COMPARATIVE STUDY OF IDENTIFYING BIOLOGY ESSAY ERROR TYPES COMMITTED BY SCINECE AND NON SCIENCE STUDENTS IN SENIOR SECONDARY SCHOOL IN DEKIN

[1] ABU, Alice O. (*Ph.D*)
Prince Abubakar Audu University, Anyigba Kogi State
dehindealice@gmail.com, abu.a@ksu.edu.ng

Abstract

This study compared error types committed by science and non-science biology students in Senior Secondary School. The study was conducted in Anyigba, Dekina Local Government Area of Kogi State, Nigeria. Two research questions and one null hypothesis were used for the study. The study population comprise 764 ss2 biology students in public government secondary school in Anyigba while the sample used for the study consist of 240 samples, selected using stratified random sampling from 8 schools. The instrument used for data collection was Biology Test for identification of students essay Error Types developed by the researcher including the marking scheme used for data collection, which have b2een validated and found reliable at 0.87 using Pearson's Product Moment Correction Co-efficient. The researcher used descriptive survey design. The questions comprised of short answer questions from two topics in the biology syllabus. Data obtained from the science and non-science groups, error types and their frequencies were recorded. The hypothesis was tested using t-test for independent group at 0.05 level of significance. The result showed that there is significant mean difference in the frequency of error types among the science and non-science students in biology essay. Among the findings of the survey result showed that science and non-science senior secondary school ii biology student committed error, the least error includ2ed little knowledge of the topic. The most error types included poor approach to answering essay questions, poor expressions of English language, poor understanding of some basic concept in biology, inability to relate biological concepts to given situation, student depending on root memory rather than understanding biological concept to reason out solutions and student demonstrated lapses in spellings. Based on the findings of this study among others, revealed that secondary school students generally commit a number of errors and there was a significant difference in error types committed by student which also affect their performance in2 essay examination and hence the students as a whole. It is therefore recommended that biology teachers should teach the possible error type to the students as students awareness of these errors will help them to guide against committing them.

Keywords: Biology, Science, Non- Science

Introduction

Science and Technology have been identified and recognized as important instruments that could be used to effect socio-economic changes in the history of mankind. This is why science and technology education assumed a prominent place in Senior Secondary School Curricular and Biology is enlisted as one of the science subjects to be taught and learnt at that level of education. The educational curriculum of a nation is usually tailored to meet the needs and aspirations of the society. Federal Ministry of Education (FME, 2016) described Curriculum to represent the total experiences to which all learners must be exposed. It is obvious and susceptible to committing errors were real learning have not taking place since what was learned or experienced and skills acquired during learning could be retrieved from the memory and utilized in solving some related or similar problems. However, experimental psychologist believed that errors are committed as a conseq2uence of forgetting. Ertherton in 40 years ago "mentioned that forgetting is an act which is displaced in order to measure the quality of learning that occurred" from the foregoing related ability of forgetting but failure to learn is one of the reasons why student are unable to recall answers to examination questions accurately an commit all sort of errors which is otherwise avoidable.

Kerski (2012) in his view lamented that errors affect results and inhibit students in responding or solving problems correctly, an error in this study refers to misconception or incorrect presentation of facts or wrong answers specified2 in the procedure of a given problem in biology essay. Against this background, some of the examining educational bodies such as the West African Examination Council (WAEC) and the National Examination Council (NECO) are institutions put in place by government in order to help monitor through evaluating the quality and extent of the attainment of the objectives of the content of the Senior Secondary School Curriculum. This evaluation is further certificated by these bodies. The statistics of grades obtained by science candidate in WAEC examination in recent years have fallen below 45 percent (45%) for 2000-2010 under review (WAEC, 2015).

