An Evaluation of Science Lecturers' Testing Skills in Tertiary Institutions in Nigeria: A Case Study of Kogi State University, Anyigba

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ABSTRACT

The purpose of this study is to evaluate how science lecturers in tertiary institutions apply testing skills in their testing and examinations. The study was an ex-post factor research design. The identified testing skills used in this study are; test planning, preparation, administration, item analysis, scoring and interpretation of test result. A sample of 80 science lecturers out of a 198 population of lecturers was selected using simple random method. A 42 Items – option like type questionnaire was used for data collection, with a reliability of 0.76. The three hypotheses formulated to guide the study were tested using population t-test, and one – way ANOVA at 0.05 level of significant. The hypotheses are; the application of testing skills among science lecturers in Kogi State University is not significantly high; there is no significant influence of lecturers' qualification and lecturers' teaching experience on the application of testing skills. The result obtained among others was that on the overall, there is a significant influence of lecturers' qualification on the application of testing skills used in this study. But that lecturer' teaching experience does not significantly influence application of testing skills. It was recommended that science lecturers should attend seminars on acquisition of testing skills by expert in educational measurement and evaluation, to improve the quality of results and graduated students from sciences, which will improve the development of science and technology among our youths.

Keywords: Analysis, Testing, Skills, Construction and Assessment

Introduction:

In teaching - learning process, testing is an integral part that cannot be relegated to the background, otherwise the process of acquisition of knowledge and the quantification of how much we know of what we claim to know cannot be verified. Because of this important part testing plays in claims or counter claims to knowledge, the level of knowledge acquisition need to be evaluated and assess with the instrument of testing. When its principles are applied properly by lecturers during continuous assessment within the semesters and examinations for the four or seven years duration in the University, the final result of graduation suppose to commensurate with the performance of students within the periods.

Putting the position of teachers (lecturers) both in the classroom and in the public, it can be concluded that teachers have enormous task of reporting to students, parents and the society what is going on in the university system, particularly how they have carried their responsibility. The teachers are expected to pass Educational tests and measurement courses as a prerequisite for graduation from teacher – training institutions of higher learning but surprising most lecturers that find their way into the classroom did not pass through the rudiment of testing, measurement and evaluation courses during schooling. They find it difficult to apply the required skills for testing and examination in practice. Mostly importantly, teachers' test result can be use for variety of purposes which include placement, formative evaluation, diagnostic evaluation, and summative evaluation, in addition to instructions; test can equally serve other purposes such as classification, guidance and counseling, administrative purposes, prediction and research (Ground, 1985; Denga, 1987).

Readings from Joshua (2005) and Aiken (1988), testing skills include planning, preparation, and item analysis, administrating, scoring and interpreting. It is the proper application of these identified skills in test making and examinations that test result can be valid, reliable and useful. Each component of testing skills is important, since test result provide the ground for assessing the individual abilities of each learner and for making pronouncement with regards to his achievement in the domain tested.

In relation to this study are; Ikebude (1987) who conducted a study and he discovered that students' performance in the science subjects in general and physics in particular is lower compared to arts and social science subjects. He concluded that this poor performance is due to the fact that arts and social science teachers are better trained in the method of teaching than their science counterparts. He was of the opinion that most of the arts and social science teachers have educational background with the fundamental skills of test and measurement, most science teachers find their ways into the classroom from science colleges and science department in universities with no knowledge of the fundamentals of educational measurement. His position therefore is that arts and social science teachers have knowledge of and apply testing skills more than what science teachers do.

In a study conducted by Ali (2014), she discovered that there is a significant influence of senior secondary schools teachers' qualification on the application of testing skills in Okene Local Government area of Kogi State in favour of highly qualified teachers within the area of study. In other words, the highly qualified teachers takes their time to properly apply the required testing skills in there tests and examinations.

In a similar study conducted by Garfort (1992), she submitted that the fall in students' performance in chemistry would reach a dramatic maximum if nothing was done with regards to the employment of qualified teachers. Thus, she attributed the failure or poor performance in chemistry to the main fact that there is lack of qualified teachers in addition to other secondary reasons. One may conclude that teachers' inability to test students appropriately with the view of using the result for effective instruction was lack of qualification.

