Validation of Teacher Competency Questionnaire (TCQ) in Indian Context

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Abstract: Educators perform a cardinal part in the impartation of quality education. Teacher competence and its enhancement has humongous significance in forming the new terrain of the twenty-first century which demands holistic development. The investigators have validated the Teacher Competence Questionnaire (TCQ) by Meicky Shoreamanis Panggabean and Karel Karsten Himawan (2016) in Indian context, which was developed to measure teacher competence. It follows a Likert-scale rating format with Student Assessments of Teachers (SETs) method. The tool has 42 items across five dimensions- Professional Knowledge (5 items), Professional Skills (17 items), Personal Characteristics (8 items), Personal Ethical Standards and Values (7 items), and Professional Development and Lifelong Learning (5 items). Based on a sample of 350 senior secondary students (56% males; 44% females) across four districts in the state of West Bengal, India, analysis was conducted through descriptive statistics such as Mean, Median and Test of normality, Kaiser-Meyer-Olkin (KMO) Test, Bartlett's Test of Sphericity (BTS), Confirmatory Factor Analysis (CFA) and Cronbach's Alpha using AMOS v26 and SPSS v23. The empirical evidence determined an excellent fit of the retained 23 items in final version with a Cronbach's alpha coefficient of 0.661, and can be utilized in the Indian context to measure competence of the teacher.

1   INTRODUCTION

Education is expected to increase the knowledge, competency and skills of a child without the curb of time and place (Bhardwaj, A, 2016). Researchers and educators have widely investigated for decades on which school aspect has the most impact on the students' academic performance. As policymakers have grown to be more implicated in school reforms, this question takes on new importance since many endeavors depend on assumed relationships between multiple teaching-related factors and learning outcomes (Álvarez, J., and Patrinos, H. A, 2007; Kyriakides, L, 2013). Despite the little difference conventional methods that schools input make in student learning, a budding body of research in India and worldwide conclude that schools hold a significant impact on the students learning with the teacher-related aspects playing the major role (Singh and Sankar, 2015; Dev, M, 2016). Black and William (1998) compiled evidence from more than 250 studies and the outcome was an unmistakable and distinct message: that student achievement can be raised by initiatives designed to improve the competency of

teachers to promote learning outcomes. Smith's (2003) assertion that "Teacher quality matters" as cited by Black Williams (1998) and Greenstein (2010), also lends credence to this connection between teacher practice and student success, and concluded it to be the most significant school-related factor that affects student performance.

The changing education paradigms also demands character development alongside moral and social growth, social efficiency and spiritualism (Sootipon, 2010). Recognizing this humongous potential that education and educators hold for both the child and society, nations have commitment towards universalization of elementary education with the overt aim of providing 'Quality Education for All' (DKE Lipsky and Gartner,1989). A vital need to improve the overall quality of education in India has also been recognized by an Act of Parliament of the *National Council for Teacher Education, 1993*. This brought about a major shift from the previous view and laid down dedication, execution and competence as foremost standards for teacher's education (Rajput and Walia, 2001). Consequently, educators need to also foster their competencies in practice as per this

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educational paradigm shift (Surasak, 2013; Khalid, et a., 2021). Numerous experts in the field have undertaken the pursuit of defining competence based on one's personal characteristics. Blömeke et al. (2015) view *"competence as a continuum from traits to observed behaviors in real-world situations"*. Jinga and Istrate (2001) define it according to their *"cognitive, affective, motivational and managerial skills, which interacts with their personality traits"*. Tigelaar et al. (2004) define teaching competency as *"an amalgamated set of personal characteristics, knowledge, skills, attitudes aimed to achieve effective performance"*.

According to the Planning Commission 2012–2017, Government of India, teacher development is therefore regarded as essential for the quality education in India going forward. The skill of a person can be recognized through the work conduct and that will be a triumph pointer for the association as opposed to only his/her educational level (Peklaj, C, 2015; Nessipbayeva, O, 2012) Thus, the current human resource improvement ought to underscore on the ability of the educators and not just their degrees. Thus, globally, there is interest in assessing their skill incited by interest for guaranteeing quality and for more noticeable affirmation of this calling (Vermunt, J. D. and Verloop, N. (1999). Numerous measurement tools have been formed to quantify the competence of educators at various stages in their careers such as enrollment, experience and professional development (Dwyer, 1998). Academic institutions as a rule utilize Student Assessments of Teachers (SETs) in eliciting remarks and criticism about the teaching process, also as a matter of fact, many schools rely upon SETs to settle choices associated with workforce maintenance, promotion and advancement, tenure of contract and salaries (Jacobs, 2004). SETs continue being the primary choice of execution indication of showing viability and quality with outstanding effort facilitated at rendering SETs trustworthy and significant (Marsh and Roche, 1997; Toland and De Ayala 2005). Most SETs are straightforwardly drawn from perceptions of educators and don't actually quantify critical work parts. This may not feature portions of their teaching that are colossal from students perspective, or that mirror their qualities. There brews the necessity for student incorporation at the primary stage, without restricting them to assessing the properties or practices proposed by educators.

