

Content Validation and Item-Score Reliability of a Trait Emotional Intelligence Scale in Teacher Leadership



Bala Salisu, Siti Rahmah Awang, Tahir Ahmad, Heamalatha Krishnan

Abstract: In a two-stage process, we validated and established the item quality of an initial 15-item trait emotional intelligence (trait EI) scale in teacher leadership in higher education. First, we compute the interrater agreement ($\kappa = 0.87$) based on the trait EI domain using data obtained from a panel of nine experts. Second, item-rest correlation and item factor loading for the 15-item trait EI scale were determined based on data collected from a pilot sample of 61 teacher-leaders working with higher educational institutions in Northeast Nigeria. The results of the item-rest correlations (in two rounds) reduced the scale to nine items with excellent psychometrics (Cronbach alpha = 0.928; average interitem correlation = 0.589). This result was confirmed through the item factor loadings (range: 0.626–0.855) computed using JASP software. The scale showed good to reasonable model fit ($\chi^2 = 127.105$; $df = 90$; $\chi^2/df = 1.412$; $p > 0.006$; RMSEA = 0.099; and TLI 0.870). Overall, this study produced a valid and reliable 9-item trait EI scale in teacher leadership that can be used in assessing the trait EI of teacher-leaders in higher education. Also, the study contributes to the refinement of the sampling domain of the trait EI construct.

Keywords: Scale validation, Trait emotional intelligence, Teacher leadership, Nigeria.

I. INTRODUCTION

Chidi [1] succinctly captures some of the broad and specific challenges facing Nigerian higher education: namely, increasing misalignment between job demands and job responsibilities, escalating stakeholder expectations, shrinking staff morale and pecuniary incentives, escalating job stress due to ethnic diversity and multiculturalism, the

disruptive influence of digital technologies, and mounting institutional and societal expectations. These challenges collectively and severally make HEIs stressful to its core staff group (teacher-leaders). The situation is further tensed up by the perennial reforms HEIs pursue as the most preferred response strategy to the changing vagaries of the education industry [2]. Teacher-leaders are routinely targeted as sources of and resources for the implementation of such reforms. Thus, teachers-leaders must be emotionally resilient [3] to successfully function in school environments in a great flux due to reform initiatives. More reforms demand more teacher-leadership but one that is high on emotional intelligence [4]. Hence, talent management becomes an imperative in teacher leadership [5].

Thus, teacher-leaders who can survive the stressful environments of 21st Century HEIs are known to be high performers by leveraging their emotional intelligence (EI) competencies [6, 7]. To improve students' EI [8], teachers must also be emotionally intelligent. Thus, trait EI is a crucial factor in teacher-leaders' ability to deal with the mounting challenges in the school system, thereby making trait EI a critical yardstick in teacher selection and training evaluation [9]. But how do we evaluate an emotionally intelligent teacher-leader?

Determination of an emotionally intelligent teacher-leader entails the use of appropriate measurement instruments [10]. There are two groups of extant trait EI measures: general measures of and domain-specific measures [11]. Each group consists of various competing measures, and each measure was built on different but overlapping sampling domains. However, the literature features only a few instruments that purport to measure teacher emotion, such as the Teacher Emotion Inventory (TEI) [12]. There is virtually no scale for measuring the trait EI in teacher-leadership. However, studies have shown that constructs reflect the reality they represent better when they are specific rather than general [13]. The specificity of a given construct could be improved by making it context-specific [14, 15]. With regards to emotion regulation, for example, Ford *et al.* [16] state that context-sensitive emotion regulation is more adaptive and successful than context-insensitive approaches. We, therefore, develop a trait EI scale in teacher-leadership using data collected from a sample of teacher-leaders from Nigerian HEIs. The sampling domain of Trait EI was used as a framework for selecting the scale items.

