

Measuring Lecturers Commitment Scales: A Second order Confirmatory Factor Analysis (CFA)

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Abstract: Measuring lecturers' commitment scale using second other confirmatory factor analysis is viewed as an enabler of student academic success in a tertiary institution. This paper further expounds on these scales as a four factor solution using confirmatory factor analysis in examining the psychometric properties of the instrument for student academic success in Nigeria. A quantitative method of analysis was employed for a total of 300 data collected and analyzed with AMOS 20.0. The second order confirmatory factor analysis techniques were used on the hypothesized model with four latent variables of commitment to student, commitment to teaching, commitment to school and commitment to the profession. The result reveals the goodness-of-fit indices are adequate with the hypothesized model using the fit indices criteria. In conclusion, it is evidence that lectures' commitment is the enabler of student success which is linked to the four factor identify as commitment underlying variables. The implications of this paper are for lectures' to be more committed to the four determining variables'. Future studies should examine the relationship between the underlying variables on the student academic success in a tertiary institution.

Keywords: lectures commitment, Confirmatory factor analysis, psychometric property

1. Introduction

Education is basic and important to the development of any nation with lecturers as the main crucial point to its success. Lectures' are the core enabler of educational excellent' means good education which at present is challenging with serious concern about the level of lecturers turnover commitment. In view of this scenario few academicians disagree that lecture' is not the most influential tertiary institution related variables affecting the quality of student success or achievement (Adeyemi & Adeyemi, 2014; Baier, 2014; Ntakana, 2011; Tuwei, 2014). Contemporary learning theory clenches that the fundamental causes of poor success student can be linked to the incapacity of the lectures' to be committed student, school, lecturing and profession in less conducive educational environment (Kant & Jafri, 2014).

This, is not unconnected with shortage of qualified lectures' with the appropriate qualification, poor lecture room, inadequate information technology for learning and over-crowded classroom (Gow, Kember, & Sivan, 1992; Luoga, 2011; Oni, 2012). Over the past years a substantial empirical analysis focused on lecturers' turnover intention which has to do with the departure of lectures' from one tertiary institution to another (Travers & Cooper, 1996). Thus, this study differs since it empirically examines the variables that influence the lectures' commitment to student success and achievement.

In relation to the above mentioned issues, lecturers should involve more involved in activities that will lead to increase in student success (Ekundayo, 2008; Luoga, 2011). The contribution made by the lecturers in promoting the Nigerian educational system are echoed in their commitment to student, commitment to their work environment, commitment to school and commitment to their professional career (Anyanwu, 2010; Thien & Razak, 2014; Thien, Razak, & Ramayah, 2014). The effort made by the lectures are found to have an influence on the academic success of a student (Adeyemi & Adeyemi, 2014). The implementation of an effective educational policy is concomitant to the commitment of the lectures' to their profession (Sang, 2014). This paper further expounds on these scales as a four factor solution using confirmatory factor analysis examining the psychometric properties of the instrument for student academic success and achievement in Nigeria.

Previous study on lectures' commitment are established in the context of the western and Asian sampled population, which are more advanced compare to the Sub-Saharan African countries such as Nigeria (Anyanwu, 2010; Koh, 2014; Razak, Darmawan, & Keeves, 2009). To extend the validity of commitment scale, there is the need to further examine the component identified from the western countries using a second order factor on lecturers in the context of developing sub-Saharan Africa countries e.g. Nigeria. The measure of lecturer's commitment scale is measured as second order confirmatory factor analysis to validate the instruments. The importance of this empirical study would serve as a turning point in addressing lecturers' commitment to student academic success in the Nigerian tertiary institution.

2. Literature on Commitment Scale and it's Dimensions

The use of commitment scale has increased significantly from different academic researchers in most developed western countries and the Asian pacific region. Oni (2012) said that when a tertiary

institution lectures' is highly committed it will services as an asset to the university in producing a successful citizen. Also, identified is that a committed lecturer is more likely to work hard and to be devoted to organizing extracurricular activities for the student to accomplish the mission of the tertiary institution (Jo, 2014).