Furthermore, Glass (2002) carried out summary of literature review on teachers characteristics, and it was reveal that there is an important correlation between teachers' measured intelligence and their students' achievement. However he maintained that there is a modest relationship between teachers' college course work in subject they latter teach and their students' achievement.

In a situation where students who were suppose to could have accumulated grade points before graduation as having being well tested/examined for four or seven years end up failing out, having carry over courses or spill over's or still graduating with passed degrees, then method of testing for assessment by Science Lecturers need to be evaluated. Therefore this study seek to find out how lecturers in sciences apply the skills of test planning, preparation, items analysis, administration, scoring and interpretation in tertiary institutions using Kogi State University, Anyigba, Kogi - Nigeria.

Purpose of the study

The purpose of this study is to evaluate how science lecturers in tertiary institutions apply test skills in their testing and examinations. And to determine how lecturers' teaching experience and qualifications influences the application of test skills in testing and examinations.

Research questions

1. To what extent are the lecturers in sciences applying testing skills in their testing and examination.
2. How does science lecturers teaching experiences influence application of testing skills?
3. Is there any significant influence of science lecturers' qualification on the application of testing skills?

Hypotheses

The following hypotheses were formulated to guide the study

1. The application of testing skills among science lecturers in Kogi State University is not significantly high.
2. Science lecturers' teaching experiences do not influence the application of testing skills.
3. There is no significant influence of lecturers' qualification on the application of testing by science lecturers.

Methodology

Research design
The main purpose of this study is to assess how science lecturers in tertiary institutions apply testing skills in their interaction with their students. Therefore research hypothesis were formulated in a manner to seek to determine the implied relationship between the subscales variables. The study was therefore an ex-post factor research design. Since the researcher did not have a direct control of the independent variable.

Area of study
The study area is Kogi State University, Anyigba – Nigeria. It is located in eastern senatorial district of the state. The state is located in central senatorial district of Nigeria. It is easily accessible by road from any part of the country (Nigeria), water (through Lokoja) and air (via Abuja). Kogi State University is one of the young generation Universities in Nigeria, established in November, 1999 and commenced academic activities in April 2000 (KSU Academic Brief: 2010).
Population of the study: The population of this study as at 2013/2014 session was 198 lecturers; Deans' record (2014).
Sampling and sampling technique: The identified testing skills used in this study are; test planning, preparation, administration, item analysis, scoring and interpretation of test result. A sample of 80 science lecturers out of a 198 population of lecturers was selected using stratified and simple random methods.

Reliability: A 42 Item 4 – option Likert type questionnaire constructed by the author was used for data collection The reliability of the instrument for data collection was established using splint half reliability and the coefficient of correlation was 0.76.
Method of data analysis: Three hypotheses were formulated to guide the study and were tested using population t –test and one – way ANOVA at 0.05 level of significant.

Analysis of data

The following were the analysis of the data, hypothesis by hypothesis
Hypothesis one: The application of testing skills among science lecturers in Kogi State University is not significantly high.
This hypothesis was tested using population t – test and the analysis is reflected on table 1 below

Table 1: Population t- test for science lecturers testing skills

S/N	Variables	$\bar{X}$	SD	t - value	Df	Sig
1.	Test planning	22.000	2.615	75.263*	79	0.000
2.	Test preparation	21.950	2.942	66.731*	79	0.000
3.	Test administration	23.700	2.730	77.647*	79	0.000
4.	Test scoring	19.925	2.805	63.536*	79	0.000
5.	Test interpretations	19.975	4.115	43.414*	79	0.000
6.	Test item analysis	19.850	4.010	44.277*	79	0.000
7.	Overall testing skills	21.167	3.203	54.555*	79	0.000

*p<0.05, critical t = 0.99, N = 80

Looking critically at the mean, only test planning, preparation and administration tends to be significant with narrow mean difference from the overall mean of 21.167, while with t –test, four testing skills (test planning, preparation, administration and scoring skills) were significant, since there t – values were above the overall t – values but using the t – values and comparing with the critical t - values, we could deduced that on the overall science lecturers application of testing skills is significant.

