WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Competency-Based Learning on Biology Students' Academic Achievement in Colleges of Education in Nigeria.

[1]Egomo, John Ellah (Ph.D) , & Ayang John Etura[2], Igiri Charles Egbonyi[3]

[1,2] Department of Curriculum and Instruction,
[3]Department of Educational foundation and Administration
[1,2&3]Cross River State College of Education, Akamkpa, Nigeria

ABSTRACT

Competency-based learning refers to the system of instruction, assessment, grading and academic reporting that are based on students demonstrating that they have learned the knowledge and skills they are expected to learn as they progress through education. The main purpose of the study was to investigate the impact of Competency-based learning on Biology students' academic achievement in colleges of education in Nigeria. Two specific objective; two research questions and null hypotheses were formulated to guide the study. Pre-test-Post -test nonequivalence groups design was adopted for the study. One instrument known and called Biology Practical Achievement test (BPAT) was developed for data collection. The instrument was forwarded to three experts on Biology for vetting and scrutiny. Fifty Biology students outside the study area was used for the testing to ascertain the internal consistency of the instrument using Kuder Richardson coefficient (KR20). The reliability index of the instrument was 0.79. Analysis of Covariate (ANCOVA) was used to test all the null hypotheses at 0.05 level of significance. The findings of the study revealed that there is no significant difference between the mean achievement of students taught Biology with Communication-Based learning and those taught with conventional approach. There is no significant interaction effect between gender and the instructional approach of learning. It was recommended that stake holders in the education industries should shift focus from a simple factors to multiple factors (variables) in determining the academic achievement of students, gender bias should be remove in science education in our schools system. Based on the findings communication-Based learning are not significant factors of students achievement in Biology but, there may be other factors (variables) which were not mention in this study.

Keywords: *Competency-Based Learning Gender, Communication.-Based Learning, Biology students and academic achievement.*

Introduction

Competency- based learning or competency-based education is a framework for teaching and assessment of learning. It is also described as a type of education base on predetermined "Competencies" which focuses on outcome and real work (Wikipedi, 2016). Competency-Based learning (CBE) is an outcome based approach to education to ensure proficiency in learning by student through demonstration of the knowledge, skills, values and attitudes required for dealing with real life situation at the age and grade of appropriate level.

Competency-Based learning focuses on three key characteristics: learner-centre, differentiation and learning outcome. Competency-Based teaching and learning refers to the system of instruction, assessment, grading and academic reporting that are based on students demonstrating that they have learned the knowledge and skills they are expected to learn as they progress through the education.

Ana (2003) findings showed that there was no correlation coefficient between male and female performance emphasis practical but the male students practical. Peter (2014) proof that gender (male/female) has no significance effect on students achievement in social studies and also showed that there was significant interaction effect of treatment and gender on students academic achievement in social studies.

Olumatosin and Josial (2017) in their study shows that there is no significant effect of gender of students taught stoichiometry using hand-on activities analysis found that there was no significant interaction effect between method and gender on the mean achievement scores of students in stoichiometry Sukola, Abdulmalik and Yunusa (2016) findings showed that there was no significant differences of the performance of male and female students in sciences

Yakubu (2021) posit that there is significant difference between the performance of male and female students, but the male performed better than females counterpart. Umar(2015) findings show no significant difference between gender and students academic performance. Godspower (2017) posit that there s significant gender influence on students academic achievement in Integrated science.

Learning competencies are the main ideas or skills you expect students to master (called grade) we expect from 3-6 of these skills for each credit hour of instruction, like providing a morphologic diagnosis given a gross tissue specimen of the liver. The competency-based education (CBE) approach allows students to advance based on their abilities to master a skill or competency at their own pace regardless of environment. This method is tailored towards

building students abilities and can lead to more efficient student outcomes. However, there are three core competencies like communication, thinking ability and personal-social skills (Sturgies, 2011).

In a personalized competency-Based classroom, teachers are moving in between groups of learners, facilitating discussions, helping students explore and set goals or may be engaged more direct instruction with a few students at a time. That is for each individual student, the teacher should ensure that each student has full mastery of a particular skill before he or she can move forward. It gives a clear focus on preparing students for the next stage of their lives. In traditional education, all students in a classroom must be of the same age range, while competency-based education (CBE) is flexible to the students and where they are in the learning process and places deep understanding of the topic and it is based on the performance levels of each student with bias. Students are better prepared for life as adults. Competency-Based education (CBE) is an approach to teaching/learning that identifies the competencies that students must master.

Prior learning assessment is a tool used to assess learners outside of a student's academic programme at their own pace regardless of environment (Patrick & Pittengen, 2011).

