

**EFFECT OF CONTINUOUS ASSESSMENT SCORES ON
ACADEMIC ACHIEVEMENT OF NATIONAL CERTIFICATE
IN EDUCATION (NCE) BIOLOGY STUDENTS:
IMPLICATIONS FOR SCHOOL ADMINISTRATION**

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ABSTRACT

The study investigated the effect of continuous assessment scores on academic achievement of National Certificate in Education (NCE) Biology students in Anambra State. Three research questions and three null hypotheses were formulated to guide the study. Related literature were reviewed which helped to highlight more facts necessary for building the study. The pre-test post-test quasi experimental design was used for the study. The population of the study was 640 NCE Biology students which comprised of 264 NCE Biology students in College of Education, technical Umunze; and 376 NCE Biology students of Nwafor Orizu College of Education, Nsugbe. The sample for the study was 120 NCE Biology students (45 male and 75 female) as respondents. Two instruments, Teacher Made Test (TMT) was used for the Continuous Assessment and Biology Achievement Test (BAT) was used as both pretest and post test. The test items were content and face validated by three experts. The instrument has a reliability value of .94 using Kudar-Richardson (K-R₂₀) test which was considered adequate for the study. Research questions were answered with mean and standard deviation, while Analysis of Covariance (ANCOVA) was used in testing the hypotheses at .05 level of significance. The finding of the study showed that male students achieve more than female students after two and four sets of continuous assessments while female students achieve more than male students in final examinations in NCE Biology. The study also revealed there is a significant difference in the mean achievement scores of students exposed to two and four sets of continuous assessments in NCE Biology. The study further revealed that there is a significant mean difference between continuous assessment scores and final examination scores of students exposed to four sets of continuous assessments in NCE Biology. The study therefore concluded that the treatment of continuous assessment had significant and positive effect on academic achievement of students in NCE Biology. Thus, students tend to achieve more in Biology concepts better when exposed to series of continuous assessments. In the light of the findings from this study, it was recommended among Biology teachers should strive to see that at least four continuous assessments are given to students per semester in order to improve their academic achievement and that

teachers should also be properly trained on the methods and techniques of continuous assessment construction and administration so as to improve the system.

Key words: Continuous assessment scores, academic achievement, National certificate in Education Biology students, school administration.

Introduction

The Nigerian educational structure is an integral component involving examinations and assessment in the system. They are conducted both formally and informally, at practically all levels of education and serve a variety of different functions. In the narrow sense, examinations and assessments may be thought of as having predominantly educational purposes. They may be used in order to assess students' attainment at the end of a course or study programme; evaluate diagnostically students' academic achievement, progress and/or learning difficulties; evaluate students' aptitude, possibly for the purpose of assigning them to different courses or teaching set; evaluate the effectiveness of an educational programme or curriculum (Richard, 2011).

Assessment in education in general is essential and is an ongoing process. It is the basis for all educational activities. Assessment information is a vital tool in the hands of the professional teacher. It directs, guides and protects both the teacher and the learner at every stage of academics (Okwudire, 2015). Assessment is very important in teaching and learning process; this is because through assessment, feedback could be provided to both students and teachers. Thus, assessment is a central element in the overall quality of teaching and learning. Teachers must regularly assess the effectiveness of the learning experiences which they have organized to enable the students achieve the earlier stated objectives.

Greaney (2015) defined assessment as any procedure or activity that is designed to collect information about the knowledge, attitude or skills of the learner or group of learners. Assessment is therefore a process through which the quality of an individuals' work or performance is judged. Assessment, according to Ihekwaba and Osuala (2012) is a process of gathering and documenting information (usually in measurable terms) about the achievement, abilities and personality variables of an individual.

When carried out as an on-going process, assessment is known as continuous assessment. Assessment is either internal or external. Internal assessment refers to school-based assessment, which includes class assignments, practical reports, teacher-made tests, recap exercises, projects and field studies. All these tools form part of the classroom continuous assessment strategies. A continuous assessment strategy refers to the different tools/procedures used in the classroom to understand the academic achievement levels of learners in terms of their knowledge, attitudes and values. External assessment refers to tests that are produced by examining bodies away from school. For example, the Senior Secondary Certificate Examination (SSCE) is a public examination offered by the West African Examination Council (WAEC) or National Examination Council (NECO) that forms part of external assessment at O' Level.