Hypothesis two: Science lecturers' teaching experiences do not influence the application of testing skills. This hypothesis was analyzed on each component of testing skills and on the overall using one way – ANOVA

Table 2: One – way analysis of lecturers' teaching experience on test planning skill

Group: Years of teaching Experience	**N**	$\bar{X}$	**SD**	
1 - 5yrs	29	22.17	2.60	
6 - 10yrs	21	22.90	2.15	
11 – 15yrs	12	19.08	2.86	
16 – Above yrs	18	21.67	1.86	
Source of variation	SS	Df	MS	F-ratio
Between groups	49.849	3	16.61	2.548
Within groups	489.138	76	5.522	
Total	**538.987**	**79**		

P>0.05, Critical $F_{3, 76} = 2.73$

The computed F- ratio (2.548) is less than the critical table value of 2.73, we are to accept the null hypothesis of no significant influence, which is an indication that lecturers teaching experience do not influence the application of test planning skill. In other words good planning of test for test takers does not depend on teaching experience. This is further supported by the insignificant variation in their means.

Table 3: One – way analysis of lecturers teaching experience on test preparation skill

Group: Years of teaching experience	**N**	$\bar{X}$	**SD**	
1 -5yrs	29	22.41	2.60	
6 -10yrs	21	21.67	2.15	
11 – 15yrs	12	23.00	2.86	
16 – Above yrs	18	21.67	1.86	
Source of variation	SS	Df	MS	F-ratio
Between groups	69.784	3	23.261	3.017*
Within groups	578.166	76	7.709	
Total	**647.949**	**99**		

*P< 0.05, Critical $F_{3,76} = 2.73$

From table 3, the computed F – ratio of 3.017 is greater than the F - critical value of 2.73, leading to the rejection of the hypothesis of no significant influence of lecturers' teaching experience on the application of test preparation skill. Therefore good test preparation for test takers is a question of teaching experience. The experience lecturers took their time in preparation of instrument for test than the inexperience lecturers.

Table 4: One – way analysis of lecturers teaching experience on test administration skill

Group: Years of teaching experience	**N**	$\bar{X}$	**SD**	
1 -5yrs	29	23.45	2.60	
6 -10yrs	21	24.71	2.15	
11 – 15yrs	12	21.67	2.86	
16 – Above yrs	18	24.00	1.86	
Source of variation	SS	Df	MS	F-ratio
Between groups	95.512	3	31.837	4.951*
Within groups	482.260	76	6.430	
Total	**577.77**	**79**		

*P< 0.05, Critical $F_{3,76} = 2.73$

On the application of test administration, the null hypothesis was not to be rejected since the computed value of F (4.951) is greater than the critical value of F (2.73). This means teaching experience impact significantly on application of test administration skill. From experience, the highly experienced lecturers knows when, where and how to administer test on the various groups of students for proper coordination.

Table 5: One – way analysis of lecturers teaching experience on test scoring skill

Group: Years of teaching experience	**N**	$\bar{X}$	**SD**	
1 -5yrs	29	17.41	2.10	
6 -10yrs	21	20.90	2.55	
11 – 15yrs	12	20.75	2.56	
16 – Above yrs	18	20.44	1.90	
Source of variation	SS	Df	MS	F-ratio
Between groups	92.386	3	30.794	4.396*
Within groups	525.317	76	7.006	
Total	**617.787**	**79**		

*P< 0.05, Critical $F_{3,76} = 2.73$

The computed value of F- ratio as reflected on table 5 is 4.396, while the table value of is 2.73, here again we are to reject the null hypothesis of no significant influence of lecturers experience on application of test scoring skill. That is to say that proper scoring of test takers to each items on the test depend the teaching experience of the individual lecturers. Careful grading of scores with equivalent marking scheme depends on the experience of lecturers. In other words the inexperienced lecturers grade test responses without carefulness, which is anyhow.

Table 6: One – way analysis of lecturers teaching experience on test interpretation skill

Group: Years of teaching experience	**N**	$\bar{X}$	**SD**	
1 -5yrs	29	19.55	2.60	
6 -10yrs	21	18.86	2.53	
11 – 15yrs	12	17.50	2.29	
16 – Above yrs	18	19.61	2.86	
Source of variation	SS	Df	MS	F-ratio
Between groups	25.668	3	25.348	1.511
Within groups	1312.282	76	16.773	
Total		**79**		

P > 0.05, Critical $F_{3,76} = 2.73$

As presented on table 6, there is no significant influence of teaching experience on the application of the skill of test interpretation among lecturers in the university used for this study. The calculated F – value of 1.511 was obtained compared to the critical F – value of 2.73. From this result, the null hypothesis that teaching experience of science lecturers does not significantly influence the application of test interpretation skill is not to be rejected. The implication of this is that for lecturers in Kogi State University to apply the skill of test interpretation, it is not determined significantly by their years of experience in lecturing job.