Commitment scale is the process by which individual agrees to the choice and effect of the decisive vision of the tertiary institution (Razak et al., 2009). Existing literatures have discovered the much interest of researcher in exploring lecturer commitment in the area of school and profession (McInerney, Ganotice, King, Morin, & Marsh, 2014; Raaff, 2014; Rawls & Herman, 2009; Tuwei, 2014). Evidence has shown that commitment of lecturers has buttressed student academic success and the tertiary institution in achieving an excellent and productive student to of the labor market in Nigeria (Adeyemi & Adeyemi, 2014; Olorunsola & Arogundade, 2014).

Due to this fact, it is important to better understand the related dimension that is associated with the commitment by exploring the conceptualized dimension as second order confirmatory factor analysis in a Nigerian education environment. It is claimed that commitment is a multidimensional construct which is associated with academic success (Adeyemi & Adeyemi, 2014; Anyanwu, 2010). With this evidence we conceptualized that the four identified variables (commitment to students, teaching, school and the profession) are. Latent constructs of commitment, determinant of student academic success and tertiary institution's achievement. The next paragraph explained the four identified dimensions as a latent variable that serves as a measure of lecturers' commitment toward achieving student academic success.

Firstly, commitment to student in tertiary institution is said to be grounded ideas of lecturers with high expectation of good performance from the student (Yorke & Longden, 2004). Brophy and Good (1984) suggest for the need to concentrate on student performance which is also associated with the lecturers' ability to lecture and understand by the student. Also explained is the lecturer's motive for students to achieve success by identifying student weakness despite coming from a different family background (Goldrick-Rab, 2010). Widen and Vildo (2013) highlight that committed lecturers to student have a positive engagement with their student. Thus, lecturers' commitment to student is conceptualized as one of the dimensions of commitment measure.

Secondly, the commitment of the lecturers to teaching is the process whereby individual indicated their level of seriousness in giving lectures to student (Ramsden & Martin, 1996). Thus, perhaps we can conclude that lecturers that are more committed to their profession would have a positive effect towards it teaching ability than those with less commitment to either profession, teaching, schools and student. This paper, has abstract the identified variable as a measure of commitment to echoes the willingness of lecturers, in devoting more time to student in order to achieve the best out of student of tertiary institution.

Thirdly, lecturers' commitment to schools has been defined as a measure of the tertiary institution product to the economy (Osei, 2006). The nature and effects of schools on student academic achievement was examined by Adeyemi and Adeyemi (2014) and found that a committed lecturer have a positive effect on the tertiary institution base on their level of commitment and hardworking

for the success of the institution. In addition the more committed a lecture is to its tertiary institution the better the outcome of the institution.

Lastly, in the view of Louis, Marks, and Kruse (1996) lecturers commitment to their profession is the process by which individual attitudes towards it profession are being measured with its specialization. Also, defined by Dip (2004) as the way individual occupational goals and determination are being accomplished. Lecturers' commitment to the profession is abstracted as the potency of lecturers' enthusiasm and participation to work and to progress in their area of expertise, understanding and lecturing capability. In all, lecturers' commitment is important in the academic setting and to accomplish the university goals, by improving lecturers' level of professionalism to be followed by the changes in lecturing practices.

3 Methodology

The underlying factor structure of a 13 items of commitment related to the measurement of lecturers commitment to student academic success was examined. The measurement of lecturer commitment scale is composed of four underlying variables; a commitment to student, commitment to teaching, commitment to school and commitment to the profession. This item comprising underlying subscales was adapted and modify from an existing measure of commitment scale by (Jo, 2014; McInerney et al., 2014; Raaff, 2014; Razak et al., 2009).

The complete set of the items is given a caption for in table 1 of the exploratory factor analysis were the items loaded under its expected underlying component. The data were collected from lecturers in 10 selected tertiary institutions in Nigeria. The administered questionnaire has 13 indicators with the exception of demographic questions reflecting the relevant variables adapted from previous studies. The variables are divided into 5 categories including the demographic variables, commitment to students, commitment to teaching, commitment to school and commitment to the profession. The questionnaire was developed using 5-point Likert Scale, ranging from (1= strongly disagree) to (5= strongly agree) to achieve the reliability score values of the items.

