

RELATIONSHIP BETWEEN STUDENTS' PERFORMANCE IN ESSAY AND PRACTICAL TESTS IN SENIOR SECONDARY SCHOOL BIOLOGY EXAMINATION

CASMIR N. EBUOH, (Ph.D)

*Department of Science and Computer Education,
Enugu State University of Science and Technology,
Agbani.*

Abstract

Literature revealed that there is poor enrolment of students in Biology related courses such as medicine, pharmacy, radiography, nursing, medical laboratory science, dentistry as a result of poor performance of students in Biology. The purpose of the study was to find out the relationship between the students performance in essay and practical scores in senior secondary mock examination in Biology. The design of the study was correlation and the population was all the 1956 students that wrote the senior secondary mock examinations in biology in the 2008/2009 academic session. Simple random sampling (battling without replacement) was used to sample 650 students from 14 secondary schools in Ezeagu Local Government area of Enugu State. The method of data collection was documentary information of students' scores on essay and practical in mock biology examinations. Pearson 'r' and t-test were used to correlate and test the hypothesis at 5% level of confidence. Based on the analyzed data, it was found that out of the 10 schools studied, the relationship between essay and practical scores was significant in seven schools, The relationship was significant in the co-educational and boys schools. In the girls' schools relationship was not significant

The process of finding out how well students' performed and the extent to which the behavioural objective are achieved is called evaluation. Nworgu (1992) noted that evaluation is a process of assessing the effectiveness of a programme of study with the aim of bringing about desired behavioural changes in the learner. These processes take into account all the skills, attitudes, abilities, behavioural changes and knowledge, in subject acquired by the students in a particular programme. The reasons for evaluation could be to judge the level of achievement. Teachers need to know the successes of their students and in doing so, weakness in learning is revealed. To enable students realize their changes and how they improve by their efforts.

Nworgu (1992) stated that if evaluation is to be effective, the teacher must be success of his students' learning and to receive feedback from them in order to enable

the teachers to be sensitive to their needs. Evaluation techniques include theory (essay and objectives) practical, projects, questioning, marks and corrections. These different methods of assessment or evaluation are useful in the sciences in general and Biology in particular. It has been observed that the type of examination that takes place in our schools strongly influence the type of study procedure use by students preparing for them.

Experience has shown that inadequate use / lack of essay and practical methods in the evaluation of students' performance in Biology particularly has ultimately denied the students the feeling of participation and reality. What makes a Biologist is not only how much information he/she has stored in his memory but the actual practice he receives in biological rigorous process, how he wonders, sets up a controlled experiment, his willingness to withhold judgments and how he realized the limitations of Biology. These are affected by the use of practicals and essay in evaluating Biology.

Ibekwe (1995:38-39) summarized some of the importance of essay and practical tests in evaluation of Biology as;

the essay and practical provide opportunity to promote the scientific method of thought. The scientific method entails inculcating into the learners, the habit of drawing conclusions on basis of observation experimental and practical. Practical tests extend and re-reinforce theoretical learning. He also mentioned that practicals promote problem solving and self-reliance in real life situation. Getting involved in essay and practical can also enable students to learn much about the interrelationship between biology and other science subjects.

The evaluation techniques (essay and practical) employed in the evaluation of Biology are designed ultimately to produce educated individuals. Some of whom may or may not take to biological studies in their professional pursuits. However, in whatever profession they finally find themselves, it is hoped that the Biology education they have acquired in school will be of value to the totality of their education.

Correlation study is highly useful in studying problems in education or in other behavioural sciences. This permits one to measure a great number of variables and their interrelationship simultaneously. In behavioral science, we are frequently confronted with situation in which a large number of variables are contributory causes of a particular pattern of behaviour.

The classical experimental method which manipulates one variable and attempts to hold others constant often introduces a high level of artificiality into research situation encountered in the behavioural science. The partial correlation

however, is often preferable to experimental design in situations where control is necessary as it permits the statistical control of variable that we wish to hold constant and does so without changing the field situation.

In this section of the work, the study delved and searched into previous but related work to the study. Consequent upon this, the literature review was approached from two perspectives namely:

1. Essay and practical types as acclaimed method of evaluating students' performance in Biology.
2. Factors militating against students' performance in essay and practical Biology examinations.