Continuous assessment is very important at all educational levels in Nigeria. Alonge (2013) opined that through continuous assessment, progress of each student can be measured and monitored and appropriate counseling method can be put in place as the case may demand. The National Policy on Education laid strong emphasis on the use of continuous assessment practice at the various levels of Nigeria educational system. Kolawole and Ala (2014) viewed continuous assessment as the method of finding out what the students have gained from learning activities. Abbas (2014) said ordinary continuous assessment is an on-going test device which is comprehensive and include the three domains of learning. Continuous assessment must include project, internet assignment, use of community resources and many more.

The researcher defines continuous assessment as a periodic and systematic method of assessing and evaluating students' attributes. Information collected from continuous behaviors of students will help teachers to better understand their strengths and weaknesses in addition to providing a comprehensive picture of each student over a period of time. It involves a systematic and objective process of determining the extent of a student's performance in the expected changes in his/her behavior of all information derived with a view of using them to help the student. Continuous assessment as a matter of fact involves the students period of schooling. It is not only doing tests and assignment that are given to the students by the teacher. It cuts across other social activities like interests and creativity instead of intellectual ability alone.

The Federal Government in the new National Policy on Education in Nigeria has directed that continuous assessment should be used at all educational levels for the evaluation of students' achievement. This means that every teacher from primary school to university should understand and practice it. Before the implementation of continuous assessment, the summative system of assessment was used where students will be assessed at the end of the term without including any other form of assessment, and this form of assessment is used to evaluate students' achievement for placement and promotions to upper class. Mock examination was conducted prior to WAEC examinations. This result was often used to determine those students that qualify to write the final examination (WAEC) and also to secure provisional admission into higher institution before the release of WAEC result (Ango, 2005). Carew (2008) stated that irrespective of how well a students' performance is during his/her years of schooling, if his/her performance in the summative type of examination is not good, he/she is considered incapable of advancing further in education.

Schools and colleges adopted the continuous assessment system to reduce failure from final examinations. The Federal Government of Nigeria stressed the need and importance of Continuous Assessment in relation to examination. It was stated in the National Policy on Education (NPE, 2013) that there is the need for continuous assessment for the integration of all types of evaluations. Continuous assessment therefore, represents a continuing awareness of the development of the pupil over a period of time and the general building of cumulative judgment.

Continuous assessment in biology is a very vital teaching-learning initiative that will help in stimulating the Biology Knowledge in the students and make learning to be more effective. Biology is a core science subject and it is all encompassing as all other science related subjects are embedded in the subject. Biology which is the study of life is dynamic Aluko (2012) stated that Biological knowledge is dynamic which implies that sciences instructional practices of teachers should also be dynamic.

Biology is a science subject which explains the existence of life. It is a natural science which is concerned with the study of living organisms, their structures, forms and functions, heredity, etc. It is a fundamental science subject which serves as the basis for understanding the complexities of how the body parts of organisms

function. Biology according to Taiwo and Emeke (2014) exposes the students to the world of knowledge of self, the immediate and distant environment. This may be the bases for its inclusion in the Senior Secondary School (SSS) curriculum in Nigeria. The objectives of teaching Biology in the SSS in Nigeria include adequate laboratory and field skills in biology; meaningful and relevant knowledge in Biology; ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture (Federal Republic of Nigeria (2013).

Academic achievement in science (in this study, biology) is viewed in different ways by different authors; depending on the context in which it is viewed. Generally, achievement means accomplishment or exhibition of proficiency in a given skill or body of knowledge. Amuset (2014) viewed academic achievement as the knowledge obtained or skill developed in the school subject usually designated by test scores or by means assigned by the teacher. However, Okebukola and Jegede (2014) sub divided achievement into three categories. These are:

- a. High achievers (top 75%)
- b. Medium achievers (middle 55%)
- c. Low achievers (bottom 25%)

Academic achievement is defined as the extent to which a student, teacher or institution has achieved their short or long-term educational goals (Bossaert & Doumen, 2011). Academic achievement is commonly measured through examination or continuous assessment but there is no general agreement on how it is best evaluated or which aspect are most important-procedural knowledge such as skills or declarative knowledge such as facts (*Annie, Howard & Mildred, 2008*).