The poor performance in Biology have been attributed to the use of ineffective teaching and learning strategies and lack of appropriate learning environment under which biology teaching takes place (Okebukola, 2008). Similarly, Federal Ministry of Education (FME, 2014) observed inadequate number of competent teachers and absolute infrastructure as some of the variables hampering teaching/learning of science. These factors could negatively affects the teaching/learning processes among the science students. Hence errors could be committed and replicated. Bello (2016) opined that a writing examination gives the teacher not a fair idea of the progress of the students, but also indicate which parts of the course were not well understood. Infact, a properly kept record of all types of errors will be of value when a teacher prepares his future lessons. In the same vain Akonobi 2014 mentioned that the learners written examinations reveals the learners error types, in support of this, the chief examiners report for the west Africa senior school certificate examination for May/June 2020 mentioned that most students weaknesses or errors include poor approach to answering questions, poor expression of English language and poor understanding of some basic

concepts in biology such as inability to relate applications of biological concepts to given situations and little knowledge of the topic taught among others.

Etherton (2018) observed that the classification of errors varies from individual to individual. Lederman (2016) investigated types of errors in biology practicals among high school students. In his findings, discovered that errors were committed by student and these errors differ. For example, the errors committed include rote 8memory rather than understanding biological concepts to reason out solutions am2ong others. Evidence also abound in the work of (Abdulkarim, 2012 Omosewo & Akanbi, 2013 & Falalu, 2015) that science and non-science student are committing errors and these errors differ from one another. Their studies therefore revealed that the more the errors committed by a student, the less is the mean scores and the overall achievement of the learner in the subject, leading to poor performance.

The Biology examination written by Senior Secondary School candidates is designed and composed of two main papers namely Practical Biology and Essay paper. The practical promotes scientific skill, self-confidence; group work and social interaction are encouraged. While the essay paper tests the general biology knowledge acquired by the students. The quality of their expressions in the essay part could contribute to the quality of the pass mark obtained. Few research works have been carried out on error analysis at the senior secondary and tertiary school level in science subjects (Biology inclusive); Abu (2017) carried out a research on identification and Remediation of Practical Biology Errors Committed by college of Education students in North-West Nigeria, among the findings of the survey result; showed that Nigerian Certificate in Education (NCE) two Biology students least errors committed were 4 while highest number of errors committed were 9. Others argued that science students perform better than non-science students Shangowawa, (2011). The study therefore revealed that students are committing error in biology essay even with differ differences among the group. From this view point, a study of using Biology error types to identify the common error types in biology essay is most paramount. Unless such a study is made to identify these common error types, the science and non-science student are committing in biology essay cannot be defended. Therefore the problem of this study posed as a question is what are the common error type's science and non-science students are committing in biology essay.

Research Questions

Two research questions were formulated to guide the study:

1. What are the common biology essay error types committed by students in Biology?
2. What are the frequencies of the different biology essay error types committed by non-science and science students in Biology?

Hypothesis

This hypothesis was tested at 0.05 level of significance:

HO_l: There is no significant mean difference between the frequencies of the biology error-types committed by both the science and non-science students.

Methods

The research design adopted for the study was2 descriptive survey design were biology essay error types identification test was used to identify the error type's senior secondary II biology science and non-science student commit in biology essay. The study was conducted in Anyigba, Dekina Local Government of Kogi State, Nigeria. The sample for the study was 240 students drawn from all the students offering biology in government public senior secondary schools in Anyigba, Dekina LGA of Kogi State, Nigeria. Stratified random samplings were employed for the selection of the samples of the 8 schools used this study. 120 are science and non-science consists of 120 respectfully. The instrument used for the data collection was Biology essay Test for identification of students Error Types. The instrument was developed by the researcher including questions and the marking scheme, but adopted from West African Examination Council (WAEC 2020) biology essay error typ2es. The error types are: (i). poor approach to answering essay questions (ii). Poor expression of English language (iii) understanding of some basic concept in biology (iv) inability to relate applications of biological concept to given situation (v) student depends on rote memory rather than understanding biological concept to reason out. (vi) Had little knowledge of the topic (vii) demonstrated lapses in spelling and (viii) failure to adhere to instructions. The eight (8) government public senior secondary schools are more or less homogenous with similar conditions in terms of student enrollment, teaching staff, coeducational in nature, used the same curriculum. In other to test this biology essay error types committed by the science and non-science students, the biology essay error type's identification test were used. These questions were drawn from the topics reproductive behaviours and biology of hereditary. These topics were use in determining the essay error types of biology students (science and non-science). The data collected form the test was used for research questions and the hypothesis tested in the survey study. The content validation of the biology essay error identification test item was subjected to validity and reliability before being put to use. The instrument was pilot-tested to establish its reliability. The reliability coefficient when computed gave 0.87 using Pearson's Product Moment Coloration Co-efficient. The instrument was thus adjudged to be reliable and would test what it was out to test.

