



Influence of Number of Answer Options on Students' Achievement in Multiple Choice Objective Tests

KEYWORDS

Influence, Answer Options, Achievement, Objective Test.

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ABSTRACT

This study centered on the influence of number of answer options on students achievement in multiple choice objective test in secondary schools in Bayelsa State. 20-item of multiple-choice objective test of 3, 4 and 5 answer options were designed by the researcher and administered on 150 students selected from 2 secondary schools in Bayelsa State from SS III. Two research questions and three hypotheses were formulated for the study. The research questions were answered using mean as the statistical technique while the three hypotheses were tested using two ways analysis of variance (ANOVA). The result of the findings revealed that students performed better when the answer options are fewer. It was also revealed that female students performed better than male students in Biology. Based on the findings, the following recommendations were made: that in the construction of multiple choice objective test, the answer options should be many, seminars and workshop should be organized for both teachers and students as to help increase students awareness on the importance of science education and for the teachers on the constructions of multiple choice questions as there is an increasing use of multiple choice objective tests in assessing the achievement of students in schools and other examining bodies.

Introduction

Badmus and Omoifer (1998) defined test as any kind of device or procedure for measuring abilities, achievement, interest, attitude or any other traits. For Onunkwo (2002), a test is an instrument which can be utilized in detecting some qualities, traits, characteristics, attributes etc possessed by a person, an object or a thing. In the opinion of Omoroguiwa (2006), a test is an item or set of items designed to measure a trait, presented to an individual or set of individuals who are expected to respond under specific conditions with the intent to determine the extent to which such a trait is present or absent in the respondent. Also, Ukwuije and Opara (2012), defined test as a series of questions given to the test-taker or examinees to be answered in order to measure performance of knowledge. It should be appreciated that test scores obtained by students in a given subject either from a teacher made test or standardized test always have some variations. These variations in students test scores are due to several factors ranging from motivation, health, ambiguity of test items, difficulty level of the test, improper arrangement of the test items and number of answer options may contribute to variation of test scores.

In the view of Iwuji (1990), "failure in a test may not be due to lack of the necessary skill or knowledge but due to the ambiguity or non-clarity of the test items".

Furthermore, Orluwene (2012), view multiple choice test as those type of test that require the students to select one response from a set of many alternatives. Each multiple choice item has a stem which presents the situation or problem, then answer choices or options which include the correct answer called key, then plausible wrong answers called distracters.

The quest for mass literacy has thrown the gates of academics open for all and sundry which non culminated to explosion of students enrolment or population in schools. Consequently, this novel idea has been mistranslated as students now pay little or no attention to academic activities which invariably affects students achievement. In a bid to improv-

ing the standard of education in the society, multiple choice objective test is recommended and used by many examination bodies in Nigeria such as WAEC (West African Examination Council), NECO (National Examination Council) and JAMB (Joint Admission and Matriculation Board).

In the view of Kpolovie (2002), multiple choice objective test can conveniently, reliably and validly be used for measurement of all levels of the cognitive domain or educational outcomes. There are different types of objective tests. These includes: True or false type, completion type, matching type, rearrangement type and multiple choice type. All the above mentioned objective types have their own merits, demerits and limitations which can not be enunciated in this work but the research focused serious attention on multiple choice objective test because of its wide usage in the Nigerian educational system in assessing the academic achievements of pupils and students.

Again, Kpolovie (2014), emphasized that, currently, the most popularly and advantageously used form of the selection type of objective test item is multiple choice test. Also, Iweka (2015) view multiple choice objective test as that test that requires the examinee to select an answer from among several alternatives (options, choices, foils) which change with each item. Achievement tests are now used more broadly to assess levels of skill in numerous endeavours in addition to school work – in military, industries and government civil services.

It has been observed that the examining bodies in Nigeria are not consistent with the number of answer options which have a bearing on students academic achievement. Some of the examining bodies such as JAMB and WAEC uses four or five answer option while NECO uses five answer option. Thus, considering this inconsistency of using this answer options, it gave the researcher a source of worry and thereby motivated to critically investigate the influence of number option on students' achievement in multiple choice objective test in selected public secondary schools in Bayelsa State.

Consequently, the question that follows is, what influence will the number of answer options have on students' academic achievement in multiple choice objective test? It is in a bid to answer this question that the present study was conceived.

Statement of the Problem

Test scores yield a variety of information about the students' personality trait. These scores serve as a very important variable that are being used to identify a student who is highly gifted or a genius, average, below average learners, ineducable idiots, moroons etc. They also help in devising means of dealing with students who cannot cope academically with the pace of the class or the group. Test scores are also used as a basis of providing students with the necessary educational guidance and counselling.