With regard to the sub-heading that discusses the essay and practical types as acclaimed method of evaluating students' performance in Biology; Omelewa (1997) noted that it is needless to re-emphasise the fact that Biology by its nature and characteristics is both practical subjects. The less it is evaluated otherwise the more it ceases to be Biology that is examined. The two test instruments (essay and practical) are useful in evaluating and developing students' abilities in biology. Essay and practical types are more successful in evaluating ability in problem solving in Biology. Essay and practical types appear to offer means of development of students' performance in the learning of biological concepts, principles and methods. Okeke (1985) noted that the two instruments are indispensable tools for the evaluation of the affective, psychomotor and cognitive domains of students' performances. Essay and practical testing yield more positive result in evaluation of Biology than theory and objective tests. It was observed that practical tests are more suitable to low and average students when compared with theory questions. Ekwuzie (1985) stated that practical is the best because it brings into play the use of the five senses and thus creates fertile ground for the examination of the objective of the topic and sometimes discovering new terms. Therefore, the opportunity of making students the researchers or discovers full of curiosity, interest that were desired at formative stage of appreciation and seeing Biology as their best alternative to other subjects. Essay tests need to be dovetailed into practical assessment so that the entire content is a unique whole and evaluated in a manner conducive to thinking. Other methods Devaluating Biology such as observation, questioning, projects, corrections and marks) lack the necessary training or manipulative skills and creative thinking which are found in essay and practical type tests. Ibekwe (1985) while comparing two evaluative methods in the evaluation of integrated science found out that practical method is more appropriate in evaluating integrated science (Biology chemistry ad physics). Evaluation should be made more practical oriented so that examinees can be more actively involved and makes for concretization of evaluation. Ibekwe (1995) stated that Biology cannot be evaluated from but through practical and written expression. Ndu (1980) found out that practical and essay types are the best methods of

evaluating Biology and indeed other sciences. The test format allow students in guess, put down, experience, observe, experiment and draw conclusions so that they can perceive Biology as it really is Maduabum (1984) claimed the superiority of essay and practicals from the advantages they have over other evaluative techniques. The essay (written examinations) type for instance has the following advantages according to Ekwuezie (1985:69).

- a) It gives opportunity for bluffing and influence writing skill
- b) It can encourage the development of understanding thinking skills and other complex outcomes if properly constructed
- c) Preparation of essay tests is relatively easy since few questions arc needed for a test
- d) Guessing is minimized and it is appropriate fort measuring ability to select, organize ideas, abilities to organize, integrate and express ideas effectively.
- e) Opportunity to promote the scientific method of thought
- f) It inculcates into the examinees the habit of drawing conclusion on the basis of observation and experimentation
- g) It provides opportunity to students to develop scientific attitudes such as curiosity, thoroughness, open-mindedness, objectivity, skepticism, acceptance of warranted generalization.
- h) It provides training in problem solving through opportunity offered in practice investigation.

Knowledge gained, through essay and practical examinations are easily retained and recalled. They provide students the opportunity to acquire various skills such as observation, weighing, measuring, recording and predicting. They also make the phenomena being evaluated more real through thinking and actual experience.

Having examined the rationale for the use of correlational study, essay and practical examinations, it is pertinent to carry out a study on the relationship between students' performance in essay and practicals in senior secondary Biology in Ezeagu Local Government Area.

There is poor performance of students in biology as a result of inadequate use of the claimed method of evaluation biology. Okeke (1985) found out that the method of evaluating biology in particular and sciences in general affect students' performance. In recent years, there were increases in the poor performance of students in senior secondary certificate biology. Similarly Ebuoh, Nwamaka and Nwosu (1989) found out that these students' poor performances were related to the use of the inadequate method of evaluating Biology in secondary schools. Consequently, the researcher wish to investigate the relationship of using essay examination scores as a predictor of students performance in practical and vice versa in senior secondary mock biology.

This study concerns itself with finding out the relationship between students' performance in essay and practical examination in senior secondary mock biology examination. This study is restricted to senior secondary 3 biology students in Ezeagu local Government Area. It concerns itself with finding the relationship between students' performance in essay and practical examinations in mock Biology in the 2008/2009 academic session.

Research Questions

What is the relationship between students' performance in essay and practical examination in senior secondary mock biology examination?

Hypothesis

There is no significant relationship between students' performance in essay and practicals in senior secondary mock examinations.

The hypothesis was tested at five percent (5%) level of significance that is ninety five percent (95%) chances of being correct if rejected or failed to be accepted.

Ho: $U_2 = U_2 = 0$

This means that there was no significant different between performance of the two (variables) groups under consideration.

Methodology

This study is a correlation study. It was aimed at finding out the relationship between students' performance in essay and practical in senior secondary Biology

The study was carried out in all in the senior secondary schools in Ezeagu local government area of Enugu state. Ezeagu Local Government -Area- is one of the rural areas in Enugu state.

The population for the study comprised all the senior secondary mock Biology students in the 18 senior secondary schools in the Ezeagu L.G.A in 2008/2009 session. The students were the 1,896 senior secondary school (SS3) Biology students that wrote their mock examination in 2008/2009 session.

