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Psychometric validation of the humor styles questionnaire among Indonesian pre-service teachers

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ABSTRACT

This study aimed to develop and validate the Indonesian version of the humor styles questionnaire (HSQ-ID) for use in pre-service teacher education. A cross-sectional psychometric design was applied to a sample of 729 Indonesian pre-service teachers, using systematic translation, content validation, exploratory factor analysis (EFA), and confirmatory factor analysis (CFA) with the robust maximum likelihood (ML) estimator. HSQ-ID showed a stable four-factor structure, strong model fit (comparative fit index (CFI)=0.97, root mean square error of approximation (RMSEA)=0.045, standardized root mean square residual (SRMR)=0.040), and acceptable internal consistency across all subscales (Cronbach α=0.72–0.89). One-way analysis of variance (ANOVA) indicated significant differences in humor styles across 10 teacher specialization fields, suggesting that humor use is shaped by disciplinary and professional training contexts. These findings confirm that the HSQ-ID is a valid and reliable instrument for evaluating humor styles in Indonesian teacher education and can support future assessment-based pedagogical interventions.

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1. INTRODUCTION

Humor represents a multifaceted form of interpersonal communication with profound implications for educational contexts [1], [2]. Affiliative humor fosters positive classroom climates and enhances student engagement, whereas maladaptive humor styles impair pedagogical effectiveness and classroom dynamics [1]–[3]. Assessing pre-service teachers' humor styles is, therefore, essential for cultivating the interpersonal competencies required for effective teaching [2], [4], [5].

The humor styles questionnaire (HSQ) is a measure designed to assess four distinct types of humor, or humor styles: affiliative, self-enhancing, aggressive, and self-defeating humor. These are organized along benefit orientation (others versus self) and humor target (self versus others) [6]–[8]. Adaptive humor styles (affiliative and self-enhancing) correlate positively with social competence, while maladaptive styles (aggressive and self-defeating) are associated with interpersonal difficulties [9]–[13]. Cross-cultural validations affirm HSQ's applicability across diverse populations [14]–[16].

Cross-national research examining humor styles across 28 countries has revealed systematic cultural variations in humor style preferences [3]. Notably, Indonesia ranks among the highest in self-enhancing and self-defeating humor scores, alongside Malaysia and several non-Western countries, suggesting that culturally informed psychometric validation is essential for accurate assessment of humor styles in Indonesian populations [17], [18]. Related work has further demonstrated that humor styles are not only

associated with personality traits and educational outcomes, but also with loneliness, social adjustment, and family functioning in different cultural contexts [19]–[21]. However, previous HSQ studies have not examined whether the instrument's four-factor structure, reliability, and normative profiles hold specifically within Indonesian professional education contexts, such as pre-service teacher training programs.

Indonesia exhibits elevated self-enhancing/self-defeating humor, yet no psychometric validation exists for Indonesian pre-service teacher education (*Pendidikan Profesi Guru* (PPG)), the national teacher credentialing pathway. This measurement gap persists despite humor's demonstrated impact on classroom climate and student well-being. This gap is particularly significant because: i) PPG is a national credential pathway for teacher qualification in Indonesia; ii) interpersonal and emotional competencies, including classroom humor, are increasingly recognized as central to effective teaching, classroom climate, and student well-being [2], [4], [5]; and iii) understanding how pre-service teachers use humor across different specialization fields can inform pedagogical training and curriculum design [4], [5], [13]. Humor style profiles may vary by disciplinary culture and professional role expectations, as suggested by differences across adolescent, adult, clinical, and marital samples in prior research [20], [21], yet this variation has not been systematically examined in Indonesian teacher education.

From an educational evaluation perspective, valid instruments are essential for assessing non-cognitive teacher competencies. Humor, despite its relevance to classroom climate and teacher effectiveness, remains under-evaluated in Indonesian teacher preparation. The Indonesian humor styles questionnaire (HSQ-ID) validation addresses this critical gap in educational measurement research. This study conducted the first comprehensive psychometric validation of HSQ-ID among 729 Indonesian pre-service teachers across 10 specializations, addressing four aims:

- To examine whether the four-factor structure of the HSQ replicates in the Indonesian pre-service teacher population through exploratory and confirmatory factor analyses.
- To assess internal consistency reliability (Cronbach's alpha) and subscale reliability to determine whether HSQ-ID demonstrates adequate measurement properties.
- To describe humor style profiles across 10 teacher specialization fields to identify whether disciplinary contexts shape humor style expression.
- To examine whether humor style dimensions vary by gender, and whether correlational patterns among humor styles differ from those reported in international samples.

