

Factor Analytic Study of Lecturer's Teaching Assessment Scale in Obafemi Awolowo University, Nigeria

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Abstract

This study presents a validation report of the Lecturer's Teaching Assessment Scale (LTAS) developed for the assessment of lecturer's teaching effectiveness in Obafemi Awolowo University, Ile-Ife, Nigeria. It also examined the factor structure of the LTAS, its construct validity, and internal consistency reliability coefficients. The study adopted the survey research design. A total of 13,000 students that completed the LTAS online constituted the sample for the study. The 34-item LTAS was used to collect data for the study. Collected data were subjected to reliability and factor analyses. Results showed that the LTAS has two subscales - Attitude to Teaching and Lecture Presentation and Organisation. The LTAS was adjudged to possess construct validity, and it was established through experts' judgement. The results also revealed that the LTAS was reliable (Cronbach Alpha reliability coefficient of 0.985, Spearman Brown's Split-half reliability coefficient of 0.998 and Gutman's Split-half coefficient of 0.997). Thus, the LTAS possessed adequate psychometric qualities that make it suitable for use among Nigerian undergraduate students.

Keywords: *scaling; teaching assessment; validation; reliability analysis; lecturer's assessment*

1. Introduction

Over the years, the assessment of academic members of staff during annual review of lecturers in Obafemi Awolowo University, Ile-Ife, Nigeria has been largely subjective as there was no formal, reliable and valid evidence to substantiate the rating of the quality of teaching of academic staff by their respective Heads of Department. The university recently became determined to ensure that lecturers are more committed to working hard than it was in the past, sustain its good rating via webometric ranking among its pairs in Nigeria and on the continent of Africa (Webometric ranking is a site that provides ranking of universities across the world. The site started publishing the ranking of universities in 2004 and the criteria for making the ranking are available on the website at <http://www.webometrics.info/>) and ensure excellence in learning and culture by trying to put into use an evidence-based approach for the assessment of every lecturer at the end of every semester, with a view to ensuring that lecturers strive to deliver their instructions with all the seriousness and innovations capable of enhancing learning positively.

It was in the light of the foregoing that the Lecturers Teaching Assessment Scale (LTAS) was introduced to students for the assessment of the quality of teaching of academic members of staff in Obafemi Awolowo University, Ile-Ife, Nigeria. The LTAS is due for completion online (via the university's electronic portal) at the end of lecture periods of every semester by students who might have finished at least the first semester of 200 level (i.e. first semester of Part Two). This decision was exemplified by the fact that Lecturers themselves (having the premonition that their activities will be subjected to this type of assessment at the end of the semester) will be motivated to do better in the discharge of their teaching duties, and this will impact positively on students' learning because research findings have demonstrated that effective teaching leads to good academic performance in courses (Abdulkadir, 2006).

The need for this type of assessment may be rooted in McGregor's theory X and theory Y as well as Herzberg's Hygiene and Motivational Factors Theory (Vroom and Deci, 1970 cited from Opu, 2008). McGregor's theory

explains people's perceptions of employee work behaviour. Theory X views an average worker as indolent, someone who would always want to seize the opportunity to derelict whenever there is the chance. Thus, they should be forced to work. Theory Y however views an average employee as being rational, someone that does not need to be coerced before doing his/her job. The belief of those that embrace theory X could have influenced the university management to adopt the LTAS. May be, at one point or the other, it was noticed that some members are not performing their teaching duties as expected.

Herzberg's hygiene and motivational theory on the other hand divides the employees job environment into two, namely the dissatisfiers and the motivators. Dissatisfiers include working conditions, company policies and administrative practices, salary and benefits, supervision, status, job security co-workers and personal life while the motivators include factors such as recognition, achievement, advancement, growth, responsibility and job challenge. One set of needs is associated with what a person does while the other is concerned with the situation in which it is done. The motivators are the factors that spur an employee to work effectively, bearing in mind that there is a link between the work done and the rewards that will accrue through the dissatisfiers.

The two theories (i.e. McGregor's theory X and theory Y as well as Herzberg's hygiene and motivational theory) become relevant to the situation in Obafemi Awolowo University because in every workplace, two shades of workers are most likely to be hired – the very committed and hardworking members of staff as well as the indolent and lazy type. Although, authors have no statistic of who has been committed and who has not been, but the believe is that a number of hired staff in the university have not been committed enough. This, coupled with the need for defensible proof in the assessment of lecturers' teaching assessment prompted the university to commence the online assessment of lecturers teaching effectiveness.

