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Effects of Cloud - Computing Instruction on Interest and Performance in Genetics Concept among State Colleges of Education Biology Students in North-West, Nigeria

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Abstract

This study investigated the Effects of Cloud Computing Instruction on Interest and Performance in Genetics among Biology Students in States Colleges of Education, North-West Zone Nigeria. The study has Four (4) Research Objectives, Four (4) Research Questions, Four (4) Null Hypotheses tested at $p \leq 0.05$ level of significance using Quasi-experimental design. Four groups of students were used for data collection: the two experimental and control groups were pre-tested before treatment; Post-tested and post post-tested to determine the effect of the treatments on performance and interest among groups. The study has total population of 1,360 NCE III Biology students in Seven States Colleges of Education in North-West, Nigeria. From the figure, a total number of 200 NCE III Biology students were sampled. Two validated instruments with reliability coefficient of 0.74 and 0.83 namely; Genetics Performance Test (GPT) and Students Interest to Genetics Questionnaire (SIGQ) were used for data collection. Research questions were answered using mean, mean rank and Standard Deviations. Null Hypotheses were tested using ANCOVA, Independent t-test, Man Whitney (U-test), Kruskal Wallisat 0.05 level of significance. Findings show that, significant difference was obtained between the mean academic performance scores of experimental and control group in favour of experimental group. The mean Interest scores of experimental group is greater than that of control group, Based on the findings of the study, the researcher recommends that the State Ministries of Education should collaborate with professional bodies such as STAN to train teachers through workshops, and seminars on the use of Cloud Computing Instruction in teaching Biology at Colleges.

Keywords: Cloud-Computing, Interest, Performance, Genetics, Biology Students

Introduction

Science is a dynamic and objective process of seeking knowledge, a way of explaining events and phenomena in nature. Science is also men, women and children investigating, inquiring and seeking verifiable knowledge of what the search leads to a new discovery. Science is classified into so many branches such as Chemistry, Physics, Biology and Basic Science. Biology however is the branch of science which studies life. It is a subject matter of great importance and concern to all. Biology helps to develop attitudes and science process skills such as observation, inferring, classifying, hypothesizing, questioning, measuring, interpreting, communicating, predicting, to mention a few. In view of the statements Okenyi (2012) states that, educating students in biology has been widely acknowledged as a way of promoting economic development, eliminating poverty and introducing social welfare. He further stated that, biology education is therefore the act of teaching and learning in order to inculcate or transfer the knowledge of Biology to students. In another dimension Nlewem (2012), defined Biology as the study of natural phenomena and environment which results from curiosity of man and also as a branch of science which plays a vital role in providing knowledge of relevant concepts, scientific skills, environment and natural phenomena. Biology is one of the natural science subjects taught in colleges of education in Nigeria, where Nigeria Certificate in Education (NCE) is obtained. This certificate (N.C.E.) is recognized as the minimum teaching qualification in Nigerian schools. Colleges of education are responsible for the teachers training and issue them with NCE Certificate after training.