The researcher organized a training workshop for the regular biology teachers of the sampled schools that taught the topics (reproductive behaviour and biology of heredity) by organizing a seminar by the researcher on how to teach these topics and also to administer the test items to the biology student in the sampled schools for the study. The test item was administered to each study subjects directly by their teachers shortly before the commencement of the SSCE. The test item was administered to all the students of science and non-science during the normal school hours in the regular classroom situation. The test was administered at the same time and day only one day by their teacher in each school respectfully. At the end of the test, the answer scripts were collected and marked by the researcher. An examiner who is also a biology teacher marking WAEC/NECO assi2sted in checking the scripts to ensure that mistakes were not made during the marking, scoring and collation of the scores. The data collected were scored. The data collected were scored. The biology essay error types committed by science and non-science SSII biology students were shown in table 1. This was used to answer the research question one while frequency counts of biology essay error types

committed by both science and non-science SSII biology students were used in answering research question 2. (Table 2) and for testing the research null hypothesis, the two study groups (Science and Non-science) irrespective of schools were pooled together to find the error types committed in the two groups using t-Test for table 3. The result of the research question one, two and null hypothesis one are shown in table 1 and 2. While the null hypothesis in table 3.

Results2

Two research questions were answered hypotheses tested as follows

Research Question One: what are the common Biology Essay Error Types Committed by Science and non-Science Students?

Table 1: Survey Biology Essay Error Types Committed by SSII Science and non Science Biology Students

S/N	Error Types Committed
1.	Poor Approach to answering essay questions
2.	Poor Expressions of English Language
3.	Poor Understanding of some basic concept in Biology
4.	Inability to relate applications of Biological concepts to given situation
5.	Students depend on Rote memory rather than understanding biological
concept to	reason out solutions.
6.	Had little knowledge of the topic
7.	Demonstrated lapses in spellings
8.	Failure to adhere to instructions

The result in table shows the common error types committed in biology essay by SS II Science and Non Science Biology students. 8 errors were identified from the student's script. The findings showed clearly that science and non-science biology student are committing errors in biology essay.

Research Question Two: what are the frequencies of the different biology essay error types committed by science and non- science students in biology?

Table 2 Frequency of Biology Error Types Committed by Science and Non-Science Students in Biology Essay Survey2

S/N	Error Types Committed	Frequency	
		Science	Non-Science
81.	Poor Approach to answering essay questions	200	110
2.	Poor Expressions of English Language	195	197
3.	Poor Understanding of some basic concept in Biology	160	140
4.	Inability to relate applications of Biological concepts to give situation	131	110
5.	Students depend on Rote memory rather than Understanding biological concept to reason out Solutions	199	189
6.	Had little knowledge of the topic	10	10
7.	Demonstrated lapses in spellings	240	200
8.	Failure to adhere to instructions	132	100

The Result in Table Two Shows the frequency of the common Biology Essay Error types committed in Biology Essay by SSII Science and Non-Science Students. 8 errors were identified from the student scripts. The most prominent common error types committed demonstrate lapses in spellings with 240 frequencies for science and 200 frequencies for Non-Science Biology Students, while the least committed errors is, had little knowledge of the topic with frequency of 10 for both science and non-science student respectfully. To test whether the difference is significant or not null hypothesis was tested using t-Test comparison of biology essay means score error types of science and non-science biology students.