The researcher defines Academic achievement, as the quality of results produced by students as reflected in the quality of their examination scores. If more continuous assessments is given, it means more motivation on the part of the students and it is hoped that the achievement will increase. Continuous assessment is often used to motivate students to learn. According to Beard and Seniour (2012) motivation is understood by the teacher as “the urge to work independently either applying oneself to his work, interest in ones task or course he has chosen, the desire for a good qualification and good employment, determination to pass

examination or a defined goal which one has set for himself and sustenance of enthusiasm”.

This study therefore, intends to find out if students given more number of continuous assessments per semester will perform better in the final examination than those who are not given. The study also investigates whether there is any difference in the achievements of male and female students exposed to continuous assessment. Finally, the study intends to find the effect of continuous assessment scores on academic achievement of National Certificate in Education (NCE) Biology students: implications for school administration.

Statement of the Problem

The urgent need to promote learning and improve performance in tertiary institutions in Anambra State resulted into a range of related but different developments in continuous assessment at classroom levels. The resultant features have been inconsistent performance of students in examinations nationwide and performance still varies from school to school. This undermines the future of many students that are in schools that persistently perform poorly.

The declining nature in school performance of students in Nigerian tertiary institutions such that the quality of graduates being produced by the nation's tertiary institutions is questionable. Little wonder why graduates are subjected to re-examination by companies and establishments that want to employ graduates through conduct of aptitude tests. Also, graduates of a higher institutions pursuing higher learning in other schools in Nigeria and abroad are oftentimes subjected to re-examination through different means. Therefore, there is need to track and trace the problem of learning that promotes poor performance in tertiary institutions in Nigeria.

The rationale behind using teacher-based classroom assessment scores as a component for promoting learning and improving performance in tertiary institutions in Nigeria among others “one-shot” examinations are unable to fully examine all that a student has acquired after several years of study. Therefore, the study examined the effect of continuous assessment scores on academic achievement of National Certificate in Education (NCE) biology students: implications for school administration.

Purpose of the Study

The general purpose of the study is to examine the effect of continuous assessment scores on academic achievement of National Certificate in Education (NCE) biology students: implications for school administration. Specifically, the study sought to investigate:

1. The effect of two sets of continuous assessments on students mean achievement scores in NCE biology.
2. The effect of four sets of continuous assessments on students mean achievement scores in NCE biology.
3. The effect of continuous assessment scores and final examination scores of students exposed to four sets of continuous assessments in NCE biology.

Research Questions

In view of the above, the following research questions were formulated to guide the conduct of the study.

1. What is the effect of two sets of continuous assessments on students mean achievement scores in NCE biology?
2. What is the effect of four sets of continuous assessments on students mean achievement scores in NCE biology?
3. What is the effect of continuous assessment scores and final examination scores of students exposed to four sets of continuous assessments in NCE biology?

Hypotheses

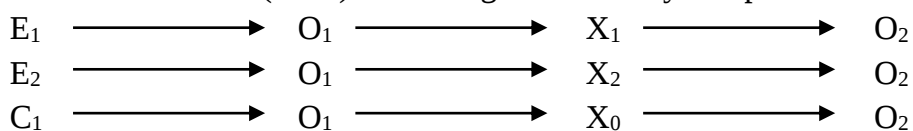
The null hypotheses formulated for the study are:

- H₀₁:** There is no significant effect in the mean achievement scores of students exposed to two sets of continuous assessments in NCE Biology.
- H₀₂:** There is no significant effect in the mean achievement scores of students exposed to four sets of continuous assessments in NCE Biology.
- H₀₃:** There is no significant mean difference between continuous assessment scores and final examination scores of students exposed to four sets of continuous assessments in NCE Biology.

Methodology

In this study, the pre-test post-test quasi experimental control group was employed. Three groups were used for this study, i.e. the experimental groups which consist of two groups (students exposed to two sets of continuous assessments (E_1)) and (students exposed to four sets of continuous assessments (E_2)) and the control group (C) (students exposed to no continuous assessments) which consists of one group. This kind of design has been recommended by Rose and Smith and used by Amedu (2008). The experimental groups were exposed to the treatment i.e. the first group was given two sets of continuous assessment in a semester while the second group was given four sets of continuous assessment in a semester due to the fact that in most institutions, continuous assessment is given mostly once or twice. For the second group which was given four continuous assessments, it is meant to test and see if more continuous assessment means better achievement in the final examination since continuous assessment is now a norm across institutions, which is often combined with examination to reach a final score determining a pass or fail for students.

