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Assessing integrated social-emotional and cognitive competencies in pre-service teachers: scale development

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ABSTRACT

Developing integrated social-emotional and cognitive (ISEC) competencies is essential for pre-service teachers (PST), yet these competencies are often underemphasized in teacher education programs. This study aimed to develop and provide preliminary evidence for a reliable, structurally sound instrument to measure ISEC competencies among PST. Using a design and development research approach, PST-ISEC learning competency scale was developed and examined for internal structure and reliability. An initial pool of 74 items, refined through literature review, and expert validation, was administered to purposively selected PST from higher education institutions in one Philippine region (n=370 for exploratory factor analysis (EFA); n=405 for confirmatory factor analysis (CFA)). EFA with Varimax rotation reduced the scale to 22 items across five dimensions: collaborative spirit (CS), hopeful mindset (HM), mindful confidence (MC), emotional resilience (ER), and responsible decision-making and accountability (RD). CFA confirmed five-factor structure with acceptable fit, and internal consistency indices indicated adequate reliability. Convergent and discriminant validity analyses supported construct distinctiveness. The PST-ISEC scale provides a theoretically grounded tool for formative assessment, program evaluation, and targeted interventions. Future studies should examine criterion-related and predictive validity, measurement invariance, and cross-context applicability to strengthen its utility.

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1. INTRODUCTION

Effective teaching requires more than subject knowledge and instructional strategies; modern classrooms demand that educators possess both social-emotional and cognitive competencies to support students' academic engagement, well-being, and overall development [1]. Teacher education programs are critical in preparing future educators to manage classrooms, build positive relationships, and respond to diverse learner needs [2]. Social-emotional learning (SEL) provides a foundational framework, encompassing self-awareness, self-management, social awareness, relationship skills, and responsible decision-making, which enhance teachers' emotional regulation, motivation, and interpersonal effectiveness—factors closely linked to student outcomes and professional growth [3]. Globally, the Collaborative for Academic, Social, and Emotional Learning (CASEL) framework guides teacher preparation, while UNESCO highlights integrating SEL into curricula to improve both academic performance and socio-emotional well-being [4].

Research shows that teachers with strong SEL skills create supportive learning environments, manage behavior effectively, and demonstrate instructional resilience [5]. Social-emotional competencies are

intertwined with cognitive skills—including critical thinking, problem-solving, attention regulation, and reflective decision-making—which collectively shape teaching practices [6], [7]. SEL has also been linked to improvements in metacognition and executive functions, such as attention, self-regulation, and academic skills [8], [9]. Despite recognition of SEL, pre-service programs often provide limited structured opportunities for developing these skills, leaving future teachers underprepared for the relational and cognitive demands of teaching [10]–[12].

Existing instruments, including the educators' social and emotional learning (EduSEL) questionnaire [13], the social-emotional competence teacher rating scale (SECTRS) [14], and the social skills improvement system–social emotional learning (SSIS SEL) Brief scales [15], generally assess social-emotional, and cognitive domains separately. Consequently, they provide limited insight into how teachers simultaneously apply emotional regulation, social judgment, and cognitive reasoning in classroom practice. The pre-service teachers' integrated social-emotional and cognitive (PST-ISEC) learning competency scale addresses this gap by embedding cognitive processes—reflective thinking, problem-solving, perspective-taking, and ethical reasoning—within SEL constructs, reflecting the inseparable nature of emotional and cognitive functioning in teaching.