2 LITERATURE REVIEW

A review of existing scales and their properties was undertaken across various nations worldwide on the target group of respondents for assessing the educators competence. While most of them utilized a Likert-scale format across various dimensions elicited on the basis of competence, teachers remain to be the sole respondents. Eg: Gresham and Elliott, 1990, in their scale *Social Skills Rating Scale (SSRS)* consisting of 53 items, collected data from the teachers themselves. Likewise, Plake, Impara and Fager's (1993), Raju (1994), Dr. Jayaramanna (Kammati, 2001), Silva and Martorell (2001), D'Agostino, J. V., and VanWinkle, W. H. (2007), Spanierman et al., (2011), Raimundo and colleagues (2012), Tom, K (2012), Murugan and Rajammal (2018), Devrim E (2020), Debabrata Bhattacharjee and Remith George Carri (2020) and, Gumus MM and Volkan K (2022) had teachers has the respondents. This format can lead to tremendous bias. Scales that elicited data from the students were handful such as by Tang F, et al., (2005), Nurdock T.B, et al., (2001) based on Wentzel's (1997) qualitative data, Aaron MT (2019) and Kamila Ludwikowska (2019). On the parallel, Gilbert F. Shearron (1978) states that choosing a rating scale over questionnaire, product or interviews is the most apt method to measure competence. The *Teacher Competence Questionnaire (TCQ) by Meicky Shoreamanis Panggabean and Karel Karsten Himawan (2016)* is one such scale that not only employs a SET but also a Likert type format and hence, proved an apt scale to measure teacher competence.

3 OBJECTIVE

To validate the Teacher Competence Questionnaire (TCQ) by Meicky Shoreamanis Panggabean and Karel Karsten Himawan (2016) in the Indian context.

3.1 Methodology &Scale Specifications

3.1.1 Study Period and Area

This research survey was conducted in 2022 among senior secondary school students from four districts of West Bengal, India- *Howrah, North 24 paraganas, Malda and Uttar Dinajpur.*

3.1.2 Respondents, Sampling Technique and Data Collection

The survey was conducted among 350 senior secondary students of class 11th. The questionnaire consisting of demographic details and the scale was developed using Google forms and was shared to students of the researcher's contacts and networks in different schools across the four districts in the state of West Bengal. A random sampling strategy of deciding the maximum sample size was adopted. The students were contacted after receiving the google form and were explained on the purpose and procedure of the survey. They were also notified that this was voluntary and did not hold any stakes on their studies if withdrawn. As the samples were drawn from different genders, castes, domains (Arts, science and commerce) and socio-economic background, it is well inclusive and diversified to be accepted as being well representative. Thus, conclusions concerning the given topic can be generalized.

3.1.3 Scale

The scale has a total 42 statements which are to be rated on a five-point continuum: (AD) Absolutely Disagree, (D) Disagree, (N) Neutral, (A) Agree, (AA) Absolutely Agree. The domains are Professional Knowledge (5 items), Professional Skills (17 items), Personal Characteristics (8 items), Personal Ethical Standards and Values (7 items), and Professional Development and Lifelong Learning (5 items). The minimum score is 1 and maximum score 5. The domains mentioned in the scale are common for the eleven south Asian countries and are:1) Teaching style competence, 2) Individual competence, 3) Societal competence, and 4) Skilled competence.

3.1.4 Data analysis

The data was fed into AMOS v26 and SPSS v23, and examined for inappropriate values, outliers, and completeness (Black, et al. 2010). The data analysis began with demographic details revealing 56% males and 44% females. Right after that, inorder to determine the adequacy of the sample size Kaiser-Meyer- Olkin (KMO) Test and Bartlett's Test of Sphericity (BTS) as an initial requirement to perform CFA was determined. Kline (2011) and Joseph et al. (2012) detailed that the rationale of CFA is to examine the standing theory or model, or authenticate the factor structure of a group of prevalent variables which is the five-factor structured Likert type scale in this case. As the scale was developed with priori theory, CFA alone proves to be well sufficient to be

carried out. Also, since the fitness estimates of the model is considered here, CFA is the apt analysis to be undertaken in this fairly new scale to measure the validity and reliability in Indian context (Hurley, A.E, et al, 1997).

4 RESULTS

The test results are elaborated based on descriptive statistics, test of normality, Confirmatory Factor Analysis and Reliability score for each factor. The descriptive statistics of the samples which describe and summarize the overall features of the data as well as its distribution was assessed. As the minimum score given is 1 and maximum is 5 as per the questionnaire's rating, we noticed in the descriptive statistics results that the lowest score (Mean) is 2 and the maximum is 4.5.

Following this, Kolmogorov-Smirnov Goodness of fit test was run to check the distribution of the data and assumption of normality. It compares the probability distribution of a hypothetical data and the data fed into the system (Kolmogorov–Smirnov distribution, 2021). The p value was 0.00 which is less than 0.05 after Kolmogorov-Smirnov Z indices were analyzed, and shows that the distribution is normal. Likewise, Shapiro-Wilk test was also run inorder to determine if normality assumptions of the study data was met (Lilliefors, H. W., 1967). The p= 0.000 i.e., < 0.05 and proves normality.