Biology is one of the core science subject students offer mostly in the secondary schools. If you wish to study any of the sciences, because all the sciences involve matter, living and non-living things. Students wanting to become Doctors, nurses, physicists, nutritionists, pharmacists, management experts etc must study Biology. Biology investigates the natural phenomena both theoretical and empirical that can be applied in different fields of life. Specialist in Biology believed that it is necessary to develop teaching methods with a variety of strategies to make use of the attained knowledge in the real world. Competency-Based education (CBE) is an approach of teaching/learning which ensures proficiency in students through demonstration of knowledge, skill which is be the best method of teaching and learning of Biology in the school system, but it is not stated clearly in the college curriculum,

The researchers consider Communication-Based learning/conventional learning and Gender effect that should be considered most on student academic achievement.

Statement of the Problem

Over the years the researchers have observed that Biology is one of the core subjects in science education that has the ability to usher in Nigeria into the level of the needed technology in this information age. But there is still low performance of students offering Biology in the country. This trend, if allowed to continue may hamper the progress of the nation. Therefore, the need to search for solution to these students low performance. Lack of clear educational policies for effective implementation of the UBE curriculum, lack of validity and reliability in learners scores, lack of infrastructural facilities, lack of adequately trained teachers and students negative attitudes towards the subject (Biology) are all related to students' academic performance.

This study suspect that competency-Based learning may be related to academic performance. The problem of the study is posed as a question? Do factors like communication- Based learning, conventional-based learning and gender-Based learning influence students' academic achievement in Biology?

Objectives of the study

The main objective of the study was to investigate the impact of Competency-based learning on Biology students' academic achievement in Colleges of Education in Nigeria.

The specific objectives of the study are to:

1. Determine the effect of communication-Based learning on Biology students' academic achievement in college of education in Nigeria
2. Determine gender interaction effect with methods based learning on Biology students' academic achievement in college of education in Nigeria

Research questions

The following research question here posed to guide the study

1. What is the mean achievement of students taught biology using communication based learning and those taught without communication based learning in Colleges of Education in Nigeria.?
2. How does gender influences the mean achievement of students taught biology using communication based learning and taught without communication- based leaning in Colleges of Education in Nigeria.

Research hypotheses.

The following null hypotheses were formulated to guided the study.

1. There is no significance difference in the mean achievement of scores of students taught biology using communication based learning and those taught without communication based learning in Colleges of Education in Nigeria
2. There is no significant interaction effect between gender and instruction approach on students mean achievement in Biology in Colleges of Education in Nigeria.

Justification/Significance of the study

Competency-Based learning is of great benefit to students, teachers, employers and the society at large. It can help students develop and demonstrate mastery over a topic, build a culture of equity and inclusivity and prepare students for life beyond the walls of their schools. Core competency are sets intellectual personal and social and emotional proficiencies that all students need to develop in order to engage in deep learning and life-long learning. It gives positive effects on students' skills and help teachers to improve their teaching techniques.

Competency-Based curriculum (CBC) fosters on the development of crucial skills such as communication and collaboration, critical thinking and problem solving imagination and creativity, citizenship, learning to learn (Rutayuga, 2014)

Self-efficacy and Digital literacy. Competency-Based curriculum (CBC) is also beneficial to children/pupils in the following ways:

Early year education, middle school education, increase opportunities for children, improved communication skills, Digital literacy, imagination and creativity. Competency-Based curriculum is also beneficial in the teaching sector like equipping students with the knowledge, skills, and attitude that they will need to successfully navigate their personal journey in learning, living and working to encounter unfamiliar or challenging situations. Teachers' competency is also important for the process of students' development in ensuring quality learning especially for students in vocational and technical colleges.

Competency-Based Curriculum (CBC) is also beneficial to the employer of labour, by allowing employees to know exactly what is expected of them and how they should accomplish their tasks. It improve job performance, better identification of training requirements, better results from recreation and easier succession planning. Competency-Based Curriculum (CBC) lead to continuous feedback and support flexible learning mastery and real world relevance. Finally, each student can work on his or her own pace.

Design of the study

The Pre-test and Post-test non-equivalence group design was adopted for the study. The design was considered suitable because it is often used in classroom experiments when experimental and control groups are naturally assembled groups of intact classes. The difference between the mean of O_2 and O_4 scores (Mean gained scores) are tested for statistical significance.

