



Measuring quality of good educator scales: A second-order Confirmatory Factor Analysis (CFA)

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Abstract

In an institution of higher learning, measuring the quality of a good educator using second-order confirmatory factor analysis is seen as impacting lecturers' success. In grouping the psychometric attributes of good educators in Nigeria, this research offers a four-factor solution using a second-order confirmatory factor analysis. A quantitative analysis method was used for 235 survey data sets collected and processed with AMOS 23.0. The hypothesized model had four latent variables: the quality of a good educator, quality of class control, effective communication, keeping a diary, and mastery of the subject. Second-order confirmatory factor analysis techniques were employed on the hypothesized model with four latent variables: the quality of a good educator, quality of class control, effective communication, keeping a diary, and mastery of the subject. The fit indices criteria demonstrate that the goodness-of-fit indices are satisfactory with the postulated model. The four criteria recognized as the quality of a good educator's enablers of the lecturer's ability to teach are the underlying determinants of the quality of a good educator. This paper implies that educators should focus more on the four determining variables. The relationship between the underlying characteristics and lecturer achievement in a tertiary institution should be investigated.

Keywords: Good class control, Effective communication, Keeping the diary, and Mastery of the subject

Introduction

Teaching is critical to every country's development, with the quality of skilled instructors serving as the primary determinant of academic achievement. The quality of a good educator is the key enabler of excellence, which is a major source of concern when it comes to lecturers achievement. Many academicians disagree that the quality of good educators is the most crucial tertiary institution-related component determining Lecturers performance or achievement, given this development(Ewetan & Ewetan, 2015; Monday & Mallo, 2021). According to published literature, all ultimate justifications for students' poor performance can be traced back to the lack of effectiveness of a good educator, acceptable class control, efficient communication, keeping a journal, and mastery of the subject in an educational setting (Adeyemo, 2012; Igbojekwe et al., 2015). Overcrowding in classrooms, , poor class control, and insufficient communication for learning are all serious challenges in some developing countries(Adamu et al., 2022; Bolaji et al., 2019). A significant empirical study focused on teaching qualities, which have to do with individual educators from various postsecondary institutions, in recent years(Fitri & Adnan, 2021). As a result, this study is unique in that it investigates the elements that determine the quality of good educators in terms of Lecturers performance and achievement.

In light of the aforementioned concerns, instructors should become more involved in activities that improve student performance (Adedokun et al., 2021; Sheridan et al., 2022). The value of high-quality instructors'

contributions to the educational system is reflected in the level of student work (Ayeni, 2018; Mohammed & Abubakar, 2020; Sheridan et al., 2022). Students determine a good educator's quality, which has an impact on student performance(Sahib et al., 2021). The purpose of enacting an educational policy is to ensure that educators are up to the task of their qualities, which include appropriate class control, effective communication, maintaining a journal, and mastery of the subject(Babajide et al., 2018). This research examines the instrument for Lecturers performance and accomplishment in Nigeria and further describes the scales as a four-component solution using confirmatory factor analysis.

Existing literature on the educator quality scale is common in the setting of the western and Asian appraised populations, which are more advanced than the western world and some Sub-Sahara African countries like Nigeria(Hay, 2020; Iroegbu & Uyanga, 2019; Sokolovic et al., 2021). It is also necessary to observe the factor established using second-order factor analysis on the quality of good educators in emerging Sub-Sahara African countries, such as Nigeria, to extend the scale validity. The exceptional educator measure needs to be confirmed as a second-order confirmatory factor analysis. It is critical to use these articles as a springboard for tackling the question of how to quantify Lecturers progress in Nigerian universities.

Literature on quality educator scale and its dimensions

Diverse scholars in the most advanced Western nations and the Asia-Pacific region have significantly enhanced the quality educator scale (Hall, 2019; Xie et al., 2021). According to Rahardja et al. (2018), having a highly educated lecturer in a tertiary institution will strengthen the academic environment, resulting in more successful students. A well-educated lecturer is also more likely to work hard and be enthusiastic about organizing extracurricular events for students in order to for them to me well establish the (Sahib et al., 2021). The progression whereby an individual decides on a vision for the tertiary institution is referred to as the quality of a good educator (Ghasia et al., 2019). Scholars' interest in exploring the quality of educators' communication breakdown and keeping a diary has been revealed (Egielewa et al., 2022; Vagi et al., 2019). The quality of a good educator has been shown to improve Lecturers performance and the tertiary institution's ability to produce an outstanding and prolific student in the labor market (Abdulkareem et al., 2020). As a result, it is critical to improve the related measurement allied with the quality of good educators in a Nigerian tertiary environment by hypothesizing the construct dimension as a second-order confirmatory factor analysis.