Additionally, lecturers commitment in the case of this study is measured by identifying four factor solution for the factor analysis and supported by the four identify variables by Thien et al. (2014). This study quantifies lecturers' commitment scale by applying a statistical analysis on the items. Thus, the lecturers' commitment scale was measured via the use of the underlying latent factor with the applicability of administering items stating the in operation the meaning of each variable. The items and the data were subjected to data screened in order to test the second order confirmatory factor analysis techniques in addressing the model hypothesized.

3.1 Data Collection Procedures

This paper emphasized by explaining the level of lecturers' commitment to student, school, lecturing and profession in line with the scale adapted from existing studies (Thien et al., 2014). The reason is to see if lecturers are committed based on the four variables would lead to the academic success of the student. The respondents were given the questionnaire on a voluntary basis with comprehensive information about the objective of the study and to ensure that they understand the choice of being committed with the variables identified. Importantly, the up-to-date consent from

the National University Commission was seeking to administer the study in the selected tertiary institution in Nigeria.

3.2. Response rate

From the 400 questionnaires distributed only 298 was returned. The data received were subjected to data screening in order to remove any issue of outliers and missing data. The basic test for this study was carried out, which include the test of normality assumption, homogeneity and linearity of the data. The process of data screening indicate that there were 63 unusable as a result of missing data and outliers which was deleted leaving the total usable data to 250. The analysis was followed by the reliability test and identification of the component through exploratory factor analysis (EFA). In summary Table 1 below shows that majority of the respondent is from the Polytechnic with a total of 80 usable data. This is followed by the respondent from Federal University with 75 usable data, state, university with 50 usable data and finally 50 from the college of education respectively.

Table 1. Response rate

Tertiary institution types	Institution	Total send/ received	Total deleted	Total usable
Federal university	FUTMINNA	(50) = 46	6	40
	FEDLOKOJA	(50) = 40	5	35
State University	KSU	(50) = 38	8	30
	NSU	(50) = 30	10	20
Polytechnic	KOGI POLY	(50) = 39	9	30
	KWARA POLY	(50) = 35	10	25
College of education	NCE OKENE	(50) = 33	8	25
	NCE ANKPA	(50) = 37	7	30
		(400) = 298	63	25

3.3. Demographic Profile

The demographic profile of the respondents is inferred in Table 2 below. The majority of the respondents are male with 161 (64.4%), while the female respondents are 89 equivalent to 34.6%. On the question of the tertiary institution type the response has almost at par with Polytechnic had a total of 80 responses representing 32.0% of the total respondent population. This is followed by the respondent with response from Federal University with 75 (30.0%), respondent with from the state university are with a total of 50 (24.8%). The least number of respondent tertiary institutions is the college of education with a total number of 45 representing 18.0% of the total respondent population. The next analysis continues with the exploratory factor analysis immediately after Table 2 below.

Table 2: Respondents Demographic Profile

Variables		Frequency	%
Gender	Male	161	64.4
	Female	89	35.6
	Total	250	100

Type of tertiary institution	Federal University	75	30.0
	State University	50	20.0
	Polytechnic	80	32.0
	College of Education	45	18.0
	Total	250	100

4. Data Analysis and Findings

The data collected from the administered questionnaire were subjected to SPSS version 20.0 as the first stage of analysis to identify the items component loading with exploratory factor analysis (EFA), followed by the second stage which is the second order confirmatory factor analysis (CFA) using AMOS 20.0 respectively.