The study did not use all the 1.896 Biology students in the 18 senior secondary schools in the Local Government Area, 10 schools were randomly sampled. The schools were stratified using type variable to ensure appropriate representation. Simple balloting without replacement was used to sample 4 co-educational, 3 boys' and 3 girls' schools.

A proportionate random sampling based on about 40% was used to sample the representatives of the four co-educational, three boys and three girls schools. These were drawn by .simple balloting without replacement and the sample size was 635

senior secondary school (SS3) Biology students that wrote their mock examination in 2008/2009 session.

The scores from the 635 senior secondary three (SS3) Biology students of the 10 sampled senior secondary schools were extracted from their senior secondary mock biology scores. These data were collected by the researcher from the principals of the various schools.

In order to analyse the data, various tools were employed. Firstly, the Pearson's product moment correlation co-efficient was used to analyse the interval data and to find the relationship between the two variables.

The calculated Pearson's 'r' was tested for significance with t-test statistics at five percent confidence level. The correlation coefficient were given qualitative interpretation based on the table 1 below

Table 1: Quantitative Interpretation to Correlation Co-Efficient

Correlation coefficient value	Interpretation
0.00-0.20	Very low/virtually no relationship
0.20-0.40	Low/ definite positive relationship
0.40 - 0.60	Medium relationship
0.60-0.80	High relationship
0.80-1.00	Very high/ near perfect relationship

Results

Research question: What is the relationship between students' performance in essay and practical examination in senior secondary mock biology examination?

The results of the research question are presented in table 2 above.

It is discernable from table 2 below that the overall relationship between essay and practical scores in mock biology examinations was positive in the various school types. There was very low/virtually no relationship in the two overall girls' schools. In schools where the relationship was positive, the magnitude was between 0.10 and 0.55 which showed a range of very low/virtually no relationship to medium relationship in the two school types (co-educational and boys) the relationship was medium with correlation coefficient of 0.48 and 0.55 respectively.

Hypothesis: There is no relationship between students' performance in essay and practical in senior secondary mock examinations.

Results of the analysis of relationship and t-test obtained from variance school types were presented in the table 2 below

Table 2: Overall of the Pearson's 'r' and t-test of Students' Performance in Essay (E) and Practical (P) Scores

Schools	Pearson's	Calculated -t	Table -t
Co-educational (Overall)	0.48*	4.25	2.06
Girls (Overall)	0.10	-24.80	2.02
Boys (Overall)	0.55*	11.29	2.10

* Significant correlation co-efficient

The results of the hypothesis are presented in table 2 above.

Out of the 10 schools studied, the relationship between essay and practical scores was significant at 5% confidence level in 7 schools. While in the 3 schools, the relationship was not significant. The relationship was significant in the co-educational, boys but not significant in the girls' schools (see table 2).

Discussion of Results

From the analysis of the results, it was observed that the students' performance in essay in relation to their scores in practical was positive and significant in most of the schools types except in girls' schools (see table 2).

The variation in the magnitude of the correlation coefficients among the various schools is comparable to Daniel's (1984) in which essay scores were correlated with practical scores in mock-WASC with WASC O'Level results. The finding were quite significant for they have revealed some degrees of reliability and validity that existed especially in the practical and essay tests. The variation in relationship between essay and practical scores which ranged from very high/near perfect to very low/virtually no relationship could be attributed to certain factors.

The medium, high and very high near perfect relationship could be as a result of adequate staffing, both qualitatively and quantitatively in the different schools and in Biology. Qualitative staffing involves the handling of the subjects by teachers who were adequately informed in the course of measurement and evaluation and in the subject matter. Quantitative aspect implies appropriate teacher-student ratio. Similarly, Ali

(1986) observed that "the quality of staff affects students' performance in Biology subjects. The existence of qualitative and quantitative staff attributes lead to high quality instructions and evaluation. The very low/virtually no relationship and low/definite positive values of relationship might be that the schools lack qualitative and quantitative teachers in Biology. Thus the available teachers would be engulfed in heavy workloads which reduce adequate teaching and evaluation processes. Inappropriate teacher-student ratio results to excessive workload. It could as well be attributed to lack of regular seminar and workshops to acquaint the teachers-with necessary skills needed for construction, administration and scoring of tests; and the use of other evaluation techniques. These were highlighted in the work of Azikiwe (1989), Ebuoh, Nnaemeka and Nwosu (1989) and Okure (1989).