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Magashi (2018) opined that, exposure to Biology education offers the NCE biology students a wide range of relevance to all aspects of life. Biology is among the subjects on the curriculum of Nigerian Colleges of Education under the supervision of the National Commission for Colleges of Education (NCCE). According to (NCCE 2012), the main philosophy behind the subject is to produce knowledgeable, highly motivated professional and effective teachers of Biology who will be able to develop in students, appreciation and understanding of biological process and principles. Despite this stated relevance of biology Okenyi (2016) find out that, there are shortages of qualified Biology teachers in Nigerian schools, and the so called teachers of the subject are not professionally qualified and may have the knowledge of the subject but lack the method. Okoli (2006) stated that, overwhelming majority of “science teachers prefer the conventional method of teaching and therefore shy away from innovative methods like conventional method. Also, Usman (2010) observed that, conventional method encourages rote learning without understanding, thereby resulting in poor performance among students. Rauschenberg (2015) added that, teaching and learning is now becoming easier, motivating and interactive due to new innovations in technology. In that respect, Tambaya, Lawal, and Ukor (2016) mentioned that, technology has recently provided qualitative teaching and learning materials to help both teachers and learners during teaching and learning sessions were for many years, educational materials have mostly been static texts with pictures printed on paper and in books with rapid developments in digital content and access to schools, these initiatives are geared towards development and provision of digital aids to schools all over the world. One of the aspects of Information and Communications Technology is the cloud computing, in which Abifarin (2016) stated that, the word cloud is used as a metaphor for the internet. So, the phrase cloud computing means “a type of internet-based computing” where different sharing of network are delivered to an organization’s computer and devices through the internet. Rania (2017) observed that, cloud computing in teaching and learning of science is the use of it in institutions of higher learning where it has provided a number of benefits to universities and colleges. Cloud computing is cost effective thus efficient where the resources are minimal. Secondly, the academicians derive a positive experience from its use. Zubairu (2016) reported that, students perceived Biology as too wide and too difficult to comprehend, the Biology textbooks are too difficult to read and understand which has contributed to the fluctuating results of Biology in NECO and WAEC update. This is what informed the present study. The issue of interest is another area of concerned in science education in which Lazarides and Ittel (2012) asserted that, interest has a powerful influence on academic performance and they demonstrated the function of interest in fostering remembering and understanding materials and stimulating students’ positively towards a topic. Abdullahi (2014) further added that, teaching NCE students using computer improves their interest, and helps them to have high potential academically and enhances their understanding of biology lessons. In addition, Chifwa (2015) stated that, Genetics is considered to be one of the most difficult topics to teach and learn in Biology by teachers and students in many part of the world its abstract and mathematics related nature. The Table 1.1 shows the result of NCE III Biology Students on Genetics.

Table 1: College of Education Genetic Results from 2015/2016 - 2021/2022 Academic Session of Sa’adatu Rimi College of Education Kano.

S/N	Academic Session	No of Registered students	No. of student Pass	No. of students Failed	Percentag e of Pass %	Percen tage of Failure %
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1	2015/2016	293	167	126	56.99	43'00
2	2016/2017	351	234	117	66.67	33.33
3	2017/2018	453	337	161	74.39	35.54
4	2018/2019	470	252	218	53.62	48.38
5	2019/2020	702	291	411	41.45	58.54
6	2020/2021	834	346	488	41.48	58.51
7	2021/2022	967	429	538	44.36	55.64

Source: Exam and Record office Sa'adatu Rimi College of Education Kano, April, 2022

It is against the background of the Table 1, that this study is centered.

Objectives of the Study

The study has the following objectives, To;

1. Determine the effects of cloud computing instruction on academic performance of state colleges of education Biology students taught genetics concept using cloud computing instruction;
2. assess the effects of cloud computing instruction on academic performance between male and female state colleges of education Biology students taught genetics concept using cloud computing instruction;
3. ascertain the interest levels of state colleges of education Biology students taught genetics concept using cloud computing instruction;
4. find out the interest levels between male and female state colleges of education Biology students taught genetics concept using cloud computing instruction;

Research Questions

The following research questions formulated are addressed in the study;

1. What is the mean difference of the academic performance scores between state colleges of education Biology students taught genetics concept using cloud computing instruction and those taught using conventional method?
2. What is the mean difference of the academic performance scores between male and female state colleges of education Biology students taught genetics concept using cloud computing instruction.
3. What are the interest levels of state colleges of education Biology students taught genetics concept using cloud computing instruction and those taught using conventional method?
4. What are the interest levels between male and female state colleges of education Biology students taught genetics concept using cloud computing instruction?

Null Hypotheses

The following null hypotheses were formulated and tested at $P \leq 0.05$ level of significance.

HO₁: There is no significant difference in the mean academic performance scores among state Colleges of education Biology students taught genetics concept using cloud computing instruction and those taught using conventional method.

HO₂: There is no significant difference in the mean academic performance scores between male and female state colleges of education Biology students taught genetics concept using cloud computing instruction.



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HO₃: There is no significant difference in the interest levels of state colleges of education Biology students taught genetics concept using cloud computing instruction and those taught using conventional method.