E: O_1 X O_2

C: O_2 x O_3

E = Experimental group

C = Control group

O_1 x O_3 are pre-test

O_2 x O_4 are post test

Area of the study

Nigeria is a patchwork of distinctive regions, including deserts, plains, swamps, mountains and steamy jungles. It has one of the largest river system in the world including the Niger Delta , the third largest Delta on Earth. Much of Nigeria landmass is covered with plains and Savannas. Nigeria is often called the “Giant of Africa”. This name comes from the vastness of its land, the diversity of its land; the languages, its huge population (the largest in Africa) and it oil and other natural resources. These tropical grasslands spread out as far as the eye can see and are interrupted here and there by trees and shrubs. The South western plains are home to the Yoruba people who have lived there for thousands of years. There are more that 250 languages spoken in Nigeria and possibly more than 400 music and art spring from strong tribal roots and prevalent throughout society. At least 60 percent of Nigerian Live below poverty line, existing on less than a dollar a day. Unfair distribution of the country’s wealth, as well as political, ethnic and religious conflicts have put a strain on Nigeria’s southern Moutains, the slopes are covered by rain forest. Green plants grow everywhere, broken by flashes of colours from flowers, fruits, birds and butterflies. Thus, the home of rare western lowland gorrillas, once thought to be extinct in Nigeria.

Nigeria’s diverse landscape makes it ideal for a broad range of plants and animals. Many species live nowhere else on Earth. Unfortunately, there are not very many natural parks in Nigeria and competition for space with humans has left many species on the endangered list. Many years ago, Nigeria Savannas was blessed with giraffes, elephants, lions, cheetahs and large herds of antelope. Today, most of these animals have been killed by hunters or their habitats have been destroyed.(Wildlife , 2004)

The rule of Nigeria started in 1960. Since Nigeria won independence from the Britain in 1960, it has suffered through corrupt leaders occasioned by military rule. In 1999, the country adopted a new constitution of the first democratic elections in the past 20years were in Nigeria the most important country politically and economically in West Africa. It is richer than other West African nations and hold constitutional power. Nigeria most important export is oil, more than half of which is shipped to the United States. Rubber and Cocoa (for chocolate and cocoa) are also important export produce.

Nigeria boast the largest economy in Africa. It is projected to rank among the world's top ten economies by 2050. It has an abundance natural resources including oil and gas. The country holds the largest natural gas reserves on the continent and Africa largest oil and gas producer. Nigeria is a multi-national state. The three largest ethnic groups are the Hausa in the north, the Yorubas in the west and the Igbos in the East together constitutes over 60% of the total population. The country has more than 250 spoken languages. It has cultural diversities and Nollywood is the name of the Nigerian Movie industry.

Population of the Study

The population of the study consist of 5,500 NCE II Biology students in Colleges of education in Nigeria (2022-2023 academic session). This information was obtained from National Commission for Colleges of Education (NCCE) Headquarters for both Federal and State Colleges of Education in the country. The NCE II students was chosen for the study and the choice of this class was based on the fact that NCE II students have studied Biology for more than one year. They were be capable -of responding' to the instrument.

Sample and Sampling Techniques

The sample size comprise 1,000 NCE II Biology students that was selected from 12 states of the federation, 2 states in each zone and 24 Local Government areas in the whole country, Nigeria. Stratified random sampling technique was used to select 1,000 students from the population of 5,500 students Two states were selected from each region (zone), making a total of 12 states and two local government area in each state to make a total of 24 local government areas, all was selected using Simple random sampling of (Hat and cap). The name of each state and local government shuffling (shaking) one piece of paper was selected with replacement until the 12 states and 24 local government areas were selected. A similar approach was used to select one college of education in each of the 12 states in the states.

Instrumentation

The researchers designed a-50- item Multiple Choice Objective Biology Practical Achievement Test (BPAT) for data collection in the study. The items were constructed from NCE II Biology Practical Syllabus covering (5) five topics areas namely: cell, diffusion, photosynthesis, osmosis and carbon cycle.

Each item consisted of four options with one as the answers (key) while the other three are distractors. A table of specification in line with the best practices was constructed. Each participant was required to encircled the letter bearing the answer. The achievement test was divided into two parts; A and B. Part A deals with students' demographic information, Part B comprised 50-test items of Biology practical achievement Test (BPAT).