In schools in which the relationship between essay and practical scores was not significant could be attributed to lack of qualified teachers. This affects among other things the quality of constructions, evaluation instrument and the neglect of other evaluation techniques. This might be why Maduabum (1984) noted that "for evaluation to be effective, the professional evaluators/teachers must use various techniques to evaluate the success of his pupils' learning and receive feedback from them to enable him to be sensitive to their needs. Negative relationship might be militated by the factors highlighted above and in addition, inappropriate scoring. The later manifests in either generosity or severity in scoring which results in invalidity of scoring. Lack of standardization of evaluation instruments could cause variation in relationship in various school types especially very low and negative relationship. Supporting the view, Ogbazi (1989) corroborated that non standardization is likely to cause difference in students' performance in essay and practical in Senior Secondary mock Biology.

Significant relationship was observed in four co-educational schools. The schools were CSS Olo, Model Secondary School Amandim Olo, CSS Aguobu Own and CSS Imezi Owa. While there was no significant relationship in three Girls' schools namely Sedes, Oghe; Girls secondary school, Mgbagbuowa and Girls Secondary School Imezi-Owa. The Boy's schools had significant relationship. They included ABSS, Oghe; Community High School, Iwollo and BSS Aguobu Owa. However, the relationship between students essay and practical scores varied from school to school and sex to sex. Udegwi (1985) disagreed with this. He found out that none of the tests seems to discriminate in favour of any particular sex. The factors which accounted for variations in the magnitude of relationship as emphasized earlier were accountable for the variations in various school types.

Conclusion

1. The relationship in the students' performance in essay and practical biology were positive and moderate in all the school types except girl's secondary schools.

2. There was significant relationship between students' performance in essay and practical biology all the schools except in girls' schools.

Recommendations

1. In a situation where a student completes the three years of senior secondary school programme, the essay type of evaluation could be used to make decision on students who might unavoidably be absent during the practical mock examination and vice versa.
2. Alternatively, could be used on such students that due to error of omission, students' performance in essay could be used to substitute the students performance in practical in case the students answer scripts is not found in practical biology.

References

- Abudllahi, A. (1982). *Science teaching in Nigeria*, Ilorin: Atoto Press Ltd.
- Agusiobo. N.O. & Olaitan, O.S. (1981). *Principles of practical teaching*. New York: John Wiley and Sons.
- Ali, A.(1986) *A handbook of science method for secondary school teachers*. Nsukka: Institute of Education.
- Azikiwe, U. (1989).Continuous assessment in the post- primary institution: Constraints and strategies for implementation. Implementation of National Policy on education: Theoretical and empirical analysis. *Nigeria Educational Research Association.6 [2] 13*
- Daniels, U.C. (1984). 'Testing Geography at O/L of the GCE.'*The British Journal of Education Psychology. 24.*
- Ebuoh, C.N., Nnaemeka, A.O. & Nwosu, V.C.(1989). An investigation into the extent of use of laboratory method in teaching Biology in Senior Secondary Schools in Enugu urban of Anambra State. *Unpublished B Ed Project Report*. Nsukka: University of Nigeria.
- Ewuzie, A.R. (1985). Academic performance at Senior Secondary Biology: Impact of activity and essay question methods. *Unpublished M.Ed dissertation Report*: Nsukka: University of Nigeria.

- Ibekwe, C. (1995) A comparative study of two evaluation methods in the evaluation of integrated science to JSS II students. *Unpublished M.Ed dissertation Report*. Nsukka: University of Nigeria.
- Maduabum, M. A. (1984). *Teaching biology effectively*. Jos: Jos University press limited.
- Mkpa, M.A. (1988). Population and Sample. In S.O Olaitan,. & G.I Nwoke (eds.). *Practical research methods in Education*. Onitsha: Summer Educational Publisher.
- Ndu, F.O.C. (1980). Planning and organization of Practical work in Biology in Secondary Schools, *Journal of Science Teachers' Association of Nigeria*, 18 (2) 28.
- Nwogu, B.G. (1992). *Educational measurement and evaluation: Theory and practice*. Awka: Haliman Publishers.
- Okeke, F.N. (1985). Students' Mock-WASC/GCE success in science subjects as a prediction of their achievements in WASC/GCE O/L in Anambra State. *Unpublished Master's dissertation of* University of Nigeria, Nsukka.
- Okure, S.J. (1989). A case study of current concept and implementation of continuous assessment in primary and secondary schools in Cross River State. Implementation of National Policy on education. Theoretical and "empirical analysis. *Nigeria Educational Research Association*. 8 [3] 16.
- Omelewa, M. (1997). Some Earliest Problems of Science education in Nigeria (1 859-1932). *Journal of Science Teachers Association of Nigeria*. 15 [1] 22.
- Udeigwe, A (1992). Relationship between continuous assessment scores and students' performance in SS 2 in Awgu L.G.A of Enugu state. *Unpublished Masters Dissertation Report of* University of Nigeria. Nsukka: