siswa (RPS).*	Understanding student through Development History Report.
	F5	*Membuat media pembelajaran yang sesuai dengan tujuan pembelajaran.*	Create learning media that suits learning objectives.
	F6	*Membuat media pembelajaran dengan bahan yang murah dan ada di sekitar saya.*	Making learning media with cheap materials that are around me.
	F7	*Membuat Rencana Pelaksanaan Pembelajaran Harian (RPPH) yang disesuaikan dengan konteks lokal budaya setempat.*	Create a daily learning implementation plan that is adapted to the local cultural context.

	F11	*Melakukan ice breaking (permainan) sebelum kegiatan belajar dimulai.*	Conduct ice-breaking before learning activities begin.
	F13	*Menggunakan video dan aplikasi berbasis internet dalam kegiatan belajar.*	Using videos and internet-based applications in learning activities.

Notes: All items are favorable.

Sources: Personal Data (2024)

Scoring Guide

This inventory measures Early Childhood Education teachers' perceptions of their job competencies. The measurement items use a 4-point Likert scale ranging from 1 = very unable to 4 = very capable. The average score for each dimension is calculated by summing the scores for the dimension and then dividing by the number of items.

Relevance levels:

1 = Teachers feel very unable/incompetent.

2 = Teachers feel unable/incompetent.

3 = Teachers feel capable.

4 = Teachers feel very capable.

Table B. Example of Score Calculation

Dimension	Items (n)	Score on each item	Total Score (a)	Average Score (a:n)
Aspects Of Early Childhood Development	10	4+3+4+3+4+2+3+3+3+3	32	3.20
Classroom Mastery Strategy	6	4+3+4+2+3+3	19	3.16
Become A Role Model	8	4+3+4+3+4+2+3+3	26	3.25
Participation in Teacher Community	2	3+3	6	3.00
Establishing Interpersonal Relationships	7	3+3+3+4+3+4+3	23	3.29
Ability To Facilitate Student	3	4+3+4	11	3.66
Teacher Professionalism	9	2+3+3+3+3+4+3+4+3	28	3.11
Total Average Score				22.67

Sources: Personal Data (2024)

The table above presents the total score and average for each dimension. To obtain the competency score, sum the average score and divide by 2.8. For instance, in the chart above, the overall average score is 22.67; hence, 22.67 divided by 2.8 becomes 8.09.

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