

24

# A Correlate of Criterion and Norm Referenced Tests on Secondary School Students' Biology

Casmir N. Ebuoh (Ph.D)

**Abstract** -The purpose of this study was to correlate the students' performance in criterion and norm referenced tests in senior secondary Biology in Nkanu West Local Government Area of Enugu State. The design of the study is co relational study. The population for the study consisted of all the 1596 students of senior secondary two (SS 11) of 2014/2015 academic session. The sampling techniques were multi-stage stratified and proportionate random sampling. The sample size comprised 735 students sampled from the seventeen (9) secondary schools. Method of data collection was on students' scores on criterion and norm referenced tests administered to the students in Biology. In data analysis, students' scores in criterion and norm referenced tests were correlated using Pearson's 'r'. The significance of the correlation coefficient results obtained was tested with T-test at five percent (5%) level of confidence. The result showed that there was positive and high relationship between criterion and norm referenced test scores in all the various schools. There is significant relationship between students' performance in criterion and norm referenced tests scores in secondary schools Biology.

**Keywords:** Correlates, Criterion, proportionate, Random Sampling, Referenced tests.

## 1 INTRODUCTION

The major duties of educational institutional school are to evaluate the students on what they had learnt with the aim of determining how well such students have achieved the goals and objectives of the course of their study. The process of finding out how well such students have achieved the goals and objectives of the course of study with relevant feedback is called evaluation. [1] noted that evaluation in the context of education is a process of assessing the effectiveness of a programme of study in bringing about desired behavioral change in the learner. This process takes into account all the skills, attitude, abilities, behavioral changes and knowledge in subject acquired by the students in a particular programme.

[2] summarized the reason for the desirability of the process as to judge the level of achievement. Teachers need to know how successful their students are learning, and in doing so, weaknesses in learning are revealed. To enable students realize their changes and how they improve their efforts. Again to motivate students to learn, that that is being interested and desiring to do more.

[3] mentioned that if evaluation is to be effective, the teacher must use success of his students' learning and to feedback from them to enable him to be sensitive to their needs. Such evaluation techniques include essay, objectives, practical, project, criterion reference, norm reference tests and so on. These different methods of assessment or evaluation are useful in the science general and Biology in particular [4]. The relevance of criterion and norm reference tests in the evaluation of Biology is not farfetched as these methods are known to instill in the students the required skill in Biology.

Norm - reference (N-R) tests are designed when the primary focus is to discriminate or make comparison among individuals. Usually the objectives of N-R test is to interpret an individual's score to determine where he stands' in relation to the performance of other persons who have also taken the test. N-R tests are employed when the objective of measurement is to select the able students for whatever purpose while rejecting others.

<sup>1</sup>Department of Science and Computer Education, Enugu State University of Science and Technology, Nigeria.

<sup>2</sup>MercData Consulting, [www.mercdataconsulting.org](http://www.mercdataconsulting.org)

They are based on the principal of the normal curve. Here, emphasis is not on what the students has mastered or is able to do; rather it is on how the student compares with the group. It judges the students ability to compete with others. The items in a norm referenced test are selected in such a way that they produce variability among the test scores. For example during norm analysis, the difficulty index and the discriminating power of N-R tests should ideally be 0.510 and +1.00 respectively. That is the test - item should be of moderate difficulty and maximum discrimination capacity [5].

Criterion - referenced (C-R) measurement focuses on procedures which enable tests scores to be interpreted in terms of given behaviour to be expected of a person obtaining such a score. The given behaviour is referred to as criterion or specified standard of behaviour. A criterion - referenced test is one that comprises items keyed to a set of specific behavioural objectives and would yield scores that can be directly interpreted in terms of specific standards. Even though all modern instructional programmes are often based on sets of explicitly or specifically stated objectives i.e. in criterion terms, performance is evaluated in terms of *whether* or *not* the students can demonstrate the proficiency by the said objectives. It is therefore task-oriented. Unlike the N-R achievement testing which is only tangentially related to the school programme, the C-R approach is embedded in an assess-tech-assess (maybe-re teach) cycle making it an integral part of the instructional programme as recommended by the continuous assessment policy. The major problems usually associated with criterion reference testing include:

1. The need to break down subject areas into very specific objectives which apart from been cumbersome may also not be feasible for higher level objectives
2. The Standards tend to be arbitrarily set and may lead to disagreements on what the standard should be.
3. Psychometric indices (such as difficulty and discriminating) used in validating norm-referenced tests are not applicable to C-R tests.

Since the 6-3-3-4 education system is emphasizing skill acquisition criterion referenced testing should be mastered by practicing teachers. C-R tests would be required in Skill-performance tests and traditional subject areas in which practical work is conducted. Other areas are written examinations in vocational areas for formative and summative evaluation of candidates in say carpentry, arts and crafts, home economics, welding, electronics, typing, shorthand, agriculture and operation of various equipments. Even though in C-R tests a student's 'relative standing is not of interest that a test score to be meaningful it must be related to tests content as well as the scores of other examiners.

The question that often asked is whether both types of tests measure the students' knowledge with the same degree of reliability. If they do, one can then infer that one form of the test is as good as the other. One may like to find out whether the two tests have the co coefficient of equivalency? Will student who perform well or badly in criterion reference test do the same in norm reference test where the contents are the same? Investigation into how well each measures specific Biology objectives will be carried out so as to recommend or use the most valid one.

One of the major objectives of educational research is to seek relationship between different educational and psychological variable. These relationships are generally aimed at either gaining a better understanding of the variable being related or developing techniques for predicting performances on one variable on the basis of its relationship to other variables.