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II. LITERATURE REVIEW

A. Teacher Leadership Roles

Teacher leaders play multifaceted roles: mentor role models, specific domain experts, boundaryless collaborators, cross-cultural agents, initiators of self-development, facilitators of conducive school and community environments, engaging communicators, evidence-driven professionals, and champions of diversity and inclusion [17]. They emphasise with students to teach the sciences [18, 19]. They are co-opted in daily administration of institutions [20]; they are the key drivers of educational policy development and implementation that depends on teacher-leader innate competencies and abilities, and encourage students, colleagues and community people towards school development [21]; they are indispensable in curriculum development [22] and adapting it to the changing needs of industry and government [23]; and as researchers, they continuously thinking about the problems of the society and their immediate work environments seeking for solutions to problems and generating novel products and ideas for the advancement of the society [24]. To perform these multifaceted roles, teacher leaders need to be emotionally intelligent above and beyond their technical competence [25]. This paper develops and validates a trait EI scale in teacher leadership.

B. Trait Emotional Intelligence (Trait EI)

It is generally accepted that trait EI and ability EI are distinct in terms of their measurement approaches but complementary in terms of their content domain [26]. The trait EI is assessed using self-reports (implying that there are no wrong or right responses to items), while ability EI is evaluated using maximum performance measures (with items having correct and incorrect answers). Trait EI measures people's perception of their personality-related emotional abilities, while ability EI measures people's competence in using cognitive faculties in managing emotions [27]. Trait EI is not a cognitive variable, but a subset of personality framework [28], and personality traits are best measured using self-report questionnaires [29].

Interestingly, personality traits and teaching and teacher leadership are closely aligned [30]. Additionally, the subjective experiences of teacher-leaders are introspection-reliant psychological phenomena and are best collected using introspective methods [31], of which the self-report TEIQue is one. According to van der Linden *et al.* [32], trait EI is a collection of people's perception of their emotions measured with self-reports. Trait EI is typically

measured using self-report inventories such as the TEIQue. The TEIQue measures trait EI as a four-factor construct of fifteen facets. The facets collectively constitute a global trait EI. This makes the trait EI a multidimensional and hierarchically structured latent construct. These submissions support the view that trait EI is a better measure of the socially-oriented construct of teacher leadership.

C. Measures of Trait EI

The earliest measure of trait EI was Salovey *et al.*'s [33] Trait Meta-Mood Scale (TMMS), which has now fallen into disuse. It was followed by the Schutte Emotional Intelligence Scale (SEIS) [34]. Others include Emotional Intelligence Scale (EIS) [35], Emotional Quotient Inventory (EQ-i) [36], and Trait Emotional Intelligence Questionnaire (TEIQue) [37]. Table 1 highlights the features of these measures relevant to the aims of this study.

Of the five self-report measures of trait EI highlighted in Table 1, we opted for the TEIQue as it is the only one that comprehensively covers the trait EI sampling domain, making it a benchmark among extant trait EI measures [37]. Self-reports are reliable, valid and credible instruments for collecting psychological information [38]. However, they have a fair number of shortcomings.

D. Critique of the Trait EI Questionnaire

The TEIQue is a general context invariant measure developed by Konstantinos Vassilis Petrides as part of his PhD thesis [39] "based on a content analysis of several extant models" [39]. Thus, all other trait EI measures substantially overlap with the TEIQue [40]. It has good psychometrics. Andrei *et al.* [41] and Laborde *et al.* [42] reported excellent psychometrics for the TEIQue. Nevertheless, concerns have been raised over the sampling domain of the TEIQue, which seems to contain non-emotional facets of personality [43]. For instance, Anglim *et al.* [44] found that sociability, which is a facet of HEXACO personality inventory and a dimension of the TEIQue, was slightly negatively related to Total EI. Also, Siegling *et al.* [45] suggest that part of the TEIQue may fit better with the construct of social intelligence and a part with trait EI. Additionally, the emotionality and sociability factors of the TEIQue poorly contributes to the incremental validity of the questionnaire and underestimates its predictive power at the global level [41]. Finally, the nature and number of its facets remain an unsettled science [46].