The course used in this study was an organic chemistry course; all extraneous variables were minimized. The students from experimental and control groups will be divided into four equal groups and a pre-test of Biology Achievement Test (BAT) was be administered to the four groups before the commencement of the treatment to determine the equivalence of the four groups. A post-test will be administered at the end of the treatment which comprises the same Biology Achievement Test (BAT). The design of the study is represented thus:



Adopted from: Kerlinger (1973)

Where;

- E_1 : 1st Experimental Group
- E_2 : 2nd Experimental Group
- C_1 : Control Group
- X_1 : Instruction with 2 Continuous Assessments
- X_2 : Instruction with 4 Continuous Assessments
- X_0 : Instruction without Continuous Assessment
- O_1 : Pre-Test
- O_2 : Post –Test

The area of the study is Anambra State. Anambra State is chosen for this study because literacy rate in the state is comparatively high compared to other states. Anambra State is one among the 36 states of the Federal Republic of Nigeria. Located in the south-eastern part of Nigeria, Anambra State comprises six education zones (Aguata, Awka, Ihiala, Nnewi, Ogidi and Onitsha) and 21 Local Government Areas with 261 public secondary schools in the State. The study chooses to use Colleges of Education in Anambra State because Biology is mostly part of their core course offered at all levels in the colleges of education.

The population of the study is estimated 640 (first year) NCE biology students. Two hundred and sixty-four students from Federal College of Education Technical, Umuze ; while three hundred and seven six students from Nwafor Orizu College of Education, Nsugbe . The schools and the number of students are provided in the appendix C.

The sample for the study comprise of 120 (first year) NCE Biology students as respondents. A purposeful sampling technique was used. Federal College of Education Technical, Umuze has a sample of 20 male and 35 female NCE Biology students; while Nwafor Orizu College of Education, Nsugbe has a sample 25 male and 40 female NCE Biology students. Thus, a total of 45 male and 75 female NCE Biology students were used for the study. Stratified random sampling was used to select the students that participated in the study, thus, 120 students were chosen from the two colleges of education Biology Achievement Test (BAT) consisting of 40 multiple choice items was administered to the samples as pre-test. The BAT was developed by the researcher and validated by two specialists in the subject matter. The instrument used for the different sets of CA's is the Teacher Made Test (TMT). The instrument comprised of four different sets of 10 questions making a total of forty questions. The first experimental group (E1) was exposed to two sets of CA's while the second experiment group (E2) was exposed to four sets of CA's. Details of the questions, scores and marking scheme are found in appendix B₁-B₁₀.

The test items were content and face validated by three experts. One in Science Education, one in Educational Management and one in measurement and evaluation all in the Faculty of Education, Chukwuemeka Odumegwu Ojukwu University, Igbariam Campus. The topic, the scope and purpose of the study, research questions, and hypotheses was presented to the validators as a guide. These validators ascertained the clarity and relevance of items to the research work. The

validators made some helpful suggestions and recommendations that were corrected to make the instrument fit for the study (See Appendix F).

The items were trial tested on 25 students in two colleges of education in Enugu State which is different from those used for the study. Kudar-Richardson (K-R₂₀) method was used to estimate the internal consistency of the instrument. K-R₂₀ is a special case of Cronbach alpha, computed for dichotomous scores. It is often claimed that a high KR-20 coefficient (e.g., > 0.90) indicates a homogeneous test. The analysis of the results was done using Statistical Package for Social Science (SPSS). The reliability coefficient of BAT with the use of K-R₂₀ is .94 which was considered adequate for the study (See Appendix D).

Experimental Procedure

To remove any possible effect and bias, the experimental and control groups were taught with the same techniques/method and the same steps were followed. The control group was taught but without any continuous assessment throughout the contact session.