A key problem is that current measures for assessing academics for promotion in most Nigerian Universities are not often linked to their capacity to teach effectively. Existing Federal University policies for measuring teacher effectiveness either rely almost exclusively on perception by heads of departments, or focus on teachers' course-taking records and on paper-and-pencil tests of basic academic skills and subject matter knowledge. Also, criteria for assessing academics for promotion in most Nigerian universities include qualifications, publications and community service at the local, national or international levels, all these, research as exemplified by research, are poor predictors of teaching effectiveness (Adomi and Mordi, 2003; Faleye and Awopeju, 2012).

The LTAS is a 34-item scale containing five sub-scales. These are Lecturer's Attitude to Teaching, Organisation and Presentation, Verbal and Non-Verbal Communication, Teacher-Student Relationship and Feedback. The LTAS has not been previously validated. It is however important that any measurement instrument undergoes normal psychometric scrutiny before subjecting it to public use (DeVellis, 2012). The same justification was advanced by Faleye and Awopeju (2012) concerning the Students' Evaluations of Teaching Effectiveness Rating Scale (SETERS), which was said to be useful in assessing teaching effectiveness in Western Countries. However, its suitability for use in Nigeria has not been established. Even though, there is still a dearth of comparable validated instruments for assessing the effectiveness of lecturers' teaching (such as the LTAS) using Nigerian samples, research and theory have shown that teaching assessment, as measured by students' rating of teaching, is multidimensional in nature. Hence, the conflicting factor structure of student evaluation of teaching as experienced in the validation of SETERS (Faleye and Awopeju, 2012), where different psychometric characteristics were obtained between the original version published by Tonad, and DeAyala (2005) and that by Faleye and Awopeju (2012) as well as the call for further validation efforts geared towards the improvement of the quality of SETERS also explain the need for this study.

Finally, the LTAS has not been previously validated. The university only relied on expert's judgement of the appropriateness of the instrument, the relevance of individual items on the LTAS as well as its ease of use by the students. There is therefore the need for a scientific investigation of the psychometric qualities of the instrument, hence this study.

The LTAS took its root from SETERS (Faleye and Awopeju, 2012) which had many of its items adopted from SETERS developed in the United State of America (Tonad, and DeAyala, 2005), a culture and environment different from Nigeria's; there is therefore the need for cross-cultural validation of SETERS. As recommended by many authors that scales be cross-validated before use once such scales are to be used in different cultures and national boundaries (Tschannen-Moran, Woolfolk-Hoy & Hoy, 1998; Brouwers, 2003 and DeVellis, 2012). Moreover, previous researchers, Toland and De Ayala (2005) saw a need for additional empirical research on the SETERS before widespread use, ditto for the LTAS.

In validating instruments, emphasis is placed on the degree to which the instrument is adjudged to be valid, reliable

and usable with minimal fear of committing generalization error Devellis (2012). The normal thing to do is to construct more items than the actual number needed for the actual measurement of the variable of interest. This is to ensure that there will be enough left for respondents to attempt, which will adequately elicit sufficient information required to properly (or reliably/validly) understand the variable of investigation (Nunnally and Bernstein, 1994).

Arising from the foregoing, one may wish to ask some pertinent questions such as

- i. how reliable is LTAS?
- ii. are the items of LTAS significant in measuring teaching effectiveness?
- iii. Could the LTAS assess lecturers effectively?

The specific objectives of this study were to

- i. examine the factor structure of LTAS;
- ii. investigate the construct validity of LTAS;
- iii. determine the internal consistency reliability coefficients of LTAS;

In order to be able to carry out this study effectively, the following research questions were raised:

- i. What is the factor structure of LTAS?
- ii. Does the LTAS possess construct validity?
- iii. What is the coefficient of LTAS' internal consistency reliability?