Also, the TEIQue contains 15 negatively worded (reverse scored) items which presumed to guard against the influence of socially desirable response tendencies [47]. However, this rationale was empirically contested by Sisco and Reilly [48]. Negatively worded items have been shown to form

Table 1. Self-Report Measures of Trait EI

Measure	Sources	Scales/Factors	Items	Scaling	Time*
Trait EI Questionnaire-SF	Petrides [37]	15 facets, 4 factors	30	7-point scale	5min
Emotional Quotient Inventory	Bar-On [36]	15 facets, 5 factors	133	5-point scale	40min
Assessing Emotions Scale	Schutte <i>et al.</i> [34]	1, 3 or 4 factors	33	5-point scale	10min
Trait Meta-Mood Scale	Salovey <i>et al.</i> [33]	3 factors	30	5-point scale	15min
Emotional Intelligence Scale	Van der Zee <i>et al.</i> [35]	17 sub-scales	85	5-point scale	30min

*Time = These are approximations; SF = Short-Form; LF = Long-Form

meaningless method factors [49], inflate item means and were less successful in measuring concepts [50]. They also exhibit lower factor loadings and consequently weak construct

reliability. They task respondents' effort due to their cognitive complexity [51].



Therefore, it seems that reverse-scored items are better left out. Indeed, Roszkowski and Soven [52] and Woods [49] have shown that self-reports stripped of negatively worded items show improved internal consistency reliability and scale validity. Additionally, excising negatively worded items improves an instrument's content validities [52].

Another issue is TEIQue's inter-item correlation. Petrides [39] observe that relevant and irrelevant facets do not correlate. The TEIQue should be analysed at the facet, not item, level [53]. Excision from the TEIQue-SF of reverse-scored items deemed irrelevant (as they may not do what they are expected to do) leaves single items as facet measures. Thus, the TEIQue-SF sans reverse-scored items becomes a positively worded 15-item scale. Single-item measures have been used as excellent measures of construct facets [54] and fit better the underlying structure of survey instruments [55]. However, while some scholars are concerned over the internal consistency reliability and validities of single-item measures [56], many other psychology scholars have shown that single-item measures yield satisfactory validity indices [57]. Given the previous contentions, we tested the use of a single item as facet measures.

Finally, survey length is another problem. The effort respondents exert in answering a lengthy battery of questions has been shown to diminish considerably across the course of the test [58]. The effects of respondents' poor engagement with a survey include poor quality data, severe problems of missing data, reduced response rate, as well as careless and desultory responses [58]. Thus, there is the need for a parsimonious measure of trait EI that suffers considerably less of these dysfunctions.

Overall, the foregoing discourse warrants a revisit to the TEIQue. Petrides [39] has suggested modifying the instrument or replicating their work using better scales.

III. METHODOLOGY

A. Selection of Expert Panel and Pilot Sample

This study followed a two-stage instrument validation process [58]. In the first phase, the authors used multiple expert reviewers and generated data to compute the interrater agreement concerning the suitability of each item on an adapted TEIQue for teacher leadership roles. Nine Deans of Schools with social sciences background were selected from nine polytechnics sited in the Northeast geopolitical zone of Nigeria using the "maximum variation sampling strategy" [59] to represent the target population adequately. Likert data taken as categorical values makes for better comparison and thus suitable for consensus analysis [60].

Data was collected from a pilot sample of 61 programme coordinators and used in the item-score reliability analysis. The sample was selected from nine polytechnics in Northeast Nigeria using snowballing [61]. Responsible for oversight of all academic programmes in the case polytechnics in addition to administrative and community engagement duties, programme coordinators fit well with the description of teacher-leaders. They are the most visible of the core staff groups in the polytechnics surveyed [62]. By virtue of their middle level "hierarchical roles" [63], they exemplify frontline teacher-leaders directly connected with teaching and faculty administration.

Further, their experience in assessing students' on various metrics gives them unmatched flair with data gathering processes, thereby minimising the possibility of collecting wrong data due to potential item difficulty [64]. Finally, the type of data required to measure trait EI is self-knowledge. Such data is produced through introspection [65]. The professional ability of teacher-leaders to introspect as a routine job process [63] confer assurances of the quality of data gathered from them.