HO₄: There is no significant difference in the interest levels between male and female state colleges of education Biology students taught genetics concept using cloud computing instruction.

Research Methodology

The research design adopted for the study is a quasi-experimental control group design employing pretest, posttest and post posttests as recommended by (Kerlinger, 1973& Adamu, 2014). A pretest (O₁) was administered to both the experimental and control groups using same test instrument before treatment so as to determine whether there is no significant difference in the academic performance of sample selected before the treatment exposure. The treatment was conducted by teaching genetics concepts to the Experimental Groups (EG), using Cloud Computing Instruction (CCI), while the Control Group (CG) was taught the same concepts using conventional method for the period of six weeks. A post-test (O₂) was administered after six weeks of the treatment using the same test Instruments to determine the effectiveness or otherwise of the treatment on academic performance in genetics. The population for the study comprises all NCE III Biology students of the seven state colleges of education in north-west zone are 1,360 NCE III Biology students. Out of these numbers 547 are females while 813 are male the age range of the students is from 18 to 25 years of age. All Biology students in these colleges offer Genetics BIO 324. The summary of the population for the study is contained in Table 2.

Table 2: Population of the Study

S/N	College	Ownership	Male	Female	Total
1.	Adamu Augie COE Birnin Kebbi, Kebbi	State	103	68	171
2.	Isa Kaita COE Dutsin-ma, Katsina	State	119	71	190
3.	Jigawa State COE Gumel,	State	100	73	173
4.	Kaduna State COE Gidan Waya.	State	63	50	113
5.	Sa'adatu Rimi COE Kano.	State	256	165	421
6.	Shehu Shagari COE Sokoto.	State	90	64	154
7.	Zamfara State COE Maru.	State	82	56	138
Total			813	547	1,360

Sources: NCCE (2021) and Examination Office Departments of Biology of the Colleges of Education North-West (2022)

The sample for the study consisted of two state colleges of education from the seven state colleges of education in the study area. To select these two colleges, sampling random sampling technique was used. Simple random sampling technique from the hart was used for selection of two colleges out of the seven State colleges of Education located in the study area. The two states owned colleges selected formed one experimental and one control groups. The selected colleges of education were found to be equivalent in terms of their performance because the colleges selected were given pretest and the result of pretest was subjected to Analysis of variance in which ANOVA result showed no



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significant difference among the colleges. Also, the colleges of education used in the study are co-educational. The second stage of the sampling involved the selection of students for the study using simple random sampling technique using balloting. The sample consisted of 200 NCE III Biology students drawn from the two colleges of education in the study area. That is, students from Jigawa State College of Education Gumel and Isa Kaita College of Education Dutsinma Katsina. To select the 200 subjects, the researcher used simple random sampling techniques in line with the central limit theorem, which proposed a minimum of 30 subjects as viable for experimental research (Tuckman, 1975 & Sambo, 2008). Where 95 subjects form the two experimental groups and also 105 subjects form the control groups. Table 3 shows the Sample for the Study.

Table 3: Sampled for the Study

S/N	Groups	Sample Selected Based on Gender		Total
		Male	Female	
1	Experimental College B (EG ₂)	53	42	95
2	Control College D (CG ₂)	56	49	105
	Total			200

Three instruments were used for the study, Genetics Performance Test (GPT), Students Interest to Genetics Questionnaire (SIGQ) and lesson Plans for both experimental and control groups. The Genetics Performance Test (GPT) was developed by the researcher based on the selected topics taught. The test is made up of two sections (A and B). Section A sought for the students' personal information like gender, names, age. Section B contained 40 multiple-choice (objective tests). The items in section B were evenly distributed over topics chosen for the study. The instrument and marking scheme for these 40 test items validated by experts. The lessons plans were used for both experimental and control groups respectively. The items for the GPT were designed according to Bloom's Taxonomy and the items were drawn from NCE III Biology syllabus (GPT) obtained from the Nigeria Certificate in Education Minimum Standard for Sciences 2012 Edition. The GPT was administered to both the experimental and control groups used as pretest, posttest and post-posttest. The purpose of the instrument was to assess the level of students' performance before and after treatment. Genetics falls within the NCE III course content and the course code is BIO 324 (NCCE 2012).