Table 7: One – way analysis of lecturers teaching experience on test analysis skill

Group: Years of teaching experience	**N**	$\bar{X}$	**SD**	
1 -5yrs	29	19.83	2.21	
6 -10yrs	21	18.90	2.55	
11 – 15yrs	12	19.00	2.83	
16 – Above yrs	18	17.50	2.23	
Source of variation	SS	Df	MS	F-ratio
Between groups	43.408	3	3.934	0.235
Within groups	1226.792	76	16.769	
Total	**1270.200**	**79**		

$P< 0.05$, Critical $F_{3,76} = 2.73$

Table 7 also indicated that there is no significant influence of lecturers' teaching experience on the application of test analysis skill. For analysis of students' performance in testing or examination, the attitudes of the lecturers are the same, no matter their years of experiences.

Table 8: One – way analysis of lecturers teaching experience on the overall influence of test skills

Group: Years of teaching experience	**N**	$\bar{X}$	**SD**	
1 -5yrs	29	20.80	2.80	
6 -10yrs	21	21.33	2.65	
11 – 15yrs	12	20.17	2.46	
16 – Above yrs	18	20.82	2.86	
Source of variation	SS	Df	MS	F-ratio
Between groups	43.408	3	21.965	2.153
Within groups	1226.792	76	10.202	
Total	**1270.200**	**79**		

$P>0.05$, Critical $F_{3,76} = 2.73$

On the overall there is no significant influence of teaching experience of lecturers on application of overall testing skills. The manner in which the lecturers are applying testing skills does not depend on their teaching experiences.

Hypothesis 3: there is no significant influence of lecturers' qualification on the application of each of the component of testing skill.

Table 9: One – way analysis of lecturers' qualification on test planning skill

Group: Qualification	**N**	$\bar{X}$	**SD**
1st degree	06	20.33	2.65
2nd degree	40	22.35	2.85
3rd degree	34	21.91	3.05
Source of variation	SS	Df	MS	F-ratio
Between groups	22.037	2	11.019	1.638
Within groups	517.963	77	6.727	
Total	**1270.200**	**79**		

P> 0.05, Critical $F_{2,77} = 3.12$

Table 9 shows that qualification of lecturers that does impact any significant influence on the application of test planning, since the calculated value of F -(1.638) is less than the F critical value of 3.12. The hypothesis was therefore accepted.

Table 10: One – way analysis of lecturers' qualification on test preparation skill

Group: Qualification	**N**	$\bar{X}$	**SD**
1st degree	06	20.00	2.60
2nd degree	40	22.20	2.15
3rd degree	34	21.29	2.86
Source of variation	SS	Df	MS	F-ratio
Between groups	34.967	2	17.483	2.075
Within groups	648.833	77	8.426	
Total	**683.800**	**79**		

P> 0.05, Critical $F_{2,77} = 3.12$

In table 9, the calculated value of F is 2.075 compared to the critical value of 3.12. since the calculated value is less than the critical value, the null hypothesis that there is no significant influence of teachers qualification on the application of the skill of test preparation is not to be rejected in other words, lecturers various qualification have no significant difference in the application of test preparation.

Table 11: One – way analysis of lecturers' qualification on test administration skill

Group: Qualification	**N**		$\bar{X}$	**SD**
1st degree	06		20.00	2.80
2nd degree	40		25.38	3.15
3rd degree	34		20.32	2.88
Source of variation	SS	Df	MS	F-ratio
Between groups	144.518	2	72.259	12.523*
Within groups	444.282	77	5.770	
Total	**1270.200**	**79**		

*P< 0.05, Critical $F_{2,77} = 3.12$

Table 10 reveals a great significant difference among lecturers of various qualifications in application of testing skills. Since the calculated F value of 12.523 is greater than the critical value of 3.12. The null hypothesis is to be rejected, for the alternative of hypothesis of existence of significant influence. Differences exist among lecturers in test administration skill.