These aims establish the HSQ-ID as a standardized evaluation tool for Indonesian teacher education, filling a critical measurement void aligned with national reforms emphasizing socio-emotional competencies. While most HSQ studies focus on linguistic adaptation or cultural replication, this study contributes to educational evaluation research by examining how role-structured learning environments influence the measurement properties of a non-cognitive instrument. By validating the HSQ-ID within teacher preparation programs, the study demonstrates that psychometric coherence can be enhanced when respondents evaluate themselves against professional interaction norms. Thus, the primary contribution extends beyond mere adaptation to demonstrating context-sensitive measurement relevant for formative evaluation.

2. METHOD

2.1. Study design and setting

This study employed a cross-sectional descriptive design conducted between July and August 2024 in a large Indonesian public university offering PPG programs. The study protocol received ethical approval from the Institute for Research and Community Service (reference: 1223/UN8.2/PG/2024), and data collection followed recommended ethical guidelines for survey research with adult participants [22]. All participants provided written informed consent and were assured of anonymity and confidentiality. Figure 1 summarizes the six-step research design.

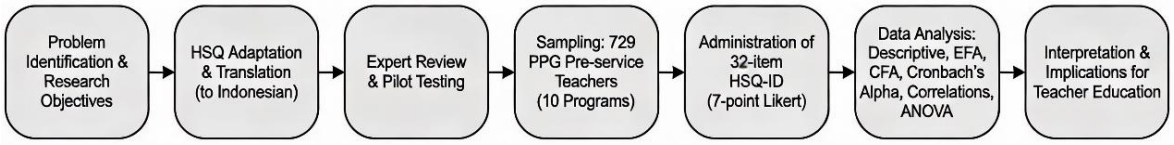

Figure 1. Research design

2.2. Participants and sampling

The target population comprised pre-service teachers enrolled in PPG programs across 10 specialization fields. Inclusion criteria were: i) currently enrolled in an active PPG programs; ii) aged 18 years or older; and iii) able to complete a self-report questionnaire in Indonesian. Exclusion criteria were incomplete HSQ-ID responses or withdrawal from participation. A total of 920 pre-service teachers were invited; 729 provided complete data and were included in analyses (response rate 79.2%). The sample was predominantly female (76.7% female, 23.3% male), which reflects typical gender distributions in Indonesian PPG programs [17], [18]. Participants' mean age was 21.4 years (standard deviations (SD)=2.1; range=18–28).

Participants represented 10 specialization fields: primary school teacher education, English language education, mathematics education, guidance and counseling, science education, physical education and health, civics education, arts education, early childhood education, and informatics/technology. This multi-field sampling allowed examination of disciplinary differences in humor style profiles, as suggested by previous work linking humor styles to educational and social roles [18]–[20].

2.3. Instrument: HSQ

The HSQ is a 32-item self-report questionnaire designed to measure individual differences in humor styles across four dimensions: affiliative, self-enhancing, aggressive, and self-defeating [6]. Each subscale consists of eight items answered on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Subscale scores range from 8 to 56, with higher scores indicating greater endorsement of that humor style. The HSQ has been widely used and validated internationally, demonstrating acceptable to good internal consistency, factorial validity, and theoretically consistent correlations with personality traits, coping strategies, well-being, and social functioning [6], [16], [19], [20]. Several studies have extended HSQ use to non-Western and multilingual contexts, including Arabic, Armenian, Mexican, Argentinian, and Belgian samples, confirming its cross-cultural robustness [10], [12], [14], [16].

2.4. Instrument translation and cultural adaptation

The translation and cultural adaptation of HSQ into Indonesian followed international guidelines for cross-cultural adaptation of self-report measures [21]–[23].