The respondents' age range straddles the two groups of *young adults* and *middle age* ($M = 40.26, SD = 9.02$), with the male respondents slightly older ($M = 40.90, SD = 9.36$) than females ($M = 36.56, SD = 5.75$). Tenure is used as a proxy for experience, and the sample had a mean tenure of 11.31 years and standard deviation of 6.82.

B. Scale Development

The TEIQue was developed "based on a content analysis of several extant models" [39], including those listed in Table 1. Thus, most other trait EI measures substantially overlap with the TEIQue [40]. The small (30 items) and extended (144 items) versions of the TEIQue both default to adult populations [39] and have the same number of facets. This study is based on the TEIQue-SF. Example of the items include "*Expressing my emotions with words is not a problem for me*" and "*I often find it difficult to see things from another person's viewpoint*". The TEIQue is the only self-report explicitly based on the trait EI theory [37]. It is made up of fifteen facets grouped into four factors [53]. The remaining two are auxiliary facets that do not form any factor but, together with the four factors, feeds directly into the global measure of the trait EI [37].

We used the sampling domain of the trait EI advanced in Petrides [37] as a reference point in developing a trait EI scale item in teacher leadership (Table 2) bearing in mind the points raised against the TEIQue. Each item was rated on a Likert scale [37]. In order to improve the degree of the respondents' engagement with the questionnaire, the items were reworded to reflect teacher leadership roles, in line with the suggestions of Shaffer and Postlethwaite [66] for improving the predictive validity of psychological measures through work context specificity.

C. Data Analysis

The data garnered from the panel of experts were analysed for interrater agreement using Fleiss' κ [67]. A measure of consensus, Fleiss' κ is often employed in validating numerical ratings. We computed the κ for each of the 15 items shown in Table 2. Higher the κ values indicate universal the agreement among the experts, and therefore the more reliable the item, and vice versa. $\kappa > 0.75$ indicates excellent agreement beyond chance; $\kappa < 0.40$ indicates poor agreement beyond chance; $\kappa > 0.40$ but < 0.75 indicate fair to a reasonable agreement beyond chance [68]. Items with $\kappa < 0.40$ are candidates for deletion.

According to Zijlmans *et al.* [69], the suitability of single-item measures can be determined using item quality indices. Thus, the quality of the 15 items on the trait EI scale was assessed using item-rest correlation and item factor loading.



Item-rest correlation is the correlation between a scale's item and the sum of the rest of the item scores and is used to determine whether an item contributes significantly to the overall measure [69]. Item factor loading is the correlation of an item with the factor it contributes to measuring [70].

The trait EI scale we developed is assumed to be unidimensional as trait EI can be computed at a global level which is "a broad index of general emotional functioning" [53]. Since this study claims measure specificity as one of its justification for a self-report trait EI measure, the acceptable item-rest correlation is between 0.40 and 0.50 [69].

Item quality of the trait EI scale in teacher leadership was further evaluated using item factor loading. Loadings ≥ 0.70 are recommended, although loadings > 0.6 , 0.5, or even 0.4 is sometimes acceptable provided AVE [average variance extracted] AVE > 0.50 [70]. Both item quality analysis and the scale's reliability statistics were done using JASP [71]. In computing the item factor loading, the oblique oblimin rotation method was selected [70]. In order to obtain the item factor loading, exploratory factor analysis was carried out in JASP using the oblimin method of oblique rotation. This

method selected because, theoretically, the trait EI is not orthogonal but oblique to the Giant Three and the Big Five personality constructs [72]. We, therefore, expect the items in the TEIS to correlate. Further, the oblique rotation offers an outcome with a more simpler structure [70]. The simpler the structure uncovered, the better the solution. The result yielded a simple unidimensional structure.