Presentation of Results

The summary of the result is hereby presented in Table 4a

Table 4a: Means and Standard Deviation of Pretest and Posttest Scores for Two Groups

Groups	Test	N	Mean	Std. Deviation	Mean Gain	Mean Difference
Exp	Pretest	53	14.30	5.16		
	Posttest	42	33.05	9.19		-18.75
Control	Pretest	56	14.70	4.14		
	Posttest	49	16.31	5.51		-1.61

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In Table 4a, the descriptive statistics, the mean performances showed that at the control group the pretest and posttest scores are 14.70 and 16.31 respectively with a mean gain of -1.61 while on the other hand at the experimental group the pretest and post test scores are 14.30 and 33.05 respectively, with a mean gain of -18.75. This is an indication that, the teaching strategy improved the performance of the experimental group.

Hypothesis One: The data were analyzed as contained in the summary in Table 4b

Table 4b: ANCOVA Statistics for Experimental and Control Groups

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	R
Corrected Model	13126.95	3	3375.65	108.98	.00	Sig
Intercept	90620.01	1	90620.01	2273.8	.00	Sig
Groups	2501.66	1	2501.66	87.29	.06	NSig
Tests	4722.01	1	4722.01	142.38	.00	Sig
Groups * Tests	2903.26	1	2903.26	97.26	.00	Sig
Error	8011.03	236	41.22			
Total	11475	240				
Corrected Total	22637.98	239				

Significant at alpha 0.05 level

In Table 4b: the results indicates that the calculated P value in Groups versus tests value of 0.00 is lower than the 0.05 and its computed F value of 97.26 is above the F critical value of 3.000 at df1. Even between groups and between tests the p value of 0.00 is lower than the 0.05. Consequently, the null hypothesis is therefore rejected.

Research Question Two: The data from pretest and posttest scores was subjected to mean and standard deviation for both groups. The summary is presented in Table 5a.

Table 5a: Mean and Standard Deviation for Male and Female Experimental Group for State Colleges

Gender	N	Mean	SD	Mean difference
Male	53	33.76	6.84	1.43
Female	42	32.33	11.13	

In Table 4a, the computed mean performance scores are 33.76 and 32.33 by male, while the female state colleges of education taught genetics using cloud computing instruction are 32.33 and 11.13 respectively, implying an insignificant mean difference of 1.43 in favor of the male students. Cloud computing instruction is hereby retained. This is an indication that, the strategy is gender friendly.

Hypothesis Two: The data collected from posttest scores is presented in summary of Table 5b

Table 5b: Independent t-test Statistics for Male and Female of Experimental Group

Gender	N	Mean	SD	Mean difference	df	t calculate	t critical	P	Remarks
Male	53	33.76	6.84	1.43	58	0.60	1.96	0.55	NSig
Female	42	32.33	11.13						

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No Significant at alpha 0.05 level, t computed = 0.93 < t critical value of 1.96 at degree of freedom 58. In Table 4.4b, the analysis indicates that the calculated value of 0.55 is greater than the 0.05 alpha level of significance. Consequently, the null hypothesis is hereby retained.

Research Question Three: The results from posttest scores of students interest to genetics questionnaire was subjected to mean rank and mean rank differences of both the male and female for the experimental groups. The summary of the findings is presented in Table 6a

Table 6a: Mean Rank Statistics for Experimental and Control Groups

Groups State	n	Mean Rank	Sum of Ranks	Mean Rank differences
Experimental	53	37.98	1139.50	14.96
Control	56	23.02	690.50	

In Table 4.9a, the Mean Rank Interest of the state students taught genetics concept using cloud computing instruction and those taught using conventional method are found to be 37.98 and 23.02 respectively. In the same vein, their sums of Ranks are 1139.50 and 690.50 respectively, which shows that, the state students taught genetics concept using Cloud Computing Instruction have a significant higher interest than their counterparts taught using conventional method.