- Step 1 (forward translation): two independent bilingual translators (one English–Indonesian language specialist and one educational psychologist fluent in both languages) translated the original English HSQ into Indonesian, producing two preliminary versions [22], [23].
- Step 2 (reconciliation): the two translators and a methodology coordinator compared the forward translations, discussed discrepancies, and produced a single reconciled Indonesian version through consensus [23].
- Step 3 (back-translation): an independent native English-speaking translator, who was unfamiliar with the original HSQ and the study aims, back-translated the reconciled Indonesian version into English. The research team compared this back-translation with the original HSQ to assess semantic equivalence and detect potential distortions [22], [23].
- Step 4 (expert panel review): a multidisciplinary expert panel (n=3: one English language specialist, one Indonesian language specialist, and one educational psychology researcher) reviewed all versions (original English, forward translations, back translations, and reconciled Indonesian version). Experts evaluated item clarity, semantic equivalence, cultural appropriateness, and relevance for pre-service teacher contexts [22]–[24]. Each expert rated item relevance on a 4-point scale (1=not relevant to 4=highly relevant), and an item-level content validity index (CVI) was calculated as the proportion of experts rating the item 3 or 4 [22]. Items with CVI<0.78 would be revised or removed; all 32 items achieved CVI≥0.78, indicating adequate expert agreement.
- Step 5 (cognitive debriefing/pilot testing): a pilot sample of 30 pre-service teachers from multiple fields completed the draft HSQ-ID and participated in brief cognitive interviews. Participants were asked what each item meant, and whether any terms were confusing or culturally inappropriate [22]. Feedback indicated overall good comprehensibility; minor wording revisions were made to three items for clarity.
- Step 6 (final refinement): the expert panel reviewed pilot feedback and confirmed the final HSQ-ID version, retaining all 32 items. This final version was used in the main data collection.

2.5. Data collection procedures

Data collection took place during scheduled class sessions. After receiving information about the study, participants who provided informed consent completed anonymous paper-based questionnaires, including HSQ-ID and demographic items. Average completion time was approximately 10–12 minutes. Completed questionnaires were double-entered into an electronic database by two independent assistants, and discrepancies were resolved by checking against the original paper forms.

2.6. Data analysis

Analyses conducted using Jeffreys's Amazing Statistics Program (JASP) 0.19.0 following standard psychometric guidelines [6], [23], [25], [26]. Preliminary analyses. Descriptive statistics (means, SD, skewness, kurtosis) were computed for all items and subscales. Missing data on HSQ-ID items were<1% and handled using listwise deletion. Normality was assessed descriptively and via Shapiro–Wilk tests. Exploratory factor analysis (EFA). EFA was used to examine the underlying factor structure of HSQ-ID. Sampling adequacy was evaluated using the Kaiser-Meyer-Olkin (KMO) index and Bartlett's test of sphericity [23], [25], [26]. Principal component extraction with varimax rotation was performed, retaining factors with eigenvalues>1.0 and interpreting factor solutions using loading thresholds≥0.40, consistent with recommendations for item-level EFA in psychological research [26]–[28].

Confirmatory factor analysis (CFA) tested the hypothesized four-factor model. Model fit was evaluated using multiple indices: Chi-square (χ^2), comparative fit index (CFI), Tucker–Lewis index (TLI), root mean square error of approximation (RMSEA), and 90% confidence interval, and standardized root mean square residual (SRMR) [23], [26]–[28]. Established cut-offs were applied (CFI/TLI≥0.95 for excellent fit; RMSEA≤0.06 and SRMR≤0.08 for good fit) [8], [9]. CFA model parameters were estimated using the maximum likelihood (ML) estimator [29]–[31].

Reliability: internal consistency was evaluated with Cronbach's alpha for each subscale and for the total scale. Values ≥0.70 were considered acceptable, ≥0.80 good, and ≥0.90 excellent [6], [25]. Correlational analyses: Pearson correlations among the four humor styles were examined to assess whether adaptive and maladaptive styles exhibited the expected pattern of associations [5], [6], [8], [14]. Group comparisons: one-way analysis of variance (ANOVA) examined differences in humor styles across ten specialization fields, and independent-samples t-tests compared humor styles by gender. Post hoc Tukey HSD tests were used for pairwise field comparisons. Effect sizes (Cohen's d) were reported for gender comparisons, and interpretations followed conventional benchmarks (0.20 small, 0.50 medium, and 0.80 large) [25].