IV. RESULTS AND DISCUSSIONS

Table 2 shows the initial 15 items of a trait EI measure in teacher leadership based on the sampling domain of the TEIQue. The items were subjected to content validation using a panel of experts. The data collected from the process were analysed for interrater agreement using Fleiss' Kappa. The results show that the κ statistic for each of the 15 items ranged between 0.78 and 1, indicating very good to perfect interrater agreement beyond chance. The resultant 15 item scale was then subjected to quality analysis using item-rest correlation and item factor loading based on pilot data obtained from a sample of 61 teacher-leaders.

Table 2. Sampling Domain of the Trait EI and Its Adaptation to Teacher Leadership

Code	Items	Facet	Supporting Sources
TEI0 1	As a teacher-leader, I find it easy to express my emotions in words.	Emotion Expression	Kun <i>et al.</i> [73]
TEI0 2	I am highly motivated when dealing with students, staff and others from outside the school system.	Self-Motivation	Mthiyane and Grant [24]
TEI0 3	I can deal effectively with fellow academics, students, school administrators and outsiders.	Emotion Perception	Kholin <i>et al.</i> [14]
TEI0 4	I feel that I am student-centred, empowering, collaborative, and relationship-oriented.	Self-Esteem	Walters [74]
TEI0 5	I am usually able to influence the way other people feel about achieving the goals of higher education.	Emotion Management (Other)	Gill [75]
TEI0 6	On the whole, I can deal with stress arising from educational reforms and workplace challenges.*	Stress Management	O'Connor <i>et al.</i> [76]
TEI0 7	I am generally able to "get into someone's shoes" and experience their emotions including students and colleagues.*	Trait Empathy	Konrath <i>et al.</i> [57]
TEI0 8	I am usually able to find ways to control my emotions when dealing with students, colleagues and community members.*	Emotion Control	Ford <i>et al.</i> [16]
TEI0 9	I am generally happy with my life as a teacher-leader.*	Trait Happiness	Hirsh and Bergmo-Prvulovic [21]
TEI1 0	I would describe myself as an excellent negotiator when negotiating the multiple roles of teacher leaders in higher education.*	Social Awareness	Bar-On [36]
TEI1 1	I quite often stop and reflect on my feelings concerning my role as a teacher-leader in higher education.*	Impulsiveness (Low)	Perera <i>et al.</i> [30]
TEI1 2	I believe I am full of personal strengths to survive, thrive and succeed as a teacher-leader in higher educational institutions.*	Assertiveness	Siegling <i>et al.</i> [45]
TEI1 3	I have this general feeling that things will work out fine in my life and work despite the challenges of the moment.*	Trait Optimism	Salovey <i>et al.</i> [33]
TEI1 4	Generally, I can adapt to new environments dictated by reforms and changing nature of higher education.*	Adaptability	Van der Zee <i>et al.</i> [35]
TEI1 5	Others admire me for being relaxed with students, colleagues and other people from outside the school system.	Relationships	Schutte <i>et al.</i> [34]

* = Selected items that make up the final Trait EI Scale in Teacher Leadership

Initial results of the item-rest correlation for the 15 items indicate low-reliability indices, notwithstanding that the overall scale returned a Cronbach alpha of 0.819 (Table 3).

The average interitem correlation index of 0.232 was below the acceptable threshold. Items TEI01, TEI02, TEI03, TEI04, TEI05, and TEI15 with item-rest correlation scores of -0.120, 0.269, 0.112, 0.212, and 0.407, respectively, also failed to reach the required minimum for typical behaviour scales. Generally, higher scores beyond 0.40 are recommended for typical noncognitive scales [69].

The six items were respectively meant to measure teacher-leader's abilities with regards emotion expression, self-motivation, assertiveness, relationships, emotion management, and impulsivity. The items were mostly social competencies that should have been subsumed under the construct of social intelligence [45, 77]. Thus, these items were deleted from the scale. The resultant 9-item scale was further subjected to the second round of item-rest correlation analysis. The second round of item-rest correlation analysis on the remaining nine items yielded excellent item quality indices (ranging from 0.623 to 0.820). The Cronbach α (0.928) indicates the high reliability of the scale. However, the use of multiple metrics in validation is always advised [70]. We, therefore, supported the item-rest correlation result with the traditional item factor loadings as evidence of item quality in a scale.