Unlike traditional social-emotional learning models, PST-ISEC conceptualizes teaching competence as emerging from the interaction between emotional and cognitive processes. The scale comprises five empirically derived dimensions—collaborative spirit (CS), hopeful mindset (HM), mindful confidence (MC), emotional resilience (ER), and responsible decision-making and accountability (RD)—which function as overlapping capacities enacted simultaneously in practice rather than as isolated skills. Among these, CS, MC, and RD show clear conceptual alignment with domains identified by CASEL framework, while extending them through cognitive components; CS integrates interpersonal engagement with perspective-taking and problem-solving; MC reflects the coordination of self-awareness, self-regulation, and reflective attention; and RD incorporates ethical reasoning and evaluative judgment in professional contexts. The remaining dimensions, HM and ER, complement these by emphasizing persistence, optimism and adaptive regulation under pressure. Taken together, the five dimensions illustrate that effective teaching relies on the coordinated use of emotional, social and cognitive processes rather than on discrete domains.

In the Philippine context, curriculum reforms and professional standards emphasize teachers' emotional regulation, support for student well-being, and reflective practice [16], [17], highlighting the practical relevance of assessing integrated competencies. The present study develops the PST-ISEC and provides preliminary psychometric evidence, aiming to identify key competency dimensions, develop and validate scale items, examine factorial structure and reliability, and offer an initial instrument for assessing integrated social-emotional and cognitive (ISEC) competencies in PST. This study was guided by the research question: is it possible to develop a reliable and structurally valid scale to measure ISEC competencies in PST?

2. METHOD

2.1. Research design

This study employed a design and development research approach to create and provide preliminary evidence for a scale measuring ISEC competencies in PST. The study consisted of two phases: i) design and development of the instrument and ii) preliminary validation of the scale. This approach enabled the systematic construction of a reliable and contextually relevant assessment tool while allowing iterative refinement based on empirical evidence and expert feedback.

2.2. Participants

A total of 775 PST from public and private institutions in a region of the Philippines participated, selected through purposive sampling to represent different institutions and year levels. This sample meets the recommended 5–10 respondents per item for scale development [2] and provides a robust basis for exploratory and confirmatory factor analyses, ensuring the scale's validity and reliability.

2.3. Instrument

The PST-ISEC was developed for this study. Grounded in the CASEL SEL framework [1], it assesses five constructs—self-awareness, self-management, social awareness, relationship skills, and responsible decision-making—integrating cognitive skills such as critical thinking, problem-solving, reflective decision-making, and attentional control. Using a 4-point Likert scale (1=not manifested at all, 4=manifested to a very great extent), the PST-ISEC fills a gap by measuring PST-ISEC development.

2.4. Data collection

The PST-ISEC scale was administered to pre-service teachers following institutional approval. Informed consent was secured prior to participation, with assurances of confidentiality and anonymity. The instrument was administered during scheduled sessions to ensure consistency in data collection conditions and to provide participants adequate time to respond. Upon completion, responses were collected and reviewed for completeness before being prepared for data coding and analysis.

2.5. Data analysis

Exploratory factor analysis (EFA) using principal axis factoring with Varimax rotation was conducted on 370 participants (5–10 per item) [3], [18], [19] to identify latent constructs. Confirmatory factor analysis (CFA) followed with an independent sample of 405 participants to validate the factor structure. Items with loadings ≥0.50 were retained, though loadings ≥0.40 were kept if theoretically justified and supported by expert review [20], [21]. CFA assessed model fit using Chi-square minimum/degrees of freedom (CMIN/DF), root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), comparative fit index (CFI), and Tucker-Lewis index (TLI). Reliability was evaluated via Cronbach's alpha, composite reliability (CR), and McDonald's omega, with corrected item-total correlations also examined. The CFA model specified five correlated first-order factors (self-awareness, self-management, social awareness, relationship skills, and responsible decision-making), with items loading on their hypothesized factors and correlations freely estimated to reflect the ISEC competencies.

2.6. Phase 1: design and development of the scale

An initial pool of 74 items was generated to capture key dimensions of social-emotional competencies among pre-service teachers, with cognitive processes intentionally embedded at the item-development stage. Item construction was guided by existing SEL frameworks and related literature. To ensure content relevance and clarity, items were written to reflect authentic classroom situations and typical experiences of pre-service teachers. Redundancies were minimized and wording was refined to maintain consistency in tone and level of difficulty across items.