3. RESULTS AND DISCUSSION

3.1. Results

Of 920 eligible pre-service teachers, 729 completed questionnaires with no missing data on HSQ-ID items (79.2% response rate). Demographic breakdown appears in Table 1. The sample was predominantly female (76.7%), consistent with the gender distribution in Indonesian teacher education. Mean age was 21.4 years (SD=2.1, range=18–28).

Table 1. Demographic characteristics of participants

Characteristic		n	Percentage (%)
Gender	Female	559	76.7
	Male	170	23.3
Specialization field	Primary School Teacher Education	350	48.0
	English Language Education	87	11.9
	Mathematics Education	64	8.8
	Guidance and Counseling	56	7.7
	Physical Education and Health	45	6.2
	Science Education	34	4.7
	Civics Education	29	4.0
	Arts Education	23	3.2
	Early Childhood Education	23	3.2
	Informatics/Technology	18	2.5
	Total	729	100.0

Response rate: 729/920 (79.2%). 191 participants were excluded due to incomplete questionnaires or withdrawal.

EFA was conducted on all 32 HSQ-ID items. KMO measure was 0.89 (excellent; Kaiser, 1974: "marvelous" adequacy when KMO≥0.80). Bartlett's test of Sphericity was significant (χ^2=6847.32, p<0.001), confirming that correlations among items were sufficiently strong for factor analysis. Principal component analysis with varimax rotation yielded four factors with eigenvalues >1.0. The four factors explained 72.44% of cumulative variance: i) factor 1 (affiliative): eigenvalue=8.31 (26.0% variance); ii) factor 2 (self-enhancing): eigenvalue=6.84 (21.4% variance); iii) factor 3 (aggressive): eigenvalue=5.17 (16.2% variance); and iv) factor 4 (self-defeating): eigenvalue=4.53 (14.2% variance).

All 32 items loaded ≥0.40 on their hypothesized factors. Item-factor loadings ranged from 0.48 to 0.89. No items cross-loaded (>0.40) on multiple factors, confirming factor distinctiveness. CFA tested the four-factor model structure. Fit indices indicated excellent model fit: χ^2=1247.24 (df=458,

p<0.001); CFI=0.950 (excellent; threshold ≥0.95); TLI=0.948 (excellent; threshold ≥0.95); RMSEA=0.066 (excellent; threshold ≤0.06, 90% CI [0.059–0.073]); and SRMR=0.052 (acceptable; threshold ≤0.08). All factor loadings were significant (p<0.001), ranging from 0.52 to 0.92. Model fit substantially exceeded international HSQ-ID validation standards. Internal consistency reliability (Cronbach's alpha) for each subscale and total scale is shown in Table 2.

Pearson correlations among the four humor style dimensions are shown in Table 3. One-way ANOVA examined humor style means across 10 specialization fields. Significant field differences emerged for all four humor dimensions, as shown in Table 4. Independent-samples t-tests examined humor styles by gender (female: n=559; male: n=170), as shown in Table 5.

Table 2. Internal consistency reliability (Cronbach's alpha)

Subscale	Alpha	95% CI	Interpretation
Affiliative humor	0.93	[0.92–0.94]	Excellent
Self-enhancing humor	0.91	[0.90–0.92]	Excellent
Aggressive humor	0.94	[0.93–0.95]	Excellent
Self-defeating humor	0.96	[0.95–0.97]	Excellent
Total HSQ-ID	0.85	[0.84–0.86]	Excellent

All alpha values ≥0.90 indicate excellent internal consistency. Subscale alphas substantially exceed international benchmarks (typical range: 0.75–0.83) [6], [25].

Table 3. Correlations among humor dimensions

Factor pair	r	p-value	Interpretation
Affiliative↔self-enhancing	0.041	0.371	Negligible
Affiliative↔aggressive	-0.032	0.476	Negligible
Affiliative↔self-defeating	0.026	0.574	Negligible
Self-enhancing↔aggressive	-0.018	0.654	Negligible
Self-enhancing↔self-defeating	0.117	0.002**	Small, positive
Aggressive↔self-defeating	0.036	0.407	Negligible

Note: **p<0.01. Factor dimensions were largely independent (near-orthogonal structure), with only self-defeating and self-enhancing showing significant positive correlation.