Correlation study permits one to measure a great number of variables and their interrelationship simultaneously. In behavioral sciences we are frequently confronted with situation in which a large number are contributory causes of a particular pattern of behavior. The classical experimental method, which manipulate one variable and attempt to hold others constant introduces a high level of artificiality into research situation encountered in the behavioral sciences, the partial correlation however, is often preferable to experimental



design in situation where control is necessary as it permits the statistical control of variable that we wish to hold constant does so without the field situation.

The ability of correlation techniques to specify the degree to which different variables concerned are relative often gives the researcher the understanding of the way in which the variables are operating that cannot be gained through other designs". Correlation does not directly establish a "causal" relationship, it may furnish clues to causes and these clues can be formalized as hypothesis in planning control experimentation.

It can be very useful in determining the comparable or the test-retest reliability of a test. [6] reported that by determining whether two variables are closely related in each other and the discovery of unexpected correlation may raise further questions for investigation. Many correlation studies in education have involved little more than locating more than available scores on a group of pupils and then correlating them. Correlation coefficient is also useful to determine the validity of a test. Predictive validity is determined by setting up a criterion to be predicted and then computing the coefficient of correlation between the predictive scores on the criterion. Having examined the rationale for the use of correlation, it is pertinent to correlate criterion and norm referenced tests on secondary school students' biology

The purpose of the study was to correlate criterion and norm referenced tests on secondary school students' biology.

This study is restricted to senior secondary (II) three Biology students in Nkanu West local Government Area of Enugu state. It concerns itself with the relationship between students' achievement in criterion and norm reference tests in senior secondary Biology in the 2014/2015 academic session.

The following Null hypothesis was tested at 0.05 level of confidence.

1. There is no significant relationship between student' mean achievement in criterion and norm reference tests in senior secondary (SS 11) Examinations in Biology.

## 2 METHODOLOGY

This study was a correlation study. It was aimed at finding out the relationship between students achievement in criterion and norm reference tests in senior secondary school Biology in Nkanu West Local Government area of Enugu state.

The study was delimited to all the secondary schools in Nkanu West Local Government area of Enugu state. Nkanu West Local Government Area is one of the Local Government Areas in Enugu state.

The population of the study comprises all the senior secondary Biology students in the 9 secondary schools in Nkanu West Local Government Area in 2014/2015 academic session. The students were made up of 1596 senior Secondary (SS.11) Biology students.

For the fact that the study did not use all the 1596 Biology students in the nine secondary schools in the Area were, simple balloting random sampling was used to select 735 secondary school (SS 11) Biology students. The data were collected using Biology Achievement tests and this was administered to secondary school (SS 11) Biology students in the area. These data were collected by the researcher from the various schools

The data collected were analysed using Pearson's (r) and T-test. The Pearson's (r) was used to answer the research question while the hypothesis was tested using T- test at (5%) confident level.

### 3 RESULTS

TABLE 1

THE OVERALL OF THE PEARSON'S 'R' AND 'T'-TEST OF STUDENT' ACHIEVEMENT IN CRITERION AND NORM REFERENCED TESTS SCORES.

Schools	Pearson's (r)	Calculated - t	Table-t
	0.76*	4.20	2.05

Note: \* Significant correlation coefficient

It is shown from the table above that overall relationship between criterion and norm referenced tests scores in Biology was positive and high (0.76) in the various schools.

The hypothesis was stated to find out the significant relationship between students' achievement in criterion and norm referenced tests scores

The T- calculated (4.20) is greater than T- table (2.05). Since the T- calculated (4.20) is greater than T- table (2.05), the hypothesis is rejected. This means that there is significant relationship between students' performance in criterion and norm referenced tests scores in secondary schools Biology.

This is in agreement with [7] and [8] who found out that positive and significant relationship between students performance in Essay in Secondary School certificate examination in Agwu Local Government Area.

### 4 CONCLUSIONS

Based on the findings of the study, the following conclusions were made:

1. The relationship was positive and high in criterion and norm referenced tests scores in Biology in all the various schools studied.
2. There is significant relationship between students' performance in criterion and norm referenced tests scores in secondary schools Biology.

### 5 RECOMMENDATIONS

The following recommendations were made on the basis of the findings of the study:

1. The fact that, there is significant relationship between the variables in students' performance, the criterion referenced test scores can be used as a substitute to norm referenced test scores in secondary school Biology.
2. In a similar situation, due to unforeseen circumstances such as accident, lost of script and soon a student's grading could be based on either on criterion reference test or on norm referenced test scores.

### REFERENCES

- [1] Anigbo, L. C (2014)
- [2] Maduabum, A.M. *Teaching Biology Effectively*. Jos (1984); Jos University Press limited.
- [3] Hoover, H.K. *Collage teaching today: A handbook for post secondary instruction*. New York (19991); John Wiley

- [4]Ejikeme, C.N. "A study of the problems involved in organizing secondary school Biology practicals." *Unpublished Project Report* Nsukka (1995): University of Nigeria.
- [5]Onunkwo, G.I. in Ezeudu, S A Agwaga U N V and Agbaegbu, C N *Educational Measurement and Evaluation for Colleges and Universities*. Onitsha (1997): Cape Publishers International
- [6]Ibekwe, G.C. "A comparative case study of two evaluation methods in the evaluation of Integrated Sciences to class one secondary school student," *Unpublished Project Report* (1985) Nsukka: University of Nigeria.
- [7]Ewuzie, A.R. "Academic performance at senior secondary Biology: Impact of activity and essay question methods." *Unpublished Project Report* Nsukka (1995): University of Nigeria
- [8]Okeke, F.N., "Students' Mock – WASC/GCE O/L in Anambra State. *Unpublished Master's project Report* (1985). Nsukka: University of Nigeria.