Table 1

Table of specification for Biology Practical NCE II students containing 50-items covering five (5)topics

S/N	Topics	Know ledge 30%	Compreh ension 25%	Applica tion 20%	Analys is 15%	Synth esis 10%	Evalua tion 5%	Total
1	30% cell	5	4	3		1	-	45
2	25% Diffusion	4	1.5	2.5			-	12.5
3	20%Photosynthesis	3	2	2	2	1	-	10
4	15% Osmosis	2	2	1.5	1	1	-	7.5
5	10%Carbon cycle	2	1	1	1	-	-	5
Total		15	12.5	10	7.5	5		50

Validation of the instrument

The Biology practical achievement test (BPAT) was forwarded to three experts in Biology Education for validation and vetting using, the title of the study, purpose of the study, research questions and null hypotheses including the table of specification containing 50 Items A terns from (5) five topics of NCE II Biology practical syllabus. This established the content validity of the instrument.

Reliability of the instrument

Fifty (50) students of comparable characteristics outside the study area was used for trial-testing to determine the internal consistency of the instrument using Kuder-Richardson 20 or (KR_{20}) to estimate the reliability index of the achievement test. The reliability index of the instrument was .79

Data collection procedure

The 5-itms Biology practical achievement test (BPAT) was administered across the 12 states and 24 local government areas of Nigeria. The students were briefed on the importance of the test so that they will be interested to complete the items. One thousand (1000) copies were administered to the students as pre-test before the commencement of the treatment and the students were given post-test. Some Biology lecturers were trained as research assistance in order to be able to handle both the experimental and control groups.

Data analysis

The two null (Ho) hypothesis for the study was analysed using analysis of covariance (ANCOVA).

Results and discussion

Data analysis and discussion were done as follows in table II

Null hypothesis one($H_{0:}$ 1)

There is no significance difference in the mean achievement of scores of students taught Biology using communication-Based learning and those taught without communication Based-learning in Colleges of Education in Nigeria.

Communication based learning is the independent variable while mean achievement of students is the dependent variable , both are continues variables.

Analysis of covariate (ANCOVA) was used to test the null hypothesis one $H_{0:}$ 1) as shown in table II.

Table II

Summary data of ANCOVA of students taught biology with communication based learning and those taught without communication-Based learning

Source	Type III sum of square	Df	Mean square	F	Sig
Correlated model	68462.88	5	13692.58	116.95	.00
Intercept	4388.35	1	4386.35	37.46	.00
Pretest	65873.41	1	65873.49	561.65	.00
Gender	4855.19	1	4855.19	41.47	.00
Methods	259.87	2	129.94	1.11	.33
Gender * method	307.92	1	807.92	2.63	.105
Error	116378.91	994	117.08		
Total	22.28153.00	1000			
Corrected total	184841.79	999			

R square=.37(adjusted) R square= .37)

Table II: showed the computed F- value (1.11) is less than the critical F- value of (3.86) at .05 level of significant for 5 and 994 degree of freedom for a two tailed test. This implies that the null hypothesis of 'no significance difference between the mean achievement of biology students taught using communication-based learning and those taught without communication-Based learning is not rejected but retained. Therefore the F- value calculated is not statistically significant.

Null hypothesis two (H_0: 2). There is no significant interaction effect between gender and instruction approach on students mean achievement in Biology in college of education in Nigeria

Gender and instructional approach are the independent variable and mean achievement is the dependent variable. Analysis of covariance (ANCOVA) was used to test the null hypothesis as shown in table II

From the table II above the calculated F-value of 2.63 is less than the critical F-value of 3.86 at 0.05 level of significant for 5 and 994 degree of freedom for a two- tailed achievement test. It implies that the null hypothesis of no significant interaction effect between gender and instruction approach on biology students achievement scores was not rejected, but retained, while the alternative hypothesis was rejected.

Discussion

There is no significance difference in the mean achievement of scores of students taught biology using communication based learning and those taught without communication based learning in Colleges of Education in Nigeria

The results of the first null hypothesis showed that there is no significance difference between taught Biology and communication-Based learning and those taught without communication Based learning. This finding was in agreement with Ashfaque, Zunaina and Sehrish, (2020) who posit that statistically there was no interpretable effect of the communication skills of the students on their academic achievement. The findings were contrary with some popular authors like Thangadura and Selvam (2017) and Aniaka and Enang (2020) findings revealed that communication skills of higher secondary school students are significantly correlated with their academic achievement. The major difference between the present work and the previous ones may be due to geographical location and sample size used for the study.

There is no significant interaction effect between gender and instruction approach on students mean achievement in Biology in Colleges of Education in Nigeria From H_0: 2 The results of the findings showed that there is no significant interaction effect between gender and intrucional approach on biology. This findings were in agreement with AINA (2015) findings which shows that there were no correlation coefficient between gender performance performed in physics practicals of male students and their female counterpart in physics practicals.

The finding also agreed with Umar (2015) findings which showed no significant difference between gender and students academic performance.

The findings also gave credence to Sukola, Yuausa and Abdulimalik (2016) who posit that there were no significant difference in the performance of male and female students in sciences.

The findings were not in corroboration with Peter (2014) whose result revealed that there was significant interaction effect between gender and instructional approach in social studies. The major difference between the present study and other may be due geographical and sample size of different studies.

Recommendations

1. Privatizing communication –Based learning should be minimized rather evaluators and researchers should shift focus from a single factors to multiple factor relationship
2. Stake holders in the education industries should remove gender bias in science education which is still prevalent in our education system

Conclusion

Based on the findings of the study, it was concluded that communication - based learning and gender are not significant factors to determine students achievement in Biology. Finally the researcher suggest that there may be other factors not considered in this study that may constitute significant factors of students academic achievement in colleges of education in Nigeria.

References

Abulmalik, S. & Yunus M. M. (2016) Compaartive analysis of gender performance in Biology, chemistry and physics among Pre-degree students of federal University, Dustinma. International Journal of Educational bench mark(IJEB) University of Uyo. 2489-0170.

Aeikwandu, S.O and Sanuel, N.N(2021) Examining communication as a tool for enhancing students' academic achievement in office technology and management. Journal of science and management Research vol 4 issue 7 nov 2022. 2581-6888.

Aina, V. O. (2015) Extraction and characterization of pectrin from peels of lemon (citrus lemon). Grape fruit (critrusparadis) and sweet orange(cirus scienceis). Birth Journal of hamarcology and toxiscology 3529-262.

Ana , P. (2003) Influence of Gender on interest and academic achievement of students in integrated science in Obioakpor L.G.A River State, Nigeria. European scientific Journal April 2017. Edition vol 13 (10).

Aniekan, N. and Enang, V.S (2020). Teachers communication skills and students academic performance of linguistic empirical study of students in tertiary institution in Akwa Ibom State Akwa Ibom state university and collge of education, Afahnsit. International Journal of advancement in education Management, Science and Technology 413 Calafornia.

Ashfaque, A.S. Zunaina, F.S and Sehrish, N. (2020). University students communication skills as a determinant of academic achievement. *Sirsyed Journal of Education and Social Research* (SJESR) Vol 3, Issue 2, DO1:https;//DOI,org/10.369021.vol iss2-2020(102-110).

Godpower, E, (2017) Students level of achievement and Communication skills. Through project-based learning (PBL) Approach; My Roller-coaster's in Science Learning. Journal of Social Science and Humanities (5) (5) 23-29. 2022.

Olumatosin, V.A and Josial, O. (2017) Effect of gender on Senior secondary school chemistry students achievement in storchemiometry using hands on sctivties. Department of curriculum and teaching, Benue state University, Makurdi, Nigeria. American Journal of Educational Research , 2017 vol 5, (8) 839-842.

Patrick and Pittengen (2011) Handbook on Continuous Assessment. London: Evan Brothers Publishers.

Peter, S. (2014) Intellectual Demands of Instructional Evaluation. *Journal of Education and Research,* 8(6) 151-162.

Rutayuga W. (2014) Project based Learning in Teaching Communication skills in English as a foreign Languages to Engineering students. National Research Tomsk Polytechnic University Tomsk. Russian (IJET) Vol 11 issues 4. 2016. http://dxdoi.org/10.3991/Ijet. vll.04.5416.

Sturgies (2011) Convert Concept and Competency in the implementation of Continuous Assessment in Colleges and Universities. Benin: University Press

Thangadural , R. AND Thanga , S. (2017). Relationship between communication skills and academic achievement of higher secondary students in triune lveli district PSN Colege of Education Tirunelveli. Edu. Reacg voc. Journal of Educational Research 22 vol 01 issue 01.

Umar, K (2015). The Impact of the effectiveness f educational organisation school of humanities, Hellenic open university 26335 Patras Greece; vbrainia2auebr. Gr (V.B) pselimi@gmail. Education science 2022 12-170.https//doi-org//10.33901/edusci.12030170

Wikipedia (2016) dictionary.com, 24th Macth , 2016

Yakubu (2016) Standardized Continuous Assessment Management Programme. *Journal of Applied Behaviour Analysis,* 12(5) 246-253

Yakubu A. (2021). Information and communication Technology – Based learning management in improving learning quality services in the Digita Era. University of Nigeria Gorontalo. Indoesia VINICSSH 2022. ASSEHR 698.PP 496-484.

Yunusa, M. (2016) strategies of engage online students and reduce altrition rates. *Journal of Education Online* 2(3) 14-28