2. Methods

This study adopted the survey design. The population of this study comprised all undergraduate students of Obafemi Awolowo University, Ile-Ife, Nigeria. The university has a total of 13 faculties with a population of about 26,000 students. A sample of 13,000 was drawn purposively comprising 1000 students from each of the 13 faculties. The selected sample was made of 5,904 males and 7,096 female students with an average age of 19.6 years. The 13,000 selected were those that responded to all the 34 items on the LTAS. The LTAS is to be completed (by every student) for each lecturer that participated in the teaching of each of their courses of study. This means that each student may have to complete the form many times depending on the number of courses taken by each student as well as the number of lecturers that taught each of such courses. Thus, for the purpose of validation, only 1000 of responses to the LTAS from each of the 13 faculties were included in this study. The students were undergraduate students of the university and the sample is inclusive of a mix of students across the 82 departments in the university. The students are those in second to the fifth year of their programme, depending on duration of programme. The items on LTAS are positively stated and there is no need for reversal of scores for any item. The response format for the LTAS is the Likert type comprising of Always, Sometimes, Rarely and Never; and the scoring relating to each of the four response options are 4, 3, 2 and 1 respectively. Data collected were analysed using factor and reliability analyses.

3. Results

The results of the student's responses to the items of LTAS were subjected to factor and reliability analyses. The collected data were subjected to Principal Component Analysis (initial rotation). Furthermore, the construct validity of the LTAS was determined by three other experts in the of Tests and Measurement for appropriateness of items in terms of wordings, length and relevants of the items contained in the LTAS. Furtherstill, the data was also subjected to reliability analysis; specifically the internal consistency reliabilities of Cronbach's Alpha and Split-half types were investigated.

3.1 Research Question 1: What Is the Factor Structure of LTAS?

The data obtained from students' response to the LTAS were subjected to factor analysis. The maximum likelihood estimate with varimax rotation was employed to understand the factor structure of the LTAS. However, the KMO and Bartlett's test of sampling adequacy and sphericity of data produced the results in Table 1

Table 1. KMO and Bartlett's Test Results for Suitability of LTAS Data for factor Analysis

- Kaiser Meyer-Olkin Measure of Sampling Adequacy.		0.931
Bartlett's Test of Sphericity	Approx. Chi-Square	2.338E4
	Df	561
	Sig.	.000

The results in Table 1 showed that the LTAS elicited a set of data that produced a very high KMO value of 0.93 as well as a Chi-square value of 2.34, which was significant at 0.05 level. Thus, from these values, the data elicited by the LTAS were suitable for factor analysis.

The underlisted item means and standard deviations were obtained from the administration of the LTAS on the undergraduate students of OAU and are as presented in Table 2.

Table 2. Item Means and Standard Deviation of Students' Responses to LTAS(to be continued)

Item No.	Item	Mean	Std. Deviation
Item1	The lecturer teaches for the number of hours required for teaching the course per week e.g. 3 hours for a 3-unit course; 2 hours for a 2-unit course	3.7094	.73502
Item2	He/She comes for lectures punctually	3.7434	.69781
Item3	He/She teaches for the whole length of the period	3.7396	.68820
Item4	He/She shows evidence of adequate preparation by logically presenting subject matter	3.6679	.70919
Item5	He/She provides lecture notes and/or refers students to available texts and other sources of information	3.6566	.76809
Item6	He/She introduces the lecture in an interesting way	3.7019	.74734
Item7	He/She provides useful presentation indicators e. g. gives outlines, states objectives, reviews main points	3.6906	.78002
Item8	He/She uses relevant and practical exercises to clarify ideas and make the lesson interesting	3.6415	.87677
Item9	He/She presents challenging and thought-provoking ideas to stimulate reflective and critical thinking	3.6528	.90466
Item10	He/She relates subject matter to current events and students' interests	3.6264	.98091
Item11	He/She welcomes and encourages ideas, comments, questions and students' active participation	3.7019	.96029
Item12	He/She uses a variety of activities, methods, techniques, media and teaching aids to complement teaching	3.6189	1.06690
Item13	He/She encourages and supervises interactive activities such as small group discussions, student presentations and solving problems in groups	3.5585	1.16668
Item14	He/She encourages students to answer questions e. g. waits for answer, rephrases questions	3.6453	1.19762
Item15	He/She uses illustrations, graphs, diagrams and other relevant instructional resources such as films, tapes, maps, slides to complement teaching	3.3623	1.50406
Item16	He/She presents technical and difficult concepts slowly, in simple everyday English	3.6038	1.38087
Item17	He/She writes key terms on the board or uses multimedia projector	3.5547	1.51189
Item18	He/She ensures understanding of a concept before proceeding to another	3.6226	1.51541
Item19	He/She delivers the lecture without excessive reliance on reading lecture notes	3.6491	1.58157
Item20	He/She answers questions asked by students satisfactorily	3.6981	1.63514
Item21	He/She is mindful of his/her speed when delivering the lecture	3.6981	1.70544

Table 2. (Continued)

Item No.	Item	Mean	Std. Deviation
Item22	He/She speaks loudly and clearly	3.7057	1.79334
Item23	He/She speaks fluently without distracting verbal and/or non-verbal mannerisms	3.8000	1.83237
Item24	He/She focuses on the students and maintains eye contact with them during the lecture	3.8377	1.90098
Item25	He/She commands respect and treats students with respect	3.8226	1.99304
Item26	He/She is ready to help students when faced with learning difficulties in and out of the lecture room	3.7887	2.08727
Item27	He/She is approachable and shows interest in his/her students' progress	3.7925	2.16514
Item28	He/She maintains discipline in and out of the lecture room	3.8075	2.25394
Item29	He/She ensures that students attend lectures regularly by taking weighted attendance	3.7698	2.37487
Item30	He/She conducts and/or gives assignments	3.7208	2.47513
Item31	He/She asks questions in line with course objectives	3.8566	2.48522
Item32	He/She evaluates students fairly e. g. assigns appropriate percentages for continuous assessment and examination	3.7547	2.60176
Item33	He/She grades and returns tests and assignments in time	3.6264	2.74139
Item34	He/She encourages students to give feedback in the course of the lecture	3.8302	2.74508

A look at the mean values of the 34-item LTAS showed a consistently high mean item value for each of the 34 items. Bearing in mind that the range of value of the response options on LTAS is between four (i.e. highest) and one (lowest). The pattern of students' responses appears to be tilted towards the affirmative of the positive statements contained in the LTAS. The highest item mean is 3.86 while the lowest is 3.36 and the values of standard deviation for every response to the items on the scale ranges between 0.74 and 2.75. The distribution of students' responses to the LTAS reflects a generally high rating of most lecturers by students. Again, from the raw data, students appeared not different in their rating of their Lecturers on the various dimensions of the scale.

The data from the LTAS was subjected to principal component analysis and the result is a two-factor model as presented in Table 3.

Table 3. Factor Structure of the LTAS(to be continued)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	25.033	73.626	73.626	25.033	73.626	73.626
2	5.445	16.014	89.640	5.445	16.014	89.640
3	.641	1.885	91.525			
4	.454	1.335	92.860			
5	.335	.986	93.847			
6	.264	.776	94.622			
7	.216	.637	95.259			
8	.205	.604	95.863			
9	.174	.511	96.374			
10	.162	.477	96.850			
11	.135	.398	97.248			
12	.131	.384	97.632			

Table 3. (Continued)

13	.119	.350	97.982
14	.096	.283	98.265
15	.082	.241	98.506
16	.074	.218	98.724
17	.066	.193	98.917
18	.062	.181	99.098
19	.048	.140	99.239
20	.041	.122	99.360
21	.035	.104	99.464
22	.031	.091	99.555
23	.026	.078	99.633
24	.024	.069	99.702
26	.019	.055	99.816
27	.013	.038	99.855
28	.012	.036	99.890
29	.010	.028	99.919
30	.009	.025	99.944
31	.007	.021	99.965
32	.006	.016	99.982
33	.004	.013	99.994
34	.002	.006	100.000

Extraction Method: Principal Component Analysis.

The suggested number of factors on the LTAS is two. These two factors (with eigenvalues greater than one) account for 89.64 of the total scale variance. This two-factor model is further supported by a chi-square value of 4751.84 (df =494, p<0.05), indicating that the two-factor model is fit for the actual assessment of lecturers. The resulting scree plot also exemplified the two-factor model produced by the principal component analysis. This is as presented in Figure 1.