The study duration was eight weeks. However, one week was used in training the research assistants and the other weeks were used for the actual experiment. The first experimental group (E₁) was exposed to two sets of continuous assessments while the second experiment group (E₂) was exposed to four sets of continuous assessments within seven weeks.

The experimental group are two groups one of the groups E₁ was given continuous assessment after five weeks making a total of 2 continuous assessments per semester while the other experimental group E₂ was given four continuous assessments at 3 weeks interval. The results obtained from the various continuous assessments and the final examinations form the data for the research. The scores of the groups E₁, E₂ were collected and collated hence subjected to data analysis.

Method of Data Analysis

In analysing the data, the researcher used mean scores and standard deviation in answering the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses at the .05 level of significance.

Results

The results are presented in line with the research questions and hypotheses that guided the study.

Research Question 1: What is the effect of two sets of continuous assessments on students mean achievement scores in NCE Biology?

Table 1: Mean and standard deviation of pre- and post test achievement scores of students exposed to two sets of continuous assessments in NCE Biology

Variable		Pre test		Post test		
Gender	No	Mean	Std. Dev.	Mean	Std. Dev.	Mean Gain
Male	45	20.67	5.53	11.80	2.37	8.87
Female	75	17.64	5.62	9.5	3.14	8.14

Analysis on Table 1 showed the mean and standard deviation of pre test and post test achievement scores of male and female students exposed to two sets of continuous assessments in NCE Biology. The table indicated that male students had a pre test mean achievement score of 20.67 with a standard deviation of 5.53 and post test mean achievement score of 11.80 with the standard deviation of 2.37 after two sets of continuous assessments. The difference between the pre test mean achievement score and post test mean achievement score of male students after two sets of continuous assessments was 8.87. On the other hands, the female students had a pre test mean achievement score of 17.64 with a standard deviation

of 5.62 and a post test mean achievement score of 9.5 with a standard deviation of 3.14. The difference between the pre test mean achievement score and post test mean achievement score of female students was 8.14 after two sets of continuous assessments. The study also showed that male students achieve more than female students after two sets of continuous assessments in NCE Biology. However, for each of the groups exposed to two sets of continuous assessments, there is improvement in the mean achievement scores as the post test mean achievement scores (20marks) were greater than the pre test mean achievement scores (40marks) with the male students having slightly higher mean gain than female students after two sets of continuous assessments in NCE Biology. Remember that the pre test mean achievement scores is 40marks with 40 multi choice questions, while post test mean achievement scores is 20marks with 20 multi choice questions. This is an indication that exposing students to two sets of continuous assessments, appear to have a positive effect on students' academic achievement in NCE Biology in colleges of education in Anambra State.

Research Question 2: What is the effect of four sets of continuous assessments on students mean achievement scores in NCE Biology?

Table 2: Mean and standard deviation of pre- and post test achievement scores of students exposed to four sets of continuous assessments in NCE Biology

Variable		Pre test		Post test		
Gender	No	Mean	Std. Dev.	Mean	Std. Dev.	Mean Gain
Male	45	20.67	5.53	25.71	3.83	5.04
Female	75	17.64	5.62	21.47	4.18	3.83

Analysis on Table 2 showed the mean and standard deviation of pre test and post test achievement scores of students exposed to four sets of continuous assessments in NCE Biology. The table indicated that male students had a pre test mean achievement score of 20.67 with a standard deviation of 5.53 and post test mean achievement score of 25.71 with the standard deviation of 3.83 after four sets of

continuous assessments. The difference between the pre test mean achievement score and post test mean achievement score of male students after four sets of continuous assessments was 5.04. On the other hands, the female students had a pre test mean achievement score of 17.64 with a standard deviation of 5.62 and a post test mean achievement score of 21.47 with a standard deviation of 4.18. The difference between the pre test mean achievement score and post test mean achievement score of female students was 3.83 after four sets of continuous assessments. The study showed that male students achieve more than female students after four sets of continuous assessments in NCE Biology. However, for each of the groups exposed to four sets of continuous assessments, there is positive improvement in the mean achievement scores as the post test mean achievement scores (40marks) were greater than the pre test mean achievement scores (40marks) with the male students having slightly higher mean gain than female students after four of continuous assessments in NCE Biology. Remember that the pre test mean achievement scores is 40marks with 40 multi choice questions, while post test mean achievement scores is 40marks with 40 multi choice questions. This is an indication that exposing students to four sets of continuous assessments, appear to have a positive effect on students' academic achievement in NCE Biology in colleges of education in Anambra State.