2.7. Phase 2: preliminary validation

Face and content validation were conducted with language specialists and five subject-matter experts using a 3-point scale. The weighted arithmetic mean for content validity was 2.56, indicating overall suitability. Items were revised based on expert feedback. EFA and CFA were conducted sequentially to provide preliminary evidence for the factorial structure, convergent validity, discriminant validity, and internal consistency of the scale.

2.8. Ethical considerations

Participation in the study was voluntary, and informed consent was obtained prior to data collection. Respondents were not asked to provide any identifying information, and all responses were treated in aggregate form. Data handling procedures were designed to ensure that information remained secure and was used solely for the purposes of the study. The research process followed established ethical guidelines for studies involving human participants.

3. RESULTS AND DISCUSSION

3.1. Factor analysis suitability

The suitability of the data for EFA was first assessed. Bartlett's test of sphericity was significant ($\chi^2(231)=2654.399$, $p<0.001$), and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.898, indicating excellent sampling adequacy, as seen in Table 1. These results confirm that the dataset is appropriate for factor analysis.

3.2. Exploratory factor analysis

The initial 74 items underwent EFA using principal axis factoring with Varimax rotation. The 52 items were removed due to low loadings (<0.50). Item 70, loading at 0.482, was retained based on:

- Conceptual uniqueness: it captured an important cognitive-emotional aspect not reflected elsewhere.
- Expert validation: confirmed relevance to integrated competencies.
- Literature support: moderate loadings (≥0.40) are acceptable when theoretically justified [3], [18].

The remaining 22 items loaded onto five factors, reflecting pre-defined constructs: CS, HM, MC, ER, and RD, as in Table 2. To ensure construct coverage and transparency in item retention, a content-mapping review was conducted. Of the original 74 items, 22 were retained based on factor loadings,

theoretical relevance, and expert validation. Table 3 maps these items to their respective constructs, showing adequate representation: CS (7 items), HM (4 items), MC (5 items), ER (3 items), and RD (3 items). This confirms that the PST-ISEC scale's theoretical constructs are well represented. The 22-item structure was then examined using CFA. Further research is needed to assess criterion-related and predictive validity, as well as measurement invariance across teacher populations.

Table 1. KMO and Bartlett's test

Test	Value
KMO measure of sampling adequacy	0.898
Bartlett's test of sphericity approx. Chi-square	2654.399
Df	231
Sig.	0.000

Table 2. Rotated component matrix

Item	CS	HM	MC	ER	RD
7	0.708				
27	0.741				
24	0.714				
45	0.621				
51	0.638				
26	0.576				
6	0.557				
18		0.669			
75		0.817			
73		0.517			
70		0.482			
32			0.724		
37			0.704		
2			0.662		
33			0.631		
47			0.658		
4				0.800	
3				0.785	
9				0.631	
40					0.639
66					0.734
65					0.754

Extraction method: principal axis factoring;
Rotation method: Varimax with Kaiser normalization. Rotation converged in 6 iterations.

Table 3. Concept-mapping table of retained items to constructs

Construct	Retained items	Key aspect covered
CS	7, 27, 24, 45, 51, 26, 6	Interpersonal collaboration, teamwork, communication
HM	18, 75, 73, 70	Optimism, perseverance, cognitive-emotional reflection
MC	32, 37, 2, 33, 47	Self-regulation, self-efficacy, attentional control
ER	4, 3, 9	Stress management, adaptability, emotional regulation
RD	40, 66, 65	Ethical decision-making, accountability, reflective judgment

3.3. Reliability analysis

The reliability of the PST-ISEC scale was evaluated using multiple indices, as shown in Table 4. Cronbach's alpha ranged from 0.657 (HM) to 0.825 (CS), with an overall alpha of 0.735, reflecting the limited items and conceptual breadth of early-stage constructs [22]. CR ranged from 0.657 to 0.825, exceeding the 0.60 benchmark [23], and McDonald's omega (ω) ranged from 0.660 to 0.828. Corrected item-total correlations (0.32–0.70) supported item retention, including item 70, retained for theoretical relevance. These results indicate adequate internal consistency, supporting the scale's use, though further research should examine criterion-related and predictive validity and measurement invariance.