A good educator's quality is a multifaceted paradigm linked to Lecturers performance (Ajani, 2018). With this information, the researcher hypothesized that the latent constructs of reasonable class control, effective communication, diary keeping, and

subject mastery are determinants of quality of good educator. The next section explains four recognized dimensions as a latent variable that measures the quality of good educators in Nigeria's tertiary institutions. To begin with, reasonable class control in tertiary institutions is considered a standard idea of educators who have high expectations of a respectable recital from the student (Mulcahy & Martinussen, 2022). Murillo-Zamorano et al. (2019) suggests that educators should concentrate on student presentation, as this will give them more control over the students' ability to comprehend what has been said. The educator's goal of reasonable class control to achieve success by identifying attitudes in class and weaknesses because they come from background is also enlightened. Poon (2013) emphasizes that a teacher's effective classroom management system has a positive impact on their students. As a result, one of the dimensions of a good educator's quality is reasonable class control by the educator.

Second, effective communication is how people demonstrate their importance and good communication skills when giving lectures to students (Sutiyatno, 2018). Educators can achieve this by improving their teaching ability and becoming more committed to their profession. This study has conceptualized practical communication skills as a notion to reflect educators' desire to devote extra time to a student in order to attain the highest level of communication outside of the classroom.

Finally, keeping a diary has been well-defined by educators as a means of assisting students in becoming members of the discourse

community by providing possibilities. Write on it and receive feedback from their teachers (Sahib et al., 2021). The purpose of the educator keeping a diary is to be able to monitor the student's academic activities. The method of diarizing, can help educators deliver more useful information to students and instructors (Blaine, 2019). Furthermore, as an educator, the more records you keep, the better your chances of sending a piece of better and more valuable information. Mastery of the subject refers to the process of comparing individual attitudes toward a profession to its specialization (Butt & Shams, 2020). Mastery of the subject matter reflects the educator's personal and professional growth. The educator's first years on the job are spent learning how to clench the ideas that will eventually be available in the lesson (Tomas et al., 2019). Teaching_ as a profession imply a high level of expectation on the educator's part. There is a smooth flow in the teaching-learning process when a teacher masters the topic. They can confirm that they provide accurate ideas, concepts, and other information to the student. If the instructor has previously signified the lesson, this allows them to match the influential materials. Overall, in a higher institution setting, the quality of good educators is critical to achieving the university's goals by increasing their professionalism.

Methodology

The underlying element is a 16-item superstructure of good educator quality, which is a scale with four underlying variables: appropriate class control, effective communication, diary keeping, and subject mastery. The core sub-scales of this item were

derived and adjusted from an established indicator of the effectiveness of good educator research (Atah, 2019). In table 3 of the exploratory factor analysis (EFA), in which the instrument is loaded beneath its predictable underlying construct, the comprehensive set of the instrument is specified as a caption. The information was gathered from academics at four Nigerian tertiary institutions. The questionnaire consists of 18 items, excluding the demographic profile of the respondent, which is based on relevant characteristics adjusted from current literature. Together with the demographic profile and the other components, the component is divided into five groups: reasonable class control, effective communication, keeping a journal, and mastery of the subject. To achieve the consistency values of the instruments, the survey was created using a 5-point Likert Scale, ranging from (1=strongly disagree) to (5=strongly agree). The items in this study are statistically analyzed to determine the quality of an excellent educator scale. Thus, the underlying latent variables were used to assess the quality of the exceptional educator scale, with the application of questions confirming the operational meaning of each variable. Data screening was used to see how well second-order confirmatory factor analysis approaches addressed the model.

Data collection process

In accordance with the scale adopted from previous research (Jain, 2021). This paper stressed discussing reasonable class control, effective communication, keeping the diary, and mastery of the subject. The purpose is to

determine whether educators are dedicated to their responsibilities depending on the stated criteria. The respondents were given a survey questionnaire with all-inclusive knowledge about the paper's goal freely to ensure that they understood the selection of the detected variables.

