Assessment Of The Effect Of Hybrid Learning Approach On Students Academic Achievement In