Hypothesis Three: The data from the posttest scores were subjected to Mann Whitney. The summary of the findings is presented in Table 6b

Table 6b: Mann Whitney test (U-test) Difference in the Interest Levels for State Colleges for Experimental and Control Groups

Groups state	N	Mean Rank	Sum of Ranks	Mann-Whitney U	P	R
Experimental	56	23.02	1139.50	225.500	0.001	Sig
Control	56	23.02	690.50			

Significant at alpha 0.05 level

Table 4.9b of non-parametric test of Mann Whitney statistics, the P value of 0.001 is below the 0.05 alpha level of significance from this background of argument, it shows that, state students taught genetics concept using cloud computing instruction have significant higher interest than their counterparts taught using conventional method. Therefore, the null hypothesis is hereby rejected.

Research Question Four: The result of posttest score is presented in Table 7a

Table 7a: Mean Rank and Mean Rank Differences in Interest Levels of Male and Female or Experimental and Control Groups

Groupings States	n	Mean Rank	Mean Rank differences
Experimental Male	53	35.63	4.70
Experimental Female	42	40.33	
Control Male	56	20.13	5.77
Control Female	49	25.90	

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In Table 4.10a of the mean rank statistics, Their Mean Rank Interest of the state students are 20.13, 25.90, 35.63 and 40.33 by Control Male, Control Female, Experimental Male and Experimental female respectively. It shows that both male and female state college students taught genetics concept using cloud computing have higher interest than those taught using conventional method.

Hypothesis Four: The data from posttest scores were subjected to Kruskal Wallis. The summary of the findings is presented in Table 7b

Table 7b: Kruskal Wallis test on Difference in Interest Levels between Male and Female State Colleges for Experimental Groups

Groupings States	n	Mean Rank	df	H	P	R
Experimental Male	53	35.63	3	12.48	0.00	Sig
Experimental Female	42	40.33				
Control Male	56	20.13				
Control Female	49	25.90				

Significant at alpha 0.05 level

Based on the outcome of the non parametric test of Kruskal Wallis statistics of Table 7b, the P value of 0.00 is lower than the 0.05 alpha level of significance. From this background of discussion, it shows that, both male and female state colleges students taught genetics concept using cloud computing have higher interest level than those taught using conventional method. Therefore, the null hypothesis is hereby rejected.

Discussion of Findings

The finding of hypothesis one is not in line with that of Bala (2018) who conducted study on gender effect on performance and retention in basic science through computer assisted instruction among secondary school students in Kano metropolis showed that, there is no significant difference in the level of performance between male and female students taught basic science concepts using computer assisted instruction. The finding of the hypothesis three support the findings of Nwanne and Agommuoh (2017), who investigated the Effect of Computer Assisted Instruction (CAI) On Students' Interest and achievement in physics in Imo state, Nigeria. Their findings revealed that the students in the experimental group who were treated with computer assisted concept mapping achieved significantly better than those in the control group.

Recommendations

1. There is need to encourage teachers to learn ICT especially the use of cloud computing instruction through sponsorship to workshops both within and outside the campuses.
2. Interest Levels of male and female students is more enhanced when Cloud Computing Instruction is used in teaching Biology than conventional method. There is a need for NCCE and TETFUND to equip ICT centres with facilities that support the use of the strategy such as computers, internet connectivity, and smart phones, among others to bridge the gender disparity.
3. The cloud computing instruction is gender friendly. Therefore, it should be used for teaching of genetics concepts for both male and female in both federal and state-owned colleges of education.

References

Abdullahi I.J.D. (2014). Effects of Guided Inquiry Teaching Method on Self-Efficacy and Academic Achievement of Nigeria Certificate in Education Integrated Science Students in North-West,



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Nigeria. Unpublished M. Ed Theses, Department of Science Education Ahmadu Bello University Zaria.

Abifarín, M.S. (2016). Inevitability of Cloud Computing in Operation of Distance Learning Programme in Nigeria. *International Journal of Research in Science, Technology and Mathematics Education*. 4 (2) 110-117.

Adamu, G.J. (2014). Effect of Problems-Solving Instructional Strategy on Self Efficacy, Creativity and Academic Performance in Genetic Among NCE Students. Unpublished PhD. Thesis Department of Science Education Ahmadu Bello University, Zaria, Nigeria.