Table 3 Summary of the t-Test Comparison of Biology Essay Mean Scores Error Types Performance of Science and Non-Science Biology Students.

Variable	Group	N	Mean	St.Dev.	Df	t-cal	p.	Remarks
Error Types Performance								
8	Science	120	67.40	4.10	98	4.81	0.001	Sig *
	Non-Science	2120	82.97	6.37				

Significant at P ≤0.05

The Result Presented in Table 3 revealed that the p-value is 0.001 which is lower than the level of significance at a=0.05 with df=98. This means that there is a significant difference between science and non-science biology essay error types mean scores of 67.40 of science and 82.97 for non-science performance in biology essay. This implies that the performance level of the mean score of the non-science is higher with 15.57 than their science counterpart, which showed that science biology student committed more errors therefore the null hypothesis one is rejected.

Discussion of Findings

The study investigates the comparative study of identifying biology Essay Error types committed by Science and Non-Science Students in Senior Secondary School in Dekina LGA. Kogi State, Nigeria. The result of the statistical analysis relating to research question one and two shoes that science and non-science biology students committed 8 errors in table 1 this findings is in line with the findings of Akonobi (2014). The group frequencies of error types committed differs from each other which is in agreement with Etherton (2018). This proves that the error types committed by science and non-science biology students are very significant. The frequencies of error types in table two shows that demonstrated lapses in spelling has being the highest score of frequency for both science and non-science biology students among others, and had little knowledge of the topic having the least. The finding is in agreement with the findings of WAEC (2020) chief examiners report.

The observed significant differences in the between the science and the non-science subjects could be explained in terms of the higher means and standard deviations. In each of these error types, the mean as well as the standard deviation of the non-science students is greater to that of the science students. The mean of the non-science students is higher in all the error types with reference to where there are significant differences in error types between the science and the non-science students. This indicates that the non-science students did better than the science students. The findings agreed with the finding of Abudulkarim (2012), Omossewo and Akanbi (2013), Falalu (2015) and Abu (2017) who mentioned that science students displayed lower mean scores due to more error types committed and were poorer in their achievement. This could be explained that the non-science students did better than the science students because they devoted time to study biology. Unlike the science students that would want show that they have already understood biology well as such no need to study While non-science students were more inclined to study it and hence their superiors performance.

The findings also agree with the findings of WAEC (2020) that showed the statistics of grade obtained by science candidates in re2cent years falling below 45% for the whole years in review 2000-2012. The finding is in disagreement with the finding of Shangowawa (2011) that science students perform better than non-science students. Therefore the findings of the study reveals that the more the error types committed by a student the less is the overall achievement of the learner in the subject. This is in line with the findings made by Falalu (2015) and Lederman (2016) that science and non-science Students are committing errors and these errors differ from one another.

Conclusion

Within the limitation of the findings of the present study, the following conclusions could be made:

1. The Students of this Study Committed all the 8 error types with a high degree which lead them to perform poorly in the test as a whole.
2. The order in which each of the error types was committed differs between science and non-science senior secondary II biology students.
3. The Frequency with which the errors were committed by science and non-science SSII varies because poor approach to answering essay questions was among the highest frequency among the science biology students as well as student depending on rote memory rather than understanding biological concepts to reason out solutions while the non-science SSII biology student had a low frequency in those aspect.

Recommendations

Based on the result of the study, the following recommendations are made:

1. Biology teachers should teach the possible error types to the students as students awareness of these errors will help them guide against committing them.
2. The teachers are encouraged to find out the error types students are committing in what they teach so that they can be corrected.
3. Teachers already in the teaching should be encouraged to attend in-service training workshops, seminars and conferences in other to make them more competent and reliable in other to curb the commission of error types by students

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