Response rate

The study distributed 400 questionnaires and received 297 responses. A data screening process was subsequently conducted on these responses to ensure the absence of outliers and missing data points. On the usable data, the fundamental normality assumption,

homogeneity, and linearity tests were performed. Due to missing data and outliers, the screening process revealed 64 unsuitable data points, which were deleted, leaving 235 usable data points. The consistency test and exploratory component analysis were used to identify the construct and structure the investigation (EFA). In summary, Table 1 demonstrates that the Federal University is home to the majority of the respondents, with 75 useable data points. Following that are the Polytechnic and College of Education responders, who each had 55 and 50 relevant data points from the state university, respectively.

Table 1. Response rate

Tertiary institution types	Institution	Total send/ received	Total deleted	Total usable
Federal University Oye-Ekiti	FUOYE	(100) = 85	12	75
State University	EKSU	(100) = 68	18	50
Polytechnic	ADO POLY	(100) = 74	19	55
College of education	NCE IKERE	(100) = 70	15	55
Total		(400) =297	64	235

Source: Author Computation 2023.

Demographic Profile

Table 2 provides a detailed breakdown of the respondent profile, revealing that 62.0% (145) were male and 38.0% (90) were female. It means that the educators in the chosen institution are all of the same gender. On the type of tertiary institution question, the result is virtually on par with Federal University, which had 75 replies, or 32.0 percent of the overall respondent population. The response

from Federal Polytechnic is next, with 55 representing 23.0 percent. There were 55 respondents from the Federal College of Education, accounting for 23.0 percent of the total. Among postsecondary institutions, the state university has the fewest responses, with 45 representing 22.0 percent of the overall participant population. The exploratory factor analysis that follows Table 2 below is the next step in the analysis.

Table 2: Respondents' Demographic Profile

Variables	Description	Frequency	Percentage
Gender	Male	145	62
	Female	90	38
	Total	235	100

Type of Tertiary institution	Federal University	75	32
	State University	50	22
	Federal polytechnic	55	23
	Federal college of education	55	23
	Total	235	100

Source: Author Computation 2023.

Data Analysis and Findings

As a first phase in the inquiry, the data from the survey questionnaire was run via SPSS version 26.0 to classify the items to factor loading using exploratory factor analysis (EFA), followed by second-order confirmatory factor analysis (CFA) using AMOS 23.0. The purpose of the EFA is to categorize the factor structure of the quality of educator scale and to explain the itemized underlying instrument. With SPSS version 26.0, the extracted component with an eigenvalue larger than 1.0 was generated using the principle axis factoring extraction procedure and varimax rotation (Sahin, 2018). The instrument's first coding and label were loaded as predicted to confirm the instrument's dependability and practical denotation of substantial changes. Three statistical metrics are employed to analyze the commitment describes for the identified component structure of the variables: Consistent factor loading, Cronbach's alpha, and Rotation Sums of Squared Loadings were considered. Following (Hair Jr et al., 2020), the accepted minimum standardized factor loading is 0.50, while a Cronbach's alpha of 0.70 is the recommended threshold.

Consequently, Table 3 shows a Kaiser-Meyer-Olkin sampling adequacy index of 0.935 for

the factor. Bartlett's Sphericity test was statistically significant ($\chi^2 = 2586.848$, $DF = 153$, $p < 0.000$). These results indicate the data's appropriateness for factor analysis. Table 3 also presents the factors and eigenvalues exceeding 1.0 extracted from the 18 items used in this study. The factor loadings ranged from 0.603 to 0.818, surpassing the recommended threshold of 0.50 (Schreiber, 2021). The initial structure is made up of four instruments (KTD1 to KTD4). When interacting with students, this described the instructor keeping a logbook of all activities. When instructing students with five instruments, the second component identified educators for having effective class control (GCC1 to GCC5). With four instruments, the third construct defined educators' effective communication when dealing with pupils (EFC1 to EFC3). The fourth construct demonstrates educators' mastery of the subject in order to help pupils better grasp five instruments (MTS1 to MTS4). The Cronbach alpha for the four factors is 0.860, 0.891, 0.873, and 0.893, respectively, which is rather remarkable. These findings demonstrate that the data's internal consistency estimation is satisfactory, above the required level of 0.70 (Brown, 2002). The details are shown in Table 3 below.