Next, the sample size adequacy using KMO Test and BTS as a requirement to implement Confirmatory Factor Analysis (CFA) was executed as the subsequent step. The KMO value retrieved is 0.781 and thus, is greater than 0.6 and even close to 1.0 (highly adequate). The value of significance of BTS for homogeneity of variance $\chi 2$=4936.069; p 0.000 i.e., <0.05 proves variance to be homogenous and acting as an approval for CFA analysis to be conducted (Hair et al., 2010; Tabachnick and Fidell, 2007).

4.1 CFA- Confirmatory Factor Analysis

CFA was employed to investigate the validity of the hypothesized dimensions and to improve the model fit. In this study, the five subscales are highly correlated with the 42 items and was tested in a sample size of 350 students. The initial model was run and the results of few individual loading factors fell below the cross loading standard value of 0.5. The goodness of fit estimates was poor and led to the

deletion of the following 18 items: PK 5, PSPED 5 and 6, PSCM 2 and 3, PSLA 1, 3 and 5, PC 2,3,5,6 and 8, ECV 2,3 and 6, and PDLL 1. Thus, second model fit estimate was again carried out after removing the 17 items and 1 item i.e., ESV 5 had an individual loading factor of less than 0.5 and led to its deletion. Following this, third fitness estimate was run and met the model estimates (Figure 1).

Table 1: KMO and Bartlett's test

Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy		0.781
Bartlett's Test of Sphericity	Approx. Chi-Square df Sig.	4936.069 820 0.000

The factor models tested and accompanying fit indices are shown in Table 2. The good estimate for all the fit indices retrieved like GFI (Goodness-of-Fit Index) 0.914, AGFI (Adjusted Goodness-of-Fit Index) 0.886, CFI (Comparative Fit Index) 0.956, RMSEA (Root Mean Square Error of Approximation) 0.047, PCFI (Parsimony Comparative Fit Index) 0.789, IFI (Incremental Fit Index) 0.956 and CFI (comparative fit index) 0.956 are mentioned here. It shows good overall estimates with their values according to the desired benchmarks, thus making the model satisfactory (Ding and Ng, 2008).
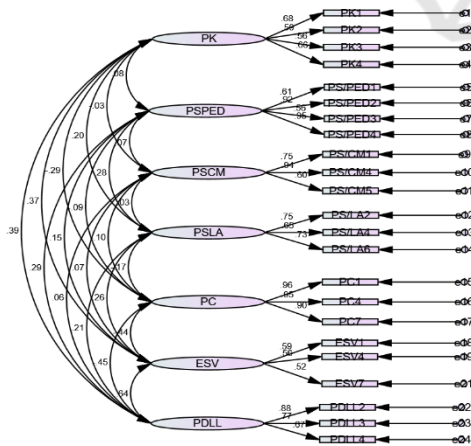

Figure 1. The fitness estimates of the model.

A scale is not valued as credible or valid lest its reliability be furnished (Tavakol and Dennick, 2011). In this present survey, the updated scale version's reliability was calculated using Cronbach's alpha,

which if 0.70 or above is considered meeting the benchmark value to conclude if the scale as a whole and its subscales is/are reliable or not. The factor wise reliability coefficient of the seven subscales showed are 0.713 for professional knowledge, 0.842 for Pedagogies, 0.802 for classroom management, 0.751 for learners assessment, 0.951 for personal characteristics, 0.574 for ethical standards and values and 0.816 for professional development and lifelong learning. The range of these Cronbach's alpha coefficients, nevertheless, attests to the good reliability value in line with the that suggested by Hair et al., (2010). Additionally, the overall Cronbach's alpha coefficient of the final scale is 0.661, signifying that it is very reliable. The finalized scale with 23 items has high validity and reliability and can be used in Indian settings to assess the teacher's competence.

Table 2 A.

Measures	P	CMIN/DF	RMR	RMSEA	GFI
Result	0.00	1.704	0.026	0.047	0.914
Benchmark	<0.05	<3	<0.08	<0.1	>0.90

Table 2 B.

Measures	AGFI	PCFI	IFI	CFI
Result	0.886	0.789	0.956	0.956
Benchmark	0 -1	>0.8	>0.90	>0.95

5 CONCLUSION

The purpose of present investigation was to validate Teacher competence Questionnaire (TCQ) by Meicky Shoreamanis Panggabean and Karel Karsten Himawan (2016) in Indian context. It is composed of a clear five-factor structure and originally consists of 42 competency items. It is also precise and emphasizes only on those aspects that are under the power of educators. The scale, likewise, does not confound assessment of teaching with the assessment of the process or workload/assignments. The result of Confirmatory Factor Analysis of the questionnaire has given approvable results, the psychometrics are highly reliable and valid to assess teacher's competencies in Indian context. After the inspection of the scale, variances and modification indices, 19 statements were deleted. Empirical evidence demonstrates an excellent score having a final set of 23 items. The reliability of the scale is 0.661 and

according to George and Mallery (2003) there exists good degree internally.

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