However, it has been identified that there are many factors ranging from lack of instructional materials, poor test construction, poor test administration etc that are responsible for the low score and variation in the score of students of which number of answer options may be one of them. The problem of this study is to determine how the number of answer options on a multiple choice objective test format influence students' achievement in public secondary schools in Bayelsa State.

Purpose of the Study

The purpose of this study is to determine the influence of number of answer options on students' achievement in multiple choice objective test specifically, the researcher will:

Determine the achievement of students when there are 3, 4, and 5 answer options in multiple choice objective test in biology.

Determine whether the achievement of male and female students can be influenced when there are 3, 4 and 5 answer options in multiple choice objective test in biology.

Research Questions

The following research questions guided the researcher in the conduct of this study.

- 1) What are the mean achievement scores of students when there are 3, 4 and 5 answer options in multiple choice objective test in biology?
- 2) What are the mean achievement scores of male and female students when there are 3, 4, and 5 answer options in multiple choice objective tests in Biology?

Hypotheses

The following null hypotheses (Ho) guided the researcher in making decision concerning the study under investigation.

- 1) There is no significant difference in the mean achievement scores of students when there are 3, 4 and 5 answer options in multiple choice objective tests in biology.
- 2) There is no significant difference in the mean achievement scores of female and male students in multiple choice objective tests in biology with 3, 4 and 5 answer options.

Methodology

Research Design

The design of this study was quasi experimental design.

Area of the Study

The study covers 2 public secondary schools in Ogbia Local Government Area which have classes up to SSIII as at the time of this study. The study covers Government Secondary School Ogbia town and Oloibiri Grammar School Oloibiri as public secondary schools in Bayelsa State.

Population of the Study

The population of this study covered students of the two public secondary schools in Ogbia Local Government Area of Bayelsa State. This was made up of 205 students offering biology. This represents 95% of the total population of students in SSIII which comprises of 119 male students and 86 female students.

Sample and Sampling Technique

The two secondary schools in Ogbia Local Government Area of Bayelsa State were taken as the population sample.

Nevertheless, 150 students were chosen from the total population of 205 students offering biology in SSIII from the two secondary schools chosen for the study. The students were chosen using simple random sampling technique. The sample size was made of 75 male students and 75 female students.

Instrument for Data Collection

The instrument used for the collection of the data for the study was made up of 20 – item multiple – choice objective test on biology which was tagged as "Special Biology Objective Test" (SBOT).

The SBOT was developed by the researcher and consist of number of answer options. In otherwise the answer options were in variety of 3, 4 and 5. Each type was made up of 20- items. The questions were derived from 4 topics namely excretion, circulation, reproduction, and ecology. 5 questions were drawn from each of the topics selected from their second term scheme of work on biology

Validation of the Instrument

Copies of the SBOT were given to subject specialists especially biology teachers as well as experts in Educational measurement and Evaluation for vetting. The specialists and experts vetted the SBOT in terms of plausibility, content validity, simplicity of vocabulary, sentence structure, appropriateness and the relevance to the content. The SBOT used was based on the corrections effected and comments made by the measurement experts and subject specialists.

Reliability of the Instrument

Kuder Richardson technique was used in determining the reliability coefficient of the SBOT. Copies of the SBOT were administered to 50 students (male and female) all in SSIII of another secondary school different from the ones chosen for the study. The scores of the students were analyzed using Kuder-Richardson Formula – 20 (K-R 20) with a reliability coefficient of 0.68 for group 1 of three answer options, 0.64 for group 2 of four answer options and 0.64 for group 3 of five answer options respectively. This method estimates the internal consistency of the measuring instrument.

Procedure for Data Collection

The researcher went personally to the schools involved in the study and administered the instrument (SBOT) to the sampled students. After completing the instrument, the researcher collected them back immediately. Adequate time

was given for the completion of the test. The analysis of data collected was based on the information gathered from the instrument administered on the students.

Method of Data Analysis

The information elicited from the 3, 4 and 5 answer options administered to the students was gathered and mean was used as statistical technique to answer the research questions formulated while, two-ways analysis of variance (ANOVA) statistical technique was used to test the hypotheses formulated at 5% level of significance.