Table 3: Analysis of Exploratory Factor Analysis.

S/N	Items	Loading	Construct	Cronbach Alpha	Rotation Sums of Squared Loadings
1	KTD1	.673			
2	KTD2	.760			
3	KTD3	.818	Keeping the diary	.860	20.568
4	KTD4	.789			
5	GCC1	.818			
6	GCC2	.769	Good class control	.891	18.321
7	GCC3	.722			
8	GCC4	.740			
9	GCC5	.725			
10	EFC1	.606			
11	EFC2	.722	Effective communication	.873	16.675
12	EFC3	.714			
13	MTS1	.709			
14	MTS2	.603			
15	MTS3	.662	Mastery of the subject	.893	16.541
16	MTS4	.619			
Total Variance Explained with four factors: Principal Component Analysis					72.104

Source: Authors Computation. 2023

Following the exploratory factor analysis that identified the component structure, a second-order confirmatory factor analysis was conducted to verify the educator scale's convergent and discriminant validity. The instrument's loading on its components represents a percentage of the variance in convergent validity methods (Ferrell, 1983). According to Hair et al. (2006), factor loading, average variance extracted, and construct reliability are statistical measures for assessing convergent validity. In structural equation modeling (SEM), common element loading indicates the relationship between variables, whereas the average variance retrieved shows the convergence of instruments measuring the same constructs.

Construct dependability, on the other hand, affects the degree to which a construct's underlying variable and its instrument are

represented in structural equation modeling. The average factor loading of average variance extracted of .50 and composite reliability of .60, as specified by Mueller et al. (2018), are the statistical degree thresholds in convergent analysis. The discriminant validity of a built instrument is the degree to which it differs from its indicators, (Sekaran & Bougie, 2016). The lack of cross loading within construct variance is explained by discriminant validity (Hair et al., 2006; Hair Jr et al., 2020). Cross-loading isn't present, which indicates that discriminant validity is adequate. The model fit analysis also tries to see if the second-order confirmatory factor analysis model of good instructor quality matches the data (Kline, 2005). Several goodness-of-fit indices, such as Chi-square X^2 , Normed Chi-square X^2/df , =3.0 or X^2/df , =5.0 Root mean square error appropriation 0.05 =RMSEA =0.10; (Byrne,

2009); comparative fit index CFI = 0.90; Tucker- Lewis index TLI = .90 index TLI = .90 (Bentler, 2007; Maskey et al., 2018).

The consistency in parameter loading using AMOS 23.0 varied between 0.60 to 0.96 for the four discovered constructs of quality of important educator variables, which is higher than the minimum requirement of 0.50 for second-order confirmatory factor analysis (Ferrell, 1983). With the increased workload, an educator must maintain reasonable class management, effective communication, a diary, and topic mastery. As a result, the four variables account for more than half of the

variance in the quality of good educators in Nigerian tertiary institutions, according to the findings. The construct reliability estimates for the four underlying variable loads above the minimum threshold value with the approximations of reasonable class control 0.865, Effective communication 0.745, keeping the diary 0.896, and mastery of the subject 0.820, respectively, for the four underlying variable loads above the minimum threshold value. Finally, the results reveal that the quality of good educator scale has a significant and constant degree of convergent validity when it comes to quality of good educator. Table 4 provides more information.

Table 4. Parameter Discriminant Validity Estimation

Items	Good class control	Effective Communication	Keeping the Diary	Mastery of the Subject
1	.78			
2	.85			
3	.72			
4	.65			
5	.74			
6		.81		
7		.60		
8		.69		
9			.73	
10			.74	
11			.96	
12			.86	
13				.66
14				.68
15				.86
16				.71
AVE	.865	.745	.896	.820
CR	.564	.513	.686	.536

Source: Author Computation 2023

Evaluation of Model Goodness Fit Indices

The four identified variables of good educator quality demonstrated acceptable goodness-of-fit indices as per (Hair Jr et al., 2020). Model evaluation and estimation utilized CFI = 0.967, TLI = 0.961, and RMSEA = 0.56 with 95% confidence intervals. The chi-square statistic was Chi-square = 214.548, df = 131,

p 0.000, which is significant at the 0.05 level. Following Schumacker and Lomax (2016), the normed chi-square threshold was set at 0.5, resulting in Cmin/df = 1.638. Overall, the 16-item quality of good educator scale, validated using second-order confirmatory factor analysis, showed satisfactory model fit.