3.4. Confirmatory factor analysis

Following EFA, CFA was conducted to examine the latent structure and assess the internal consistency of the PST-ISEC scale. The proposed five-factor model demonstrated acceptable fit to the data, with all standardized factor loadings exceeding 0.50, except for item 70 (0.482) as shown in Table 5, which was retained based on theoretical justification. These CFA results provide support for the internal structure of the scale. However, further studies are needed to evaluate criterion-related and predictive validity and to test measurement invariance across different teacher populations.

Table 4. Reliability of the PST-ISEC scale subscales

Latent construct	Cronbach's alpha	CR	McDonald's ω
CS	0.825	0.825	0.828
HM	0.657	0.657	0.660
MC	0.763	0.763	0.765
ER	0.733	0.733	0.736
RD	0.699	0.699	0.701
Overall scale	0.735	0.735	0.738

Table 5. Standardized factor loadings

Latent construct	Item	Factor loading
CS	7	0.708
CS	27	0.741
CS	24	0.714
CS	45	0.621
CS	51	0.638
CS	26	0.576
CS	6	0.557
HM	18	0.669
HM	75	0.817
HM	73	0.517
HM	70	0.482
MC	32	0.724
MC	37	0.704
MC	2	0.662
MC	33	0.631
MC	47	0.658
ER	4	0.800
ER	3	0.785
ER	9	0.631
RD	40	0.639
RD	66	0.734
RD	65	0.754

CFA was conducted to examine the latent structure of the PST-ISEC scale. The proposed five-factor model demonstrated adequate fit, with all fit indices meeting conventional thresholds, as presented in Table 6. Most standardized factor loadings exceeded 0.50, with Item 70 (0.482) retained based on theoretical justification. These results provide support for the internal structure of the scale.

The model demonstrated an acceptable fit to the data based on multiple fit indices: CMIN/DF=2.725 (acceptable), RMSEA=0.065 (acceptable), SRMR=0.027 (good), CFI=0.871 (slightly below threshold), and TLI=0.850 (slightly below threshold). Although CFI and TLI fall slightly below the conventional cut-off of 0.90, overall model fit is supported because RMSEA and SRMR indicate acceptable to good fit. Fit index thresholds are guidelines rather than strict rules, and in complex measurement models, incremental indices such as CFI and TLI are often moderately lower while other indices show acceptable fit [24], [25]. Collectively, these indices provide sufficient evidence that the five-factor model reasonably represents the latent structure of the PST-ISEC scale.

Table 6. Model of fit values

Fit measure	Recommended threshold	Model fit value	Interpretation
CMIN/DF (χ^2/df)	≤2=good, 2–3=acceptable	2.725	Acceptable fit
RMSEA	≤0.05=good, 0.05–0.08=acceptable	0.065	Acceptable fit
SRMR	≤0.05=good, 0.05–0.10=acceptable	0.027	Good fit
CFI	≥0.90=acceptable	0.871	Slightly below threshold; moderate fit
TLI	≥0.90=acceptable	0.850	Slightly below threshold; moderate fit

3.4.1. Convergent validity and composite reliability

Convergent validity was evaluated using average variance extracted (AVE), and internal consistency was assessed with CR. As shown in Table 7, the AVE values of the five constructs ranged from 0.40 to 0.55, which is slightly below the conventional threshold of 0.50 for some constructs. This level of variance explained is considered acceptable for an early-stage instrument, particularly for a newly developed scale such as the PST-ISEC. The CR values ranged from 0.657 to 0.825, exceeding the recommended minimum of 0.60 for exploratory research [23], indicating satisfactory internal consistency. The overall CR for the scale was 0.735, further supporting the reliability of the instrument.