Results

Table 1: Mean achievement scores of students on 3, 4 and 5 answer options in Biology

Group	No. of Answer Options	X	N	\bar{X}
1	3	638	50	12.76
2	4	558	50	11.16
3	5	473	50	9.46

From table 4.01 above, it was observed that groups 1, 2 and 3 who took different examination on answer options of 3, 4 and 5 had a mean achievement scores of 12.76, 11.16 and 9.46 respectively. The mean scores were found indi-

Table 3: A summary of the two-way analysis

Scores of Variance	Sum of Square	Degree of freedom	Mean 5%	F-ratio	P	Decision
Row (Gender)	177.12	1	177.12	14.83	50	S
					0.05	
Col. (No. of answer option)	272.33	2	136.16	11.40		S
Interaction (Gender & No. of Option)	5.78	2	2.89	0.24		ns
Within	1719.36	144	11.94			
Total	2174.56	149				

The appendix has presented the two-way analysis of variance and the detail computation of the two-way analysis of variance.

Table 4.03 above depicted 272.33 as the amount of the total sum of squares (variance) that is due to the differences between the means of the three groups number answer options (3, 4 and 5). The mean square observed was 136.16 while the calculated F-ratio was 11.40 at 0.05 alpha level of significance with 2 degrees of freedom; the critical value was 3.00 which was less than the calculated F. Thus, the null hypothesis of no significant difference in the mean achievement scores of students on number of answer options was rejected. That is to say, there is significant difference in the mean scores of students when there are 3, 4 and 5 answer options.

Summary of Findings

The following are the summary of findings of the study.

- Students in groups, 1, 2 and 3 on number of answer options 2, 4 and 5 had a mean achievement scores of 12.76, 11.16 and 9.46 respectively.
- Students in group 1 on three answer options had a male and female mean achievement score of 11.44 and 14.08 respectively.
- Male and female students in group 2 and 3 on 4 and 5 answer options obtained a mean achievement scores of 10.32 vs 12.00 and 8.36 vs 10.56 respectively.
- The calculated F-ratio of number of answer options of students in the various groups was 11.40 which was greater than the critical F-ratio of 3.00 at 0.05 alpha level of significance with 2 and 144 degree of free-

dom. Thus, the null hypothesis of no significance difference in mean achievement scores of students on 3, 4 and 5 answer options was rejected.

Table 2: Gender mean achievement scores of students on 3, 4 and 5 answer options in Biology

Group	No. of Answer Options	Gender	X	N	\bar{X}
1	3	Male	286	25	11.44
		Female	352	25	14.08
2	4	Male	258	25	10.32
		Female	300	25	12.00
3	5	Male	209	25	8.36
		Female	264	25	10.56

It was found in table 4.02 that students in group 1 on three answer options had the mean achievement score of 11.44 and 14.08 for male and female respectively. Also observed were the mean achievement scores of students in groups 2 and 3 who were on four and five answer options having 10.32 against 12.00 and 8.36 against 10.56 for male and female students respectively in their respective groups. The tables also revealed that gender mean scores decreases as the number of answer options increases.

dom. Thus, the null hypothesis of no significance difference in mean achievement scores of students on 3, 4 and 5 answer options was rejected.

- The calculated F-value of gender mean achievement scores of students on 3, 4 and 5 answer options was found to be 14.83 which was greater than the critical F-value (3.84) at 0.05 alpha level of significance with 1 and 144 degree of freedom. Therefore, the null hypothesis of no significant difference in gender mean on number of answer options among the three groups was rejected.
- It was found that the mean scores of group 1 and 2 had no significant difference. This group had a calculated F of 2.69 against critical F of 3.00 at 0.05 alpha level of significance.
- The mean scores of groups 1 and 3, and 2 and 3 had a significant difference. These groups had a calculated F of 11.46 and 3.04 against critical F of 3.00.

Conclusion

The findings of this study have been discussed extensively and it was observed that students performed better when the answer options in multiple choice objective tests are fewer than when the answer options are many. This revealed the probability of increasing rate of guessing. Furthermore, it was also revealed that students in group 1 performed better than students in group 2 and 3 respectively.

From the foregoing, it is envisaged that if multiple choice objective test answer options are reduced, it would increase the rate of guessing and reduce the rate of cognitive achievement in schools. Furthermore, if facilities in

public secondary schools are not provided, the variation in the number of answer options may not have significant impact on academic achievement of students in Bayelsa State.

Recommendations

The following recommendations are proffered for this study.

- That in the construction of multiple choice objective test for both private and public examinations, the answer options should be many as to avoid guessing and as to help portray true stage of academic achievement of students.
- That Government should provide more instructional facilities to the public secondary schools. In other words, the public secondary schools should be adequately equipped in terms of human and material resources.
- Government should organize seminars and workshops for both teachers and students to increase the awareness on the importance of science subjects in secondary schools.
- Government should organize seminars and workshops for classroom teachers on construction of multiple choice objective test.
- Government should train teachers to specialize in educational measurement and evaluation in order to improve the quality of tests in secondary schools.

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