Table 12: One – way analysis of lecturers' qualification on test scoring skill

Group: Qualification	**N**		$\bar{X}$	**SD**
1st degree	06		14.67	1.60
2nd degree	21		12.10	1.15
3rd degree	34		15.94	1.86
Source of variation	SS	Df	MS	F-ratio
Between groups	197.087	2	98.544	17.876*
Within groups	424.463	77	5.513	
Total	**621.550**	**79**		

*P< 0.05, Critical $F_{2,77} = 3.12$

In the same manner lecturers qualification exact a significant influence on the application of test scoring skill. In other words, the scoring of students' response to test items correctly and properly depends on qualification of various lecturers.

Table 13a: One – way analysis of lecturers' qualification on test interpretation skill

Group: Qualification	**N**	$\bar{X}$	**SD**
1st degree	06	27.67	3.60
2nd degree	40	19.65	2.55
3rd degree	34	19.24	2.66

Source of variation	SS	Df	MS	F-ratio
Between groups	25.668	3	21.704	0.753
Within groups	1312.282	76	15.93	
Total	**1337.950**	**79**		

P> 0.05, Critical $F_{2,77} = 3.12$

As reflected on table 13a, the calculated value of F value is 0.753, which is less than the critical value of F (3.12), therefore the null hypothesis is to be accepted. This means that lecturers' qualification have no significant influence on the application of testing skill of interpretation. Probably because of already standardized criterion for interpretation of test scores by university authority. For example the score from each course is assigned appropriate letter grade as follows:

Table 13b: Example of scoring and their interpretations

Score	Letter	Grade point
70 – 100 %	A	5
60 – 68 %	B	4
50 – 59 %	C	3
45 – 49 %	D	2
40 – 44 %	E	1
00 – 39 %	F	0

Source: Students Handbook, Science Education Department, KSU, Anyigba.

In other words all lecturers must adopt the above criteria to interpret students score irrespective of qualification.

Table 14: One – way analysis of lecturers' qualification on test analysis skill

Group: Qualification	**N**	$\bar{X}$	**SD**	
1st degree	06	21.67	2.66	
2nd degree	40	12.20	1.15	
3rd degree	34	12.38	1.96	
Source of variation	SS	Df	MS	F-ratio
Between groups	43.408	2	21.704	1.362
Within groups	1226.792	77	15.93	
Total	**1270.200**	**79**		

P> 0.05, Critical $F_{2,77} = 3.12$

On test analysis, table 14 shows that no significant difference exist between the categories of lecturers, which implies that there is no significant influence of lecturers' qualification on test analysis skill, since F calculated (1.362) is lesser than F critical (3.12).

Table15: One – way analysis of lecturers' qualification on overall testing skills

Group: Qualification	**N**	$\bar{X}$	**SD**	
1st degree	06	20.72	2.53	
2nd degree	40	20.48	2.30	
3rd degree	34	18.52	2.20	
Source of variation	SS	Df	MS	F-ratio
Between groups	77.948	2	38.978	3.936*
Within groups	762.436	77	9.902	
Total	**840.384**	**79**		

*P< 0.05, Critical $F_{2,77} = 3.12$

On the overall, table 15 reveals that the value of 3.936 was obtained which is greater than the critical of 3.12. This is an indication that lecturers' qualification has significant influence on the overall application of testing skills. This means that there is significant difference among the classes of lecturers in their application of the overall testing skills in favour of highly qualified lecturers (Ph. D holders).

Summary and Conclusion

The result obtained among others was that, there is significant influence of lecturers' qualification on the application of testing skills used in this study, and at the university used for this study which is in agreement with (Garfort; 1992 and Ali; 2014), who discovered that teachers' qualification have significant influence on academic performance in chemistry and teachers application of testing skills in senior secondary schools.

That lecturers' teaching experience does not significantly influence application of testing skills on the overall, but difference exists between the lecturers on the application of testing skills of science lecturers on test preparation, administration and scoring skills based on experience. Application of testing by lecturers in the study is significantly high.

Recommendation

There is the need for retraining of lecturers in science faculties for acquisition of testing skills periodically, and that science lecturers should attend seminars on acquisition of testing skills by expert in educational measurement and evaluation. It will also be useful, if they can enroll for Post Graduate Diploma in Education (PGDE) programme to equip themselves for testing and evaluation.

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