First Stage: The aim of EFA is to identify the variables structure that explained each of the specified underlying items of lecturers' commitment. Principle Axis factoring extraction method and varimax rotation were employed to generate the uncorrelated extracted component with eigenvalue greater than 1.0 with the application of SPSS version 20.0. The preliminary coding and label of the items was loaded as expected, to confirm the reliability of the practical meaning to the resultant variation. The standardized factor loading and Cronbach's alpha are the two statistical procedures employed under the EFA to examine the underlying items for the extracted component structure of the variables. According to Hair, Tatham, Anderson, and Black (2006) the accepted threshold valued of standardized factor loading is ≥ 0.50 , while Cronbach alpha is recommended at ≥ 0.70 (Nunnally & Bernstein, 1994)

Furthermore, the Kaiser-Meyer-Oklin measure of sampling adequacy index for the factor was 0.873. Bartlett's Sphericity was statistically significant with $\chi^2 = 1441.467$, DF=78, $p < .001$. This output indicates the appropriateness of the data for factor analysis. Evidence in Table 3 reveals the variables and the eigenvalue higher than 1.0 that was extracted from the total of 13 items used in the study. The factor loading through the principle axis factoring of the items ranged from 0.751 to .864 which is above the threshold of 0.50 as recommended by Hair et al. (2006). The first component comprises of 4 items (CTP1 to CTP4) this described the lecturers' commitment to their profession. The second component designated lecturers commitment to school with 3 items (CTH1 to CTH3). The third component described lecturers' commitment to lecturing, having 3 items (CTL1 to CTL3). The fourth component shows lecturers commitment to student was constructed with 3 items (CTS1 to CTS3).

Remarkably, the Cronbach alpha of the four variables are 0.877, 0.870, 0.858 and 0.869 respectively. This result indicates the internal consistency estimation of the data is adequate and above the recommended threshold of 0.70. Table 3 below exhibit the details.

Table 3: Analysis of Exploratory Factor Analysis.

Items	Items Description	Loadings	Label	@
1	Ctp1	.834	Commitment to profession	.877
2	Ctp2	.825		
3	Ctp3	.770		
4	Cpt4	.770		
5	Cth1	.833	Commitment to school	.870
6	Cth2	.823		
7	Cth3	.805		
8	Ctl1	.864	Commitment to lecturing	.858
9	Ctl2	.827		
10	Ctl3	.751		
11	Cts1	.826	Commitment to student	.869
12	Cts2	.811		
13	Cts3	.781		

Second stage: The analysis continues with the examination of the second CFA. The Second order CFA is employed to validate lecturer commitment scale in terms of the convergent and discriminant validity after the component has been identified from the EFA (Byrne, 2013; Hair et al., 2006). Firstly, convergent validity processes the degree to which each item in a particular underlying constructs share a proportion of variance in common with other items in the same construct (Hair et al., 2006).

Hair et al. (2006) evidence that standard factor loading, the average variance extracted and construct reliability are the three statistical ways in determining convergent validity. The standardized factor loading indicates the association between the variables, while average variance extracted shows the extent to which the items converge among the same construct in structural equation modeling (SEM). Construct reliability is used in measuring the degree to which an underlying variable of a construct and its items are represented in structural equation modeling. The

threshold of statistical measure in convergent analysis is standard factor loading $\geq .50$, Average variance extracted $\geq .50$ and composite reliability $\geq .60$ as recommended by Hair et al. (2006).

The discriminant validity measure is the degree to which a particular construct items are differ from it indicators (Sekaran, 2000). The use of discriminant validity is a justification for the existence and non-existence of cross loading within and between the construct error term variance (Hair et al., 2006). The nonexistence of cross-loading shows that the evidence of discriminant validity is justified. Instead, discriminant validity can also be based on the Fornell and Larcker (1981) criterion of the average variance extracted of variables \geq the correlation exists with another variable. Further to the analysis the model fit evaluation aims to examine whether the second order CFA model of lecturers commitment fit the data (Kline, 2005). The model fit of this paper would be justified with several goodness-of-fit indices such as; Chi-square X^2 , Normed Chi-square $X^2/df = 3.0$ or $X^2/df = 5.0$ (Schumacker & Lomax, 2004), Root mean square error approximation $0.05 = RMSEA = 0.10$; (Byrne, 2009); comparative fit index $CFI = 0.90$; Tucker- Lewis index $TLI = .90$ (Bentler & Bonett, 1980; Hu & Bentler, 1999).

The result of the second order CFA shows that the standardized parameter loading using AMOS 20.0 ranged from 0.70 to 88 for lecturers commitment to the profession, commitment to lecturing ranged from 0.73 to 0.96, commitment to student ranged from 0.77 to 0.87 and commitment to school ranged from 0.73 to 0.85 which is ≥ 0.50 cutoff value (Joseph, Anderson, Tatham, & Black, 1992).

The average variance extracted approximation for lecturers' commitment to profession, lecturing, student and school are 0.80, 0.79, 0.77 and 0.72 which are ≥ 0.50 threshold values (Kline, 2005). Thus, the result indicates that the four variables have more than half of the variance shared with lecturers' commitment in Nigerian tertiary institution.

The construct reliability approximation for the four underlying variable were found to load above the minimum threshold value of ≥ 0.60 with the estimates of lecturers commitment to profession 0.89, lecturers commitment to lecturing 0.88, lecturers commitment to student 0.86, and lecturers commitment to school 0.85 respectively. In conclusion, the findings presented a significant and reliable measure of convergent validity of lecturers' commitment to academic success of the student. The details are shown in Table 4 below.

Table 4. Parameter Discriminant Validity Estimation

Items	Standardized factor loading			
	Profession	Lecturing	Student	School
1	.83			
2	.88			
3	.82			
4	.70			
5		.73		
6		.96		
7		.85		
8			.82	

9			.87	
10			.77	
11				.85
12				.76
13				.73
AVE	.80	.79	.77	.72
CR	.89	.88	.86	.85

4.1 Evaluation of Model Goodness Fit Indices

The four identified variables of lecturers commitment were found to have adequate goodness-of-fit indices achieved with the threshold suggested by Hair et al. (2006). The model evaluation, estimation criterion employed include CFI = 0.966, TLI = 0.949 and RMSEA = 0.56 with corresponding 95% confidence interval. The chi-square statistics, $\chi^2 = 108.909$, df = 61, p < 0.000, which is statistically significant at 0.05. The analysis of the alternate index of the normed chi-square was established to be ≤ 0.5 threshold with $\chi^2 / \text{df} = 1.785$ as recommended by Schumacker and Lomax (2004). It is concluded that the overall assessment of the criteria for model fit was acceptable for the 13 items lecturers commitment scale using second order confirmatory factor analysis in its validation. Figure 1 below shows the details.

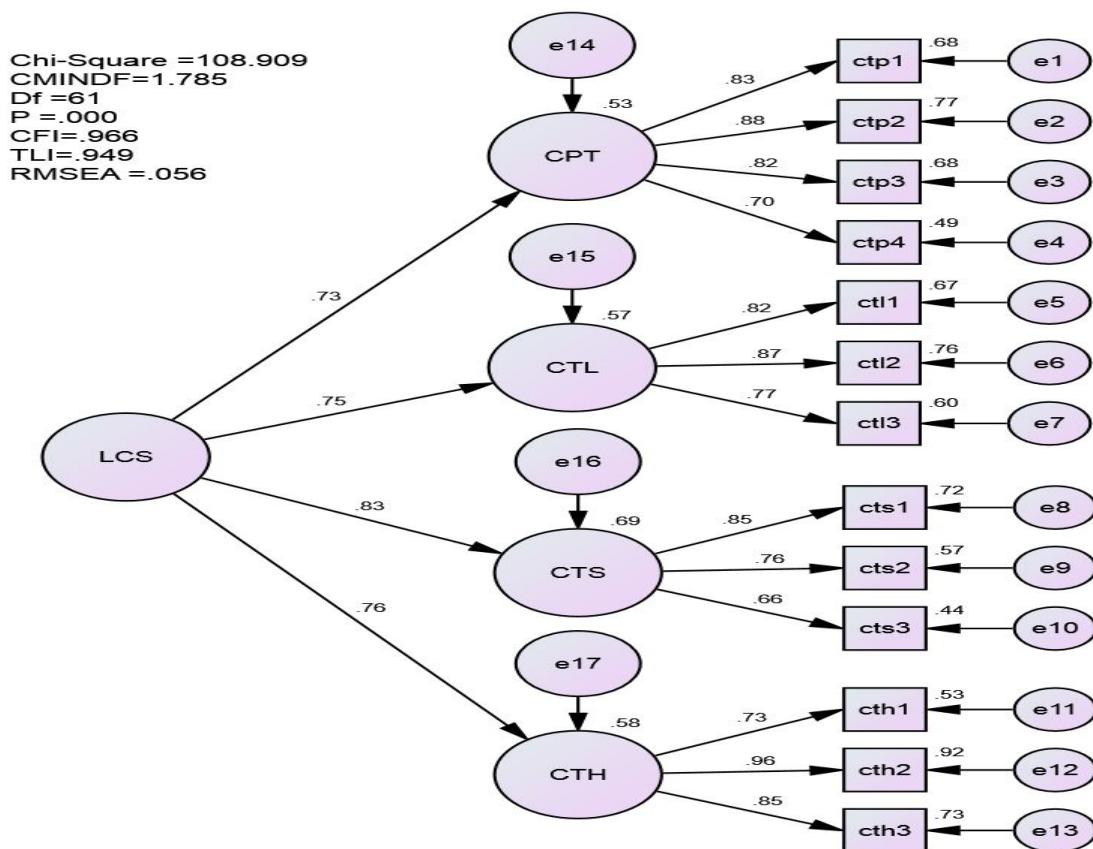


Figure 1: Conceptual Model of the paper

5 Conclusion

The result of this paper is in line with the lecturer's commitment as a multidimensional construct with a commitment to profession, commitment to lecturing, commitment to student and commitment to school. The effective outcome of the multidimensional constructs measures of lecturers' commitment are ensured without poor loading with the use of the rigorous statistical tools in the analysis. The result is integrated with the existing conceptualization of commitment scale by Louis (1998);Raaff (2014) and Jo (2014) in a wide-ranging method that echoed in the underlying construct dimension of the study.

Fascinatingly, the finding reveals consistency of the Nigerian study with Malaysian and the western sample by drawing the integrated conceptualized model of lectures' commitment transformation to the academic success of student on the present empirical paper. The practical implication of this paper is to empirically validate the adapted lecturers commitment items which are likely applicable in the context of Nigerian tertiary institution context. The validated items can further be used as an evaluative measure to assess the level to which lectures' are committed to their profession, covering student, lecturing, and school. Significantly, the identified variables of lecturer commitment would enable the academician and researchers to know the factors that influence the academic success of student and effectiveness of Nigerian tertiary institution.

In addition, the preference of similar questionnaire can be administered to set of samples such as non-academic staff for comparative study between academic' and non-academic staff of the Nigerian tertiary institution. Also suggested is the conduct of the new study with a new group of respondent in cross-validating the items to conclude the best fit to the identified four factor solution. Furthermore, this study validity is limited to convergent and discriminant validity, it can be further diversified to the use of Nomological validity which was suggested by (Yang, Cai, Zhou, and Zhou (2005)). Nomological validity is considered as an incredible measure used in examining the adequacy of the multidimensionality structure of a construct. This type of validity is done by associating the different item scores moderately with the distribution scores on the item scale.

In conclusion, with the acknowledgment of lecturers' commitment as dynamic to student academic success, this paper has progressively adapted and modified in the context of Nigerian lecturers' commitment scale measured with 13 dependable and validated items. The result of the present lecturer commitment scale possible to apprehend the value-added to lecturers' commitment scale as a second order construct with four variable solutions. This paper analysis was explored to achieve a valid second order model with model fit with the data as well as supporting the theoretical expansion of the model. The test of the second order confirmatory factor analysis implies that four variable solutions were the best fit for measuring lecturer commitment scale construct.

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