Table 7. Convergent validity and CR of the PST-ISEC scale

Latent construct	AVE	CR
CS	0.43	0.825
HM	0.40	0.657
MC	0.46	0.763
ER	0.55	0.733
RD	0.51	0.699
Overall		0.735

3.4.2. Discriminant validity

Discriminant validity was evaluated using the Fornell-Larcker criterion. The square root of the AVE for each construct (diagonal values, as in Table 8) exceeded the correlations with all other constructs (off-diagonal values). This provides preliminary evidence that each latent construct shares more variance with its own indicators than with other constructs, suggesting that the five dimensions— CS, HM, MC, ER, and RD —are empirically distinguishable. These results provide preliminary evidence for the empirical distinctiveness of the five latent constructs and offer a clear basis for visualizing their relationships and the integration of social-emotional and cognitive competencies, as illustrated in Figure 1.

Table 8. Discriminant validity of the PST-ISEC scale (Fornell-Larcker criterion)

Latent construct	CS	HM	MC	ER	RD
CS	0.66	0.45	0.40	0.38	0.42
HM	0.45	0.63	0.37	0.36	0.40
MC	0.40	0.37	0.68	0.39	0.41
ER	0.38	0.36	0.39	0.74	0.38
RD	0.42	0.40	0.41	0.38	0.71

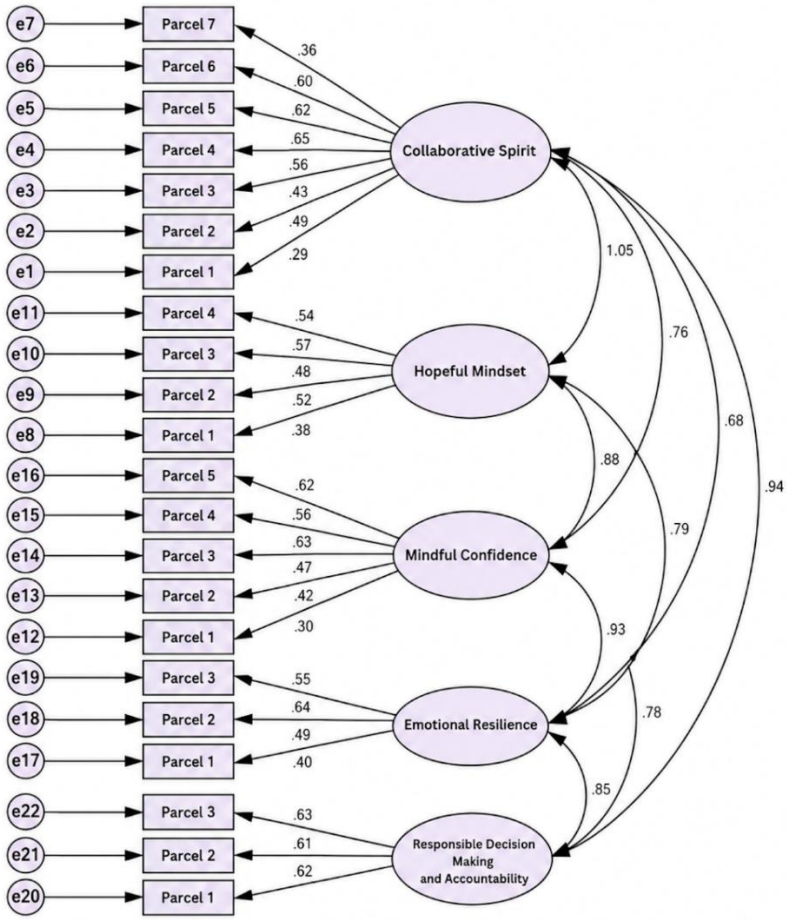

Figure 1. Five latent constructs and their associated items illustrating the integration of social-emotional and cognitive competencies

3.5. Comparison with previous research

Unlike previous studies [3], [26] focusing only on SEL, the PST-ISEC scale integrates cognitive competencies, providing a holistic assessment of PST social-emotional and cognitive skills. Consistent with prior research by Megawati *et al.* [27] on their interconnection, the scale shows promising internal structure and reliability, though further studies are needed to establish criterion-related and predictive validity before applying it to teacher readiness or performance outcomes.