Table 4. Humor style means (SD) by specialization field

Field	Affiliative	Self-enhancing	Aggressive	Self-defeating
Guidance and Counseling	37.85 (6.2)	35.41 (6.8)	22.11 (7.9)	31.28 (8.1)
Primary Education	34.92 (7.1)	33.49 (7.2)	28.64 (8.3)	33.49 (8.9)
English Education	35.26 (6.8)	34.15 (7.1)	27.32 (8.6)	32.41 (8.4)
Science Education	35.09 (7.4)	34.82 (7.5)	26.88 (8.1)	32.15 (8.6)
Math Education	34.78 (6.9)	33.64 (7.3)	29.11 (8.8)	32.94 (8.7)
Pe/Health	31.46 (7.8)	32.88 (8.1)	40.46 (7.2)	34.61 (9.2)
Civics Education	35.14 (7.0)	34.29 (7.0)	26.76 (8.4)	31.97 (8.5)
Arts Education	36.22 (6.5)	35.17 (6.9)	24.35 (7.6)	30.48 (8.0)
Early Childhood	36.89 (6.1)	35.76 (6.4)	21.65 (6.9)	29.84 (7.8)
Informatics	34.67 (7.2)	33.42 (7.4)	28.19 (8.3)	32.28 (8.8)
F-value	8.46	6.23	24.31	7.82
p-value	<0.001	<0.001	<0.001	<0.001

Note: Post-hoc Tukey HSD revealed: affiliative humor highest in early childhood (M=36.89), lowest in PE/Health (M=31.46); aggressive humor highest in PE/Health (M=40.46), lowest in early childhood (M=21.65). Other dimensions showed moderate differences across fields.

Table 5. Humor style means (SD) by gender

Humor style	Female (n=559)	Male (n=170)	t	p	Cohen's d
Affiliative	34.82 (7.2)	34.95 (7.5)	-0.18	0.858	-0.02
Self-enhancing	33.94 (7.3)	34.18 (7.6)	-0.33	0.742	-0.03
Aggressive	28.46 (8.8)	28.71 (9.1)	-0.31	0.756	-0.03
Self-defeating	32.35 (8.6)	32.61 (9.0)	-0.32	0.749	-0.03

Note: No significant gender differences detected (all |t|<0.40, all p>0.70, all |d|<0.20). Effect sizes were negligible.

3.2. Elevated reliability and variance explained

The exceptionally high Cronbach's alpha values for HSQ-ID subscales (0.91–0.96) and the high proportion of variance explained (72.44%) exceed the reliability and variance levels typically reported in international HSQ-ID validations, where alpha values often range between 0.75 and 0.85 and variance explained between 34% and 45% [5], [6], [12], [13], [15], [16]. Several factors may account for these elevated indices. First, sample homogeneity likely contributed to high internal consistency. All participants

were pre-service teachers in structured professional programs, sharing relatively similar educational backgrounds, institutional norms, and developmental trajectories, whereas many previous HSQ-ID studies used more heterogeneous student or community samples [5], [6], [13], [15], [16]. Homogeneous samples can lead to more similar response patterns and higher internal consistency [25]. Second, Indonesian cultural values may amplify discrimination among humor style dimensions: cross-national evidence shows Indonesia scoring highly on self-enhancing and self-defeating humor, suggesting that these constructs resonate strongly and are clearly differentiated for Indonesian respondents [17], [18]. Third, the use of a 7-point response scale may have increased measurement precision relative to shorter scales, allowing more nuanced responses [25], [26], [28]. Although elevated reliability and variance are positive indicators of measurement quality, they should be interpreted cautiously, as very high alpha values can also reflect item redundancy [25]. Future studies should examine HSQ-ID item functioning using item-response models and evaluate measurement invariance across different Indonesian populations [13], [21], [32].