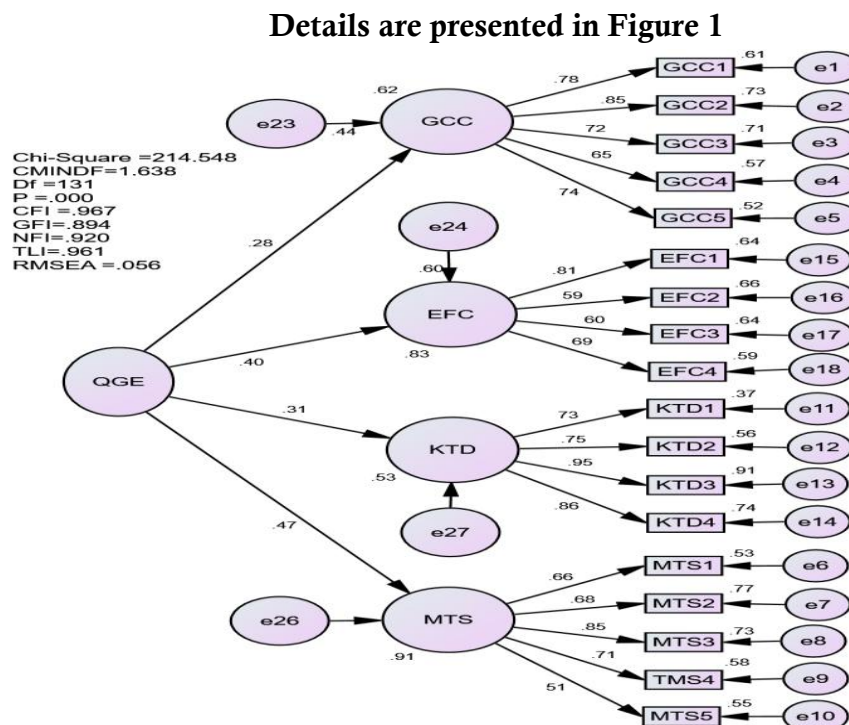


Figure 1: Conceptual Model of the parameters

Source: Authors' Computation.

Conclusion

This paper's findings are consistent with the criteria of a successful educator as a multidimensional construct: good educator quality, reasonable class control, effective communication, keeping a diary, and topic mastery. Using rigorous statistical procedures in the analysis, the actual conclusion of the multidimensional construct trials of good educator quality is proven without poor

loading. The result is integrated with Louis (Abdulkareem et al., 2020; Garrison & Kanuka, 2004; Ghasia et al., 2019) current conceptualization of the quality of good education scale. This is a common technique, and it was used to measure causal constructs in the paper.

This paper has a practical application in that it experimentally validates the adaptive

quality of good educator instruments, which are likely to be relevant in Nigerian tertiary institutions. The validated items can also be used as an evaluative tool to determine how closely a good educator's quality, reasonable class control, effective communication, keeping a diary, and topic knowledge are related. The researchers would be able to determine the aspects that have the greatest impact on the quality of good instructors in tertiary institutions using the specified variables. To further explore the findings, administering a comparable questionnaire to a group such as non-academic staff at a Nigerian tertiary institution is recommended to facilitate a comparative analysis between academic and non-academic personnel. Moreover, a new study involving a different group of respondents is suggested to cross-validate the items and ascertain the item that best aligns with the derived four-factor outcome. Building upon the current assessment of convergent and discriminant validity, it is also advised (Lin et al., 2008) to extend the study's validity by including nomological validity. This type of validity is a notable measure for evaluating the robustness of a construct's multidimensionality, and it is established through the relationship between the distribution of scores on the item scale and moderately varied item scores.

Recognizing the value of good educators is a dynamic way to assess an institution's educational scale. This document has been revised and modified throughout time in the context of the Nigerian Quality of Good Educator Scale, which has 16 verified components. Value-added was successfully conceptualized as a second-order construct with a four-variable structure, which is an

inherent feature of the developed good educator scale. The objective of this paper was to create a sound second-order model that demonstrates adequate model fit and to support the model's theoretical expansion. According to the second-order confirmatory factor analysis test, the best fit for measuring the quality of good educators in Nigerian tertiary institutions was four variable solutions.

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