3.6. Discussion

This study presents preliminary evidence for five ISEC constructs in PST: CS, HM, MC, ER, and RD. These constructs are theoretically grounded and conceptually clear. The PST-ISEC Scale extends existing measures by integrating cognitive and emotional dimensions. While major SEL frameworks such as CASEL SEL [1], SSIS SEL [28], and Devereux student strengths assessment (DESSA) [29] emphasize social-emotional domains, they largely omit cognitive strategies such as planning, reflective thinking, and attentional control. Similarly, instruments including Mayer-Salovey-Caruso emotional intelligence test (MSCEIT) [30], trait emotional intelligence questionnaire (TEIQue) [31], and social emotional competence questionnaire (child version) (C-SECQ) focus on emotional intelligence or self-regulation but lack an integrated cognitive–emotional framework. Other tools—such as the teacher self-efficacy scale [32], classroom teacher self-efficacy scale (CTSES) [33], Jennings and Greenberg's social-emotional teacher competency scale [34], teacher emotion inventory [35], and teacher reflection and cognition scale [36]—assess related competencies separately, leaving a gap in combined evaluation.

At the construct level, PST-ISEC offers distinct contributions: CS integrates interpersonal skills with teamwork and problem-solving; HM combines perseverance, planning, and metacognitive reflection; MC emphasizes self-regulation and attentional control; ER addresses stress management among PST; and RD merges ethical judgment with cognitive–emotional reflection. Practically, PST-ISEC provides teacher education programs with a structured tool for assessing interconnected competencies to inform mentoring, instructional design, and professional development. Theoretically, it advances understanding of cognitive–emotional interactions in teaching. Methodologically, the study demonstrates rigorous scale development through exploratory and confirmatory factor analyses and multiple reliability indices, including Cronbach's alpha, McDonald's omega, and CR.

Evidence is currently limited to internal structure and reliability. Future research should examine criterion-related and predictive validity, measurement invariance, and cross-cultural applicability. Overall, PST-ISEC addresses a key gap by offering a theoretically grounded, practically useful, and methodologically robust measure of early-stage teacher development.

4. CONCLUSION

This study provides preliminary evidence for the internal structure and reliability of the PST-ISEC scale. The scale's 22 items capture five integrated dimensions— CS, HM, MC, ER, and RD —reflecting the coordinated functioning of social-emotional and cognitive competencies in PST. EFA and CFA supported the five-factor structure, while internal consistency indices, including Cronbach's alpha, CR, and McDonald's omega, indicated acceptable reliability. Convergent and discriminant validity analyses provided preliminary evidence that the constructs are distinct and conceptually meaningful. Compared with existing instruments, the PST-ISEC scale extends previous measures by integrating cognitive processes within social-emotional domains, offering a theoretically grounded tool relevant for teacher education programs. While these findings support the scale's early-stage use for formative assessment, curriculum planning, and professional development, further studies are needed to establish criterion-related and predictive validity, measurement invariance across different teacher populations, and applicability in broader or cross-cultural contexts. Overall, the PST-ISEC scale provides a promising foundation for assessing integrated competencies in PST and guiding their developmental support in teacher preparation programs.

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Joy D. Talens	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting

C : **C**onceptualization
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Fo : **Fo**rmal analysis

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

INFORMED CONSENT

The author had obtained informed consent from all individuals included in this study.

ETHICAL APPROVAL

The study was reviewed and approved by the institutional review board.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, [JDT], upon reasonable request.

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