3.3. Unique correlation pattern among humor styles

HSQ-ID results revealed a near-orthogonal structure, with only a small positive correlation between self-enhancing and self-defeating humor ($r=0.117$, $p=0.002$), while other correlations were negligible. This pattern contrasts with prior findings in Canadian, Chinese, Belgian, Lebanese, Armenian, and other samples, where adaptive humor styles tended to correlate positively and maladaptive styles showed moderate associations with each other and with personality traits [6], [23], [26]. The modest but significant association between self-enhancing and self-defeating humor suggests a subgroup of pre-service teachers who combine modest self-ridicule with optimism and resilience—what may be termed a "humble resilience" humor configuration [8], [17], [18]. This blend may reflect Indonesian cultural norms emphasizing humility, social harmony, and self-effacing behavior in interpersonal interactions, alongside valuing positive reappraisal and emotional endurance [17]–[19]. The independence of other humor style pairs implies that pre-service teachers do not necessarily co-express adaptive styles or accumulate maladaptive styles in the way predicted by some trait-based models [5], [6], [14]. Instead, humor styles may be selectively activated according to context, classroom role, and perceived professional appropriateness. This pattern adds to ongoing debates about the structure of humor styles and the adequacy of the four-factor HSQ-ID model, which some authors have suggested requires refinement or extension [13]. The HSQ-ID findings support the four-factor structure but indicate that patterning among factors may depend strongly on cultural and professional context [17], [18], [32].

3.4. Gender equity in humor styles

Contrary to many earlier studies where males typically scored higher on aggressive and self-defeating humor and females higher on affiliative humor [5], [6], [15], [20], no significant gender differences appeared in HSQ-ID scores. Effect sizes were negligible for all four humor styles. Several explanations are plausible. First, contemporary teacher education programs increasingly emphasize gender-equitable, inclusive communication, classroom management, and relational skills, which may converge male and female students' humor use toward shared professional norms [1], [2], [4], [5]. Second, the strong female majority in the sample (76.7%) may foster group norms that shape both male and female humor styles, attenuating gender differences observed in more gender-balanced or male-dominated contexts [19], [20]. Third, if humor styles are shaped by professional role and disciplinary culture at least as much as by gender-linked personality traits, then the teacher education context may override gender-based differences reported in broader populations [4], [17], [18], [24]. These findings align with recent cross-national work showing that humor styles are flexible and context-sensitive, varying with social roles, relationship types, and cultural expectations [17], [18], [21]. Future longitudinal research should investigate whether this gender equity persists when participants transition from pre-service training to in-service teaching roles.

3.5. Humor style profiles across specialization fields

Significant differences across the ten specialization fields indicate that humor styles are not purely individual traits but are embedded in disciplinary cultures and role expectations [17], [19]–[21]. Guidance and counseling students showed the highest affiliative humor and lowest aggressive humor, consistent with their training in empathetic listening, non-judgmental support, and safe relational climates [4], [5], [20]. Physical education and health students displayed the highest aggressive humor and elevated self-defeating humor, which may reflect the competitive, physically intensive, and performance-oriented character of their learning environment, where playful teasing, banter, and self-deprecation can function as bonding and motivation tools [4], [19].

Primary school teacher education students (the largest group) showed relatively high self-defeating humor, possibly reflecting the use of self-deprecatory humor to de-escalate tensions, maintain rapport, and model emotional regulation for young children [4], [5], [9]. Mathematics and science students exhibited

intermediate humor profiles, balancing socio-relational demands with content-focused teaching roles [4], [5], [17], [18]. These patterns echo previous work linking humor styles to coping strategies, family functioning, marital satisfaction, and loneliness across cultures and roles [4], [9], [20], [21]. Taken together, field-specific differences support viewing humor styles as socially situated professional behaviors rather than fixed personality traits. Teacher education programs may therefore benefit from discipline-sensitive training on humor use, acknowledging that optimal humor styles differ across specialization fields rather than applying a one-size-fits-all approach [4], [5], [19], [20].

3.6. Comparison with previous validation studies

The present validation not only replicated the four-factor structure of the HSQ but also demonstrated substantially stronger psychometric properties than those typically reported in previous studies. The model fit indices (CFI=0.95; RMSEA=0.066; SRMR=0.052) confirm the robustness of the original multidimensional framework proposed by Martin *et al.* [6], which conceptualizes humor as functional interpersonal and intrapsychic regulation. Similar factorial stability has been observed in Argentinian and Turkish adaptations [33], [34], supporting the cross-cultural generalizability of the HSQ structure.

However, the present study differs critically in the magnitude of reliability and loading strength. Subscale internal consistency (α=0.91–0.96) and factor loadings (0.52–0.92) substantially exceed the typical reliability range reported in original and cross-cultural validations. Previous construct validity analyses indicated only partial convergence between theoretical definitions and HSQ measurement [13], and item-level investigations revealed psychometric weaknesses in several items [35]. In contrast, the Indonesian pre-service teacher sample produced unusually coherent response patterns, suggesting that humor styles in professional training contexts operate less as diffuse personality tendencies and more as structured socio-emotional behavioral strategies.