Research Question 3: What is the effect of continuous assessment scores and final examination scores of students exposed to four sets of continuous assessments in NCE Biology?

Table 3: Mean and standard deviation of the mean difference between continuous assessment scores and final examination scores of students exposed to four sets of continuous assessments in NCE Biology

Variable	No	Continuous Assessment Scores		Examination Scores		Mean Gain
		Mean	Std. Dev.	Mean	Std. Dev.	
Gender						
Male	45	25.71	3.83	36.64	8.84	10.93

Female	75	21.47	4.18	32.96	8.81	11.49
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Analysis on Table 3 showed the mean and standard deviation of the mean difference between continuous assessment scores and final examination scores of NCE students in Biology. The table indicated that male students had a mean achievement of 25.71 and standard deviation of 3.83 after 4th continuous assessment scores and 36.64 and standard deviation of 8.84 for final examination scores. The difference between the continuous assessment scores and final examination scores of NCE male students was 10.93. On the other hands, female students had a mean achievement of 21.47 and standard deviation of 4.18 after 4th continuous assessment scores and 32.96 and standard deviation of 8.81 for final examination scores. The difference between the continuous assessment scores and final examination scores of NCE female students was 11.49. However, exposing students to sets of continuous assessments will go a long way in improvement their academic achievement of students. Thus, there is evidence of female students achieving more during examinations than male students while male students achieve more in continuous assessment than female students. Thus, exposing students to sets of continuous assessments have a positive effect on their academic achievement order than one shot examination.

Test of Hypotheses

Hypothesis One

H₀₁: There is no significant effect in the mean achievement scores of students exposed to two sets of continuous assessments in NCE Biology.

Table 4: Summary of Analysis of Covariate (ANCOVA) on the significance effect in the mean achievement scores of students exposed to two sets of continuous assessments in NCE Biology

Dependent Variable: Academic Achievement

Source	Type 111 Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	127548.175 ^a	4	1095.833	213.137	.000
Intercept	1633.324	1	1633.324	96.025	.000
Posttest score	565.971	1	565.971	5.862	.012
Groups	2168.753	1	2168.753	44.529	.000
Gender	35.264	1	35.264	8.237	.001
Group*Gender	28.509	1	28.509	12.973	.000
Error	13487.510	111	83.036		
Total	7230.000	120			
Corrected Total	897.667	117			

a. R Squared = .611 (Adjusted R Squared = .575)

The analysis on Table 4 showed the summary of analysis of covariate (ANCOVA) on the significance effect in the mean achievement scores of students exposed to two sets of continuous assessments in NCE Biology. The result indicated that the F-ratio of 8.24 with associated probability value of .001. Since the associated probability value of .001 was less than .05 set as the significance level, the null hypothesis which stated that there is no significant effect in the mean achievement scores of students exposed to two sets of continuous assessments in NCE Biology was rejected and the alternative hypothesis accepted. Thus, the study concluded that there is a significant effect in the mean achievement scores of students exposed to two sets of continuous assessments in NCE Biology with the male students having slightly higher mean gain than female students. This implies that male and female students' academic achievement differ significantly when exposed to two sets of continuous assessments in NCE Biology.

Hypotheses Two

H₀₂: There is no significant effect in the mean achievement scores of students exposed to four sets of continuous assessments in NCE Biology.

Table 5: Summary of Analysis of Covariate (ANCOVA) on the significance effect in the mean achievement scores of students exposed to four sets of continuous assessments in NCE Biology

Dependent Variable: Academic Achievement

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	12563.154 ^a	4	2167.376	202.713	.000
Intercept	628.244	1	628.244	46.282	.000
Posttest score	657.816	1	657.816	7.317	.012
Groups	2633.864	1	2633.864	25.651	.000
Gender	41.126	1	41.126	6.212	.004
Group*Gender	8.908	1	8.908	11.345	.000
Error	27436.160	111	83.036		
Total	8340.000	120			
Corrected Total	985.736	118			

a. R Squared = .712 (Adjusted R Squared = .685)