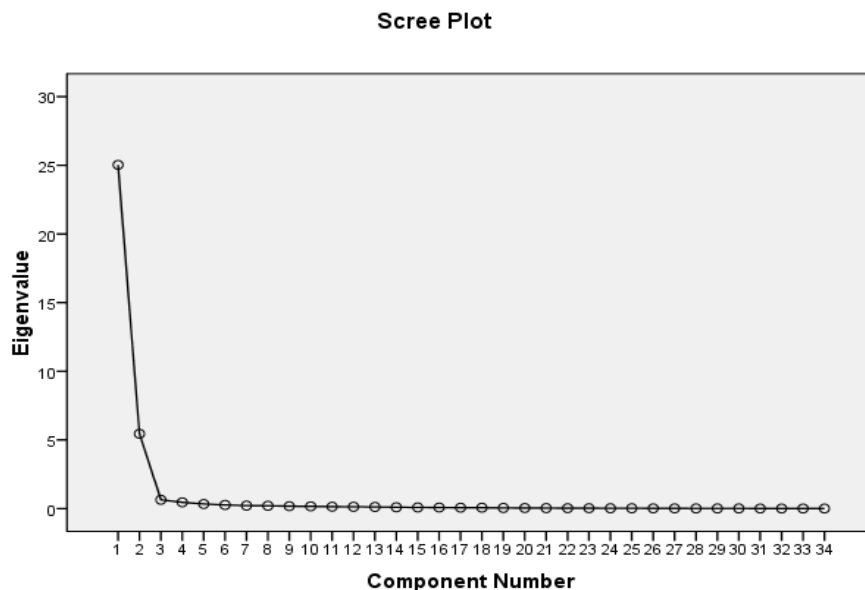


Figure 1. Scree Plot Showing the Number of Factors on the LTAS

The axis of the component path in Figure 1 shows that there are two factors located before the elbow of the axis. This means there are two factors on the scale. However, the initial classification of the dimensions of the LTAS, which was five will now give way for only two factors, they are (i) Attitude to Teaching and (ii) Lecture Presentation and Organisation. The factor loadings for each item is as presented in Table 4.

Table 4. Item Loadings on the Two Factors

	Component	
	1	2
Item1		.916
Item2		.897
Item3		.829
Item4		.771
Item5		.672
Item6	.684	
Item7	.753	
Item8	.786	
Item9	.844	
Item10	.848	
Item11	.917	
Item12	.922	
Item13	.927	
Item14	.949	
Item15	.860	
Item16	.945	
Item17	.931	
Item18	.963	
Item19	.950	
Item20	.963	
Item21	.969	
Item22	.956	
Item23	.956	
Item24	.949	
Item25	.946	
Item26	.949	
Item27	.952	
Item28	.942	
Item29	.931	
Item30	.918	
Item31	.936	
Item32	.932	
Item33	.924	
Item34	.929	

The loadings of the items showed that only the first five items loaded on Factor 2, which is Attitude to Teaching; while the remaining 29 items loaded on Lecture Presentation and Organisation.

Table 5 presents the values of communalities for each of the items on the LTAS. The results is presented below.

Table 5. Community Values of Items on the LTAS

	Initial	Extraction
Item1	1.000	.864
Item2	1.000	.875
Item3	1.000	.828
Item4	1.000	.852
Item5	1.000	.768
Item6	1.000	.852
Item7	1.000	.816
Item8	1.000	.788
Item9	1.000	.836
Item10	1.000	.800
Item11	1.000	.884
Item12	1.000	.870
Item13	1.000	.874
Item14	1.000	.903
Item15	1.000	.743
Item16	1.000	.894
Item17	1.000	.867
Item18	1.000	.931
Item19	1.000	.914
Item20	1.000	.942
Item21	1.000	.958
Item22	1.000	.939
Item23	1.000	.955
Item24	1.000	.955
Item25	1.000	.956
Item26	1.000	.959
Item27	1.000	.970
Item28	1.000	.961
Item29	1.000	.946
Item30	1.000	.931
Item31	1.000	.964
Item32	1.000	.966
Item33	1.000	.951
Item34	1.000	.966

The process of item reduction is done using the values of communality of each of the item. This item retention rule is usually hinged on the elimination of items with communality values of less than 0.5 from scales since the researcher's interest is to obtain values that will be close to one. Looking at Table 5, majority of the communality values are close to one, meaning that they adequately account for the variation that exist in the two-factor model that resulted from the factor analysis of the LTAS. Thus, in its present state, no item appeared inadequate for retention on the scale.

3.2 Research Question 2: Does the LTAS Possess Construct Validity?

Construct validity of instruments could be estimated using either of or all of correlation with another instrument measuring a similar variable (Westen and Rosenthal, 2003) relate with an expert to help in judging the extent to which the items on the instrument possesses construct validity. This statement is further supported by the submission of Brown (2000) as quoted below:

“To demonstrate content validity, testers investigate the degree to which a test is a representative sample of the content of whatever objectives or specifications the test was originally designed to measure. To investigate the degree of match, test developers often enlist well-trained colleagues to make judgments about the degree to which the test items matched the test objectives or specifications (p.8).