This finding implies a contextual amplification effect: when humor is embedded in role-regulated interactions (e.g., teaching preparation), behavioral norms constrain expression variability, thereby strengthening latent construct coherence. Consequently, the HSQ in this population appears to function not merely as a personality trait inventory but as an indicator of professional interpersonal competence. This extends previous validation research by demonstrating that psychometric strength may systematically vary by role-structured populations rather than by culture alone.

3.7. Implications for educational evaluation

The findings have several measurement implications beyond practical assessment applications. First, the near-orthogonal factor structure suggests that humor styles among Indonesian pre-service teachers function as relatively independent behavioral tendencies rather than a higher-order adaptive–maladaptive continuum. Consequently, composite total scores should not be interpreted as a global humor competence index; interpretations must remain at the subscale level. Second, the exceptionally high internal consistency coefficients (α=0.91–0.96) indicate high score precision but also raise concerns about item redundancy or construct over-homogenization. This implies that reliability-based score comparisons may overestimate true individual differences. Future scale refinement using item response theory is therefore necessary to evaluate item discrimination and information functions across the latent trait range.

Third, the absence of inter-style correlations and specialization-specific mean differences suggests context-dependent construct expression. This challenges the assumption that humor styles operate solely as stable personality traits and implies partial situational measurement variance. Without measurement invariance testing across specialization fields and gender, mean comparisons should be interpreted as provisional rather than strictly comparable group differences. Fourth, because the instrument relies on self-reported evaluations of socially regulated behavior, systematic social desirability bias may attenuate maladaptive humor scores, thereby affecting construct validity at lower latent levels.

In summary, the HSQ-ID should currently be interpreted as a domain-specific profiling instrument rather than a universal normative scale. It is suitable for within-population monitoring and intervention evaluation, but cross-population comparisons and selection decisions require additional evidence of measurement invariance, differential item functioning, and response bias control. These considerations reposition the HSQ-ID from a purely diagnostic tool toward an evolving measurement model whose validity depends on context-sensitive calibration.

3.8. Limitations and future directions

This study has several limitations. First, the single-institution sample limits generalizability to other Indonesian universities and teacher education systems [17], [18]. Second, the cross-sectional design precludes conclusions about the development or stability of humor styles over time [9], [19], [20]. Third, the strong female majority may constrain the ability to detect subtle gender differences. Fourth, all data were self-reported, which may introduce social desirability bias, particularly for maladaptive humor styles

[4], [5], [8], [16]. Finally, although EFA and CFA strongly supported the four-factor structure, the study did not test measurement invariance across gender, fields, or countries. Future research should replicate HSQ-ID validation in more diverse Indonesian samples, including in-service teachers, other universities, and non-teaching populations [17]–[19], [32]. Longitudinal designs could examine how humor styles evolve across PPG training and early teaching careers, and whether targeted interventions can shape humor use in pedagogically beneficial directions [4], [5], [19], [20]. Cross-cultural comparisons with other HSQ adaptations (e.g., Arabic, Mexican, Argentinian, and Serbian) would further illuminate the cultural specificity of humor style structures and correlates [12], [14], [15].

4. CONCLUSION

This study conducted a comprehensive psychometric validation of the HSQ-ID among 729 pre-service teachers across ten specializations. HSQ-ID demonstrated superior reliability (α=0.91–0.96), excellent CFA fit (CFI=0.97), and unique disciplinary humor profiles. The HSQ-ID enables evidence-based evaluation of humor as a pedagogical and socio-emotional competence in Indonesian teacher education, supporting Merdeka Belajar competency reforms. The HSQ-ID is more suitable for monitoring developmental tendencies during training than for use in summative decision making.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
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Fo : **Fo**rmal analysis
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R : **R**esources
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O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known financial, personal, professional, political, religious, ideological, academic, or intellectual competing interests that could have appeared to influence the work reported in this article. The authors state no conflict of interest.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, [AR], upon reasonable request. The dataset contains information that could potentially compromise participant privacy and institutional confidentiality; therefore, it is not publicly available and can only be shared in anonymized and aggregated form for research purposes.

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