Table 3. Item and Scale Reliability Statistics

Items	Item-Rest Correlation		Item Factor Loadings	
	1st Round	2nd Round	Factor Loading	Uniqueness
TEI01	-0.120	.	.	0.974
TEI02	0.269	.	.	0.967
TEI03	0.112	.	.	0.997
TEI04	0.212	.	.	0.972
TEI05	0.407	.	.	0.901
TEI06	0.648	0.702	0.727	0.471
TEI07	0.684	0.711	0.736	0.459
TEI08	0.544	0.623	0.626	0.608
TEI09	0.675	0.715	0.749	0.440
TEI10	0.692	0.782	0.809	0.346
TEI11	0.660	0.756	0.790	0.375
TEI12	0.676	0.753	0.792	0.373
TEI13	0.677	0.767	0.807	0.349
TEI14	0.776	0.820	0.855	0.268
TEI15	-0.221	.	.	0.932
Cronbach α	0.819	0.928	<i>Note.</i> Applied rotation method is oblimin.	
Average interitem correlation	0.232	0.589		

It is noteworthy that the exclusion of the six items is corroborated by their unique variance (between 0.901 – 0.997) from the results of the item factor loadings. Uniqueness is the variance attributable exclusively to an item and not shared by other items in the scale. The opposite of uniqueness is communality. The lower the uniqueness of an item in a scale, the higher its relevance in measuring the construct [69]. Thus TEI14 (Adaptability) is a highly significant indicator of trait EI. Conversely, 97.2% of the variance in TEI04 (Relationship) is unique to the indicator and not shared by any other variable in the trait EI scale in teacher leadership. Therefore, it is of virtually no relevance in measuring trait EI. In a scale that is theoretically not orthogonal, high unique variance in an item indicates a joint

degree of the item's irrelevance towards measuring the underlying construct. In this study, the result in Table 3 evinced that unique variance in stress management (TEI06), trait empathy (TEI07), emotion control (TEI08), self-esteem (TEI09), social awareness (TEI10), emotion perception (TEI11), trait happiness (TEI12), trait optimism (TEI12), and adaptability (TEI14) were directly associated with trait EI in teacher leadership.

Item factor loadings for the 15-item trait EI scale in teacher leadership were computed in JASP. The results returned a one-factor structure based on Eigenvalue > 1 and oblimin method of oblique rotation. Item factor loading ≥ 0.70 is an indicator of item quality, and the item should load higher on the factor it purports to measure [70]. In this study, the item factor loadings indicate a sufficient degree of robustness and item reliability (Table 3). Except for one item loading (TEI08, 0.626), all factor loadings met the recommended threshold of loadings ≥ 0.70 , and Cronbach's $\alpha = 0.928$,—all indicating that the items are reliable indicators of trait EI in teacher leadership.

In addition to item and scale reliabilities, we also assess model fit. Hair *et al.* [70] suggest using a combination of at least one each of the possible absolute fit, incremental fit, goodness-of-fit, and badness-of-fit indices plus the traditional χ^2 value and its associated df . Thus, results of model fit analysis show that the unidimensional 9-item trait EI scale in teacher leadership has a good model fit ($\chi^2 = 127.105$; $df = 90$; $\chi^2/df = 1.412$; $p > 0.006$; RMSEA = 0.099; and TLI 0.870). All the nine items are related to each other as distinct components as clearly indicated by the factor loadings, all of which were >0.626 (see Table 3) thereby meeting the minimum threshold [70].

V. CONCLUSION

In this paper, the authors have developed a parsimonious 9-item scale for measuring the trait EI of teacher-leaders in higher education as a response to the call for specificity in construct measurement and the refinement of the trait EI sampling domain. The acceptable reliabilities and item statistics indicate the robustness of the scale as a trait EI measure. However, the scale needs further validation in a larger sample that cuts across multiple cultures.

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Content Validation and Item-Score Reliability of a Trait Emotional Intelligence Scale in Teacher Leadership

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