The analysis on Table.5 showed the summary of analysis of covariate (ANCOVA) on the significance effect in the mean achievement scores of students exposed to four sets of continuous assessments in NCE Biology. The result indicated that the F-ratio of 6.21 with associated probability value of .004. Since the associated probability value of .004 was less than .05 set as the significance level, the null

hypothesis which stated that there is no significant effect in the mean achievement scores of students exposed to four sets of continuous assessments in NCE Biology was rejected and the alternative hypothesis accepted. Thus, the study concluded that students differ significantly in mean achievement in NCE Biology when they are exposed to four continuous assessments. This implies that male students perform significantly better than female students when exposed to four continuous assessments in a semester.

Hypothesis Three

H₀₃: There is no significant mean difference between continuous assessment scores and final examination scores of students exposed to four sets of continuous assessments in NCE Biology.

Table 6: Summary of Analysis of Covariate (ANCOVA) on the significance mean difference between continuous assessment scores and final examination scores of students exposed to four sets of continuous assessments in NCE Biology

Dependent Variable: Academic Achievement

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	12955.775 ^a	4	3238.944	36.516	.000
Intercept	42656.250	1	42656.250	480.904	.000
Posttest score	421.495	1	421.495	4.752	.021
Groups	12855.088	2	12855.088	144.927	.000
Gender	83.448	1	83.448	25.705	.000
Group*Gender	12.311	1	12.311	4.648	.015
Error	15522.536	110	88.700		
Total	576504.000	120			

Corrected	28478.312	118
Total		

a. R Squared = .705 (Adjusted R Squared = .683)

The analysis on Table 6 showed the summary of analysis of covariate (ANCOVA) on the significance effect in the mean achievement between continuous assessment scores and final examination scores of NCE students in Biology. The result indicated that the F-ratio of 144.93 was obtained with associated probability value of .000. Since the associated probability value of .000 was less than .05 set as the significance level, the null hypothesis which stated that there is no significant mean difference between continuous assessment scores and final examination scores of students exposed to four sets of continuous assessments in NCE Biology was rejected and the alternative hypothesis accepted. Thus, the study concluded that there is a significant mean difference between continuous assessment scores and final examination scores of students exposed to four sets of continuous assessments in NCE Biology with the female students achieve more than male students in examinations while male students achieve more than female students in continuous assessment.

Summary of the Findings

The findings of the study are summarized as follows:

1. The study showed that exposing students to two sets of continuous assessments have a positive effect on their academic achievement in NCE Biology whereby male students achieve more than female students after the two sets of continuous assessments.
2. The study revealed that exposing students to four sets of continuous assessments have a positive effect on their academic achievement in NCE Biology whereby male students gain higher achievement than female students after the four sets of continuous assessments.
3. The study indicated that exposing students to sets of continuous assessments have a positive effect on their academic achievement order than one shot examination. Further, the study recorded that female students achieve more than male students in examinations while male students achieve more than female students in continuous assessments.

4. The study showed that there is a significant effect in the mean achievement scores of students exposed to two sets of continuous assessments in NCE Biology.
5. The study indicated that there is a significant effect in the mean achievement scores of students exposed to four sets of continuous assessments in NCE Biology.
6. The study revealed that there is a significant mean difference between continuous assessment scores and final examination scores of students exposed to four sets of continuous assessments in NCE Biology.

Discussion of Findings

The study examined the impact of continuous assessment scores on academic achievement of National Certificate in Education (NCE) Biology students in Anambra State. The work from the analysis are discussed according to the research questions and hypotheses that guided the study.

Findings on the effect of two sets of continuous assessments on students mean achievement scores in NCE Biology revealed that exposing students to two sets of continuous assessments have a positive and significant effect on their academic achievement in NCE Biology. The study further showed that male students achieve more than female students after two sets of continuous assessments in NCE Biology. This study finding supports the findings of Iheigbulem (2011) who opined that there is a significant difference between academic achievement of male and female, but contradicts the earlier findings by Durotolu (2004); Danjuma (2008); Olagunju (2018) and the study findings contradict the findings of Musa (2010). This might be due to the fact that male and female students do not differ significantly in performance when they are exposed to tasks that are moderately stressful. It seems that emotional stress from two continuous assessments is moderate and has little or no effect on the achievement of female students. This is in line with the findings of Abdullahi (1993), who suggested that female students due to their feminine nature can withstand only moderate stress.