Bala, S.S. (2018) Gender Effect on Performance and Retention in Basic Science Through Computer-Assisted Instruction among Secondary School Students in Kano, Nigeria. Science Teachers Association of Nigeria 59th Annual Conference Proceedings. 118-127.

Chifwa J (2015). The Teaching of Genetics in selected Secondary Schools in Kitwe District, Zambia. Unpublished dissertation submitted to the University of Zambia in fulfillment for the Requirements of the Degree of Master of Education in Science.

Kerlinger, F.N. (1973). *Foundation of Behavioral Research*. London: Holt Rinehart and Wiston.

Lazarides, R., and Ittel A. (2012). Mathematics Interest and Achievement. *International Journal of Gender, Science & Technology*, 5(3), 207-214, Retrieved from www.genderandstem.com on 23/10/2017.

Magashi, A.G. (2018). Factors Responsible for Poor Academic Achievement in Biology. A Review. *Watari Journal of Science and Technology Education*., 5(1)61-67. A Publication of Secondary Education (Sciences) Federal College of Education Technical Bichi. Paramount Printer.

NCCE, (2012). *National Commission for Colleges of Education, Minimum Standard for Science*. Bifocal Publisher and Communication Ltd.

Nlewem, S.U. (2012). *Biology Teaching in Nigeria*. Lagos Government Press.

Nwanne, S. C. & Agommuoh P. C. (2017). Computer Assisted Instruction (CAI) On Students' Interest And Achievement In Physics In Imo State, Nigeria. *Journal of Research and Method in Education* 7(3) 53-58. Retrieved from www.iosrjournals.org on 12th Dec, 2019.

Okenyi C. I. (2016). The challenges and prospects of Biology Education in Nigeria. *Journal of Assertiveness*, 10(1)91-98. June, 2016. Retrieved from <http://globalacademicgroup.com/journals/assertiveness/Okenyi.pdf> on 12th Feb, 2018.

Okenyi, C.I. (2012). Science and Technology Education for Entrepreneurship Development, Proceeding of the 7th National Conference of Schools of Science FCEE. 15-19.

Okoli, J.N. (2006). Effect of Investigation Laboratory Approach and Expository Method Acquisition of Different Levels of Scientific Literacy. *Journal of Science Teachers Association of Nigeria (STAN)*. 41(1 & 2) 79-88.



Effects of Cloud-Computing Instruction on Interest and Performance in ... Ishaq, U. (2026)

Rania M. A. (2017). A Survey on the Adoption of Cloud Computing in Education Sector. *International Journal of Scientific & Engineering Research*, 3(1) 321-345. ISSN 2229-5518. Retrieved from r.almajalid@seu.edu.sa on 12/07/2017.

Sambo, A.A. (2008). *Research Methods in Education*. Stirling-Horden Publishers (Nig) Ltd Gaaf Building, 110-112 Oyo Road, Orogun, Off University of Ibadan Second Gate, Ibadan, Oyo State, Nigeria.

Tambaya, I.S., Lawal, T.E., & Ukor, D. (2016). Impact of using Digital Learning Materials on Academic Performance of Pre-NCE Biology Students in North-West Zone, Nigeria. *Journal of Educational Research and Development* 10(1)76-83. Faculty of Education Ahmadu Bello University, Zaria Nigeria.

Tukman, B.W (1975). *Measuring Educational Outcomes*. New York; Harcourt Brace Hovawick

Usman, I.A. (2010). The Effects of Indoor and Outdoor Laboratory Instructional Methods on Academic Achievement of Junior Secondary School Integrated Science Students in Zaria Local Government Area of Kaduna State. *Journal of Studies in Science and Mathematics Education*, 1(1) December. Institute of Education. A.B.U. Zaria.

Zubairu, Z. (2016). Effects of Internet-Based Learning Tools on Performance of Senior Secondary School Students in Biology in Kaduna State, Nigeria. Unpublished Ph.D Theses. Department of Educational Foundation and Curriculum, Faculty of Education, Ahmadu Bello University Zaria, Nigeria