Thus, the LTAS was reviewed by three other experts in the field of Tests and Measurement. The three hold doctoral

degree in the field. They were given the first draft of the instrument containing 40 items. The 40 item version was then examined for content relevance, appropriateness of wordings, freedom from ambiguity and multiple interpretations, item length e.t.c. Their examination led to the removal of six items from the 40 items contained in the LTAS, leaving the instrument with 34 items that were adjudged relevant and suitable for the assessment of lecturers.

3.3 Research Question 3: What Is the Coefficient of LTAS' Internal Consistency Reliability?

The LTAS was also subjected to internal consistency reliability analysis. Specifically, the Cronbach's alpha coefficient reliability as well as the split-half reliability analyses were investigated. Results showed that the LTAS had a Cronbach Alpha reliability coefficient of 0.985, Spearman Brown's Split-half reliability coefficient of 0.998 and Gutman's Split-half coefficient of 0.997. All these coefficients are very high and are pointers to the fact that the LTAS is a reliable instrument.

When the item-total Statistics of the LTAS was considered using the (SPSS), it was found that all the items on the LTAS are reliable enough and none deserved to be eliminated. The results is as presented in Table 8.

Table 8. Item-Total Statistics of the LTAS

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item1	121.9472	2183.618	.088	.	.986
Item2	121.9132	2177.019	.195	.	.986
Item3	121.9170	2170.001	.307	.	.986
Item4	121.9887	2160.526	.442	.	.986
Item5	122.0000	2153.523	.506	.	.986
Item6	121.9547	2146.240	.627	.	.985
Item7	121.9660	2139.048	.700	.	.985
Item8	122.0151	2129.674	.738	.	.985
Item9	122.0038	2122.473	.803	.	.985
Item10	122.0302	2116.128	.810	.	.985
Item11	121.9547	2110.680	.891	.	.985
Item12	122.0377	2101.097	.899	.	.985
Item13	122.0981	2091.869	.909	.	.985
Item14	122.0113	2086.496	.935	.	.984
Item15	122.2943	2072.655	.842	.	.985
Item16	122.0528	2070.437	.938	.	.984
Item17	122.1019	2060.918	.925	.	.984
Item18	122.0340	2056.041	.959	.	.984
Item19	122.0075	2051.288	.952	.	.984
Item20	121.9585	2044.373	.968	.	.984
Item21	121.9585	2037.366	.974	.	.984
Item22	121.9509	2031.304	.963	.	.984
Item23	121.8566	2027.214	.967	.	.984
Item24	121.8189	2021.982	.963	.	.984
Item25	121.8340	2014.533	.960	.	.984
Item26	121.8679	2005.835	.963	.	.984
Item27	121.8642	1998.391	.967	.	.984
Item28	121.8491	1992.583	.957	.	.984
Item29	121.8868	1984.010	.948	.	.984
Item30	121.9358	1978.598	.933	.	.984
Item31	121.8000	1973.661	.953	.	.984
Item32	121.9019	1964.362	.950	.	.984
Item33	122.0302	1954.840	.940	.	.985
Item34	121.8264	1953.296	.945	.	.985

The value of the scale's 'Cronbach's Alpha If Item Deleted' falls between 0.984 and 0.986 for all the items on the

LTAS. This means that no major increase in Cronbach's alpha reliability coefficient will be achieved for the scale upon the removal of the items on the instrument.

4. Discussion

The results obtained showed that most lecturers enjoyed positive (and high) rating by students. This could be as a result of the awareness of academic members of staff across all the teaching units in the university that their teaching duty will be assessed by the students at the end of the semester. Not only this, the results of students' assessment of every lecturer will also be incorporated into the process of review for promotion of the lecturer(s) concerned. These are enough factors to spur lecturers to teaching well. The finding is in line with the submission of Wood (2000), that when employees are motivated to achieve a target, the reward that follows such an achievement motivates the employee to work hard. This is also in line with McGregor's theory X, as well as Herzberg's hygiene and motivation theory. It is a matter of common knowledge that commitment to duty has greatly improved since the introduction of the LTAS. The outcome of this study is also in line with the conclusion of Faleye and Awopeju (2012), when they investigated the psychometric characteristics of SETERS, and they concluded that the instrument possessed appropriate psychometric characteristics that made its use appropriate on Nigerian sample.

5. Conclusion

The 34-item LTAS in its current format has acceptable psychometric features and thus, it could adequately measure the quality of lecturer's teaching.

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