Findings on the effect of four sets of continuous assessments on students mean achievement scores in NCE Biology showed that exposing students to four sets of continuous assessments have a positive and significant effect on their academic achievement in NCE Biology. The study further revealed that male students

achieve more than female students after four sets of continuous assessments in NCE Biology. The difference may be due to the high stress involved in preparing for so many continuous assessments, the more the number of continuous assessments the higher the stress the students are subjected to. This could be as a result of male students being able to cope with stressful experiences more than female students due to their superior physical and emotional stability over female students. Thus, male students are expected to perform better at high stressful conditions than female students. From the value of the mean scores, the male students have a mean score higher than the female students. Therefore, the male students with the highest mean perform better than the female students. This could be because the male students can withstand more stress and the rigorous drills involved in preparing for four sets of continuous assessments due to their masculine nature than the female students due to their feminine nature. The difference as revealed by results in the academic achievement of male and female students may be attributed to cultural and social factors. Women are socialized in preparation of their roles as wives and mothers while men are socialized and oriented to take up masculine roles of high prestige and high skills as in (Hassan, 2014). Some of the female students are married with children, so they have other responsibilities at home unlike the male students that are mostly bachelors.

Findings on the effect of continuous assessment scores and final examination scores of students exposed to four sets of continuous assessments in NCE Biology indicated that exposing students to sets of continuous assessments have a positive effect on their academic achievement order than one shot examination. The study also showed that there is a significant mean difference between continuous assessment scores and final examination scores of students exposed to four sets of continuous assessments in NCE Biology. Furthermore, the study recorded that female students achieve more than male students in examinations while male students achieve more than female students in continuous assessments. This might be due to the fact that smaller portion of the syllabus is being considered in the administration of the continuous assessment and this will make the preparation for the continuous assessment to be less stressful which makes the performance in continuous assessment to be better than the examinations which has wider coverage of the syllabus. Also the strictness in terms of invigilation and examination rules and regulation are more during examinations when compared to during continuous assessment. Therefore, students tend to be involved in

examination malpractice during the administration of continuous assessment as compare to final examination. This result is in line with the findings of Durotolu, (2004) where he conducted a research correlating continuous assessment and examination scores and find out there is a significant correlation between continuous assessment scores and final examination scores. This result is also in line with the findings of Aliyu and Ngadda (2010), whose study revealed that there is a strong positive correlation between formative evaluation and summative evaluation of the subjects considered.

Conclusion

The study therefore concluded that the treatment of continuous assessment had significant and critical impact on academic achievement of students in NCE Biology. Thus, students tend to achieve chemistry concepts better when exposed to series of continuous assessments. Application of continuous assessment in Biology teaching and evaluation is a ‘must’ if the objectives of Biology Education are to be achieved expeditiously. While some draw-backs exist in its implementation, there is the need to improve the strategies used, with emphasis on the teacher having a good knowledge of continuous assessment to enable him/her apply it properly and meticulously. Thus, the teacher needs to be awakened to the burden of continuous assessment practice.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. The study showed that students performed better in chemistry when they are exposed to series of continuous assessments (i.e. 4) before the final examination. Biology teachers should therefore strive to see that students are exposed to many continuous assessments before the final examination. This will go in a long way to increase their achievement.
2. The study showed that few continuous assessments are gender friendly. With many continuous assessments, male students performed better than female students. Therefore the teachers should encourage both sex (male and female) to participate equally in the learning and assessment process in biology.

3. The finding showed that continuous assessment scores do correlate with the final examination. Therefore, teachers should strive to make the continuous assessment of standard and it should be conducted under examination rules and regulations. There should also be more strictness during invigilation of the continuous assessments.
4. The colleges should organize seminars on continuous assessment for both lecturers and students. This is to acquaint all the parties involved of their roles in its practice and the things expected from them.
5. Teachers-students ratio should be reduced to a manageable size of say one lecturer to 40 students by either employing more lecturers or reducing admission into colleges of education. This will help reduce the work load on lecturers and encourage them to give as much number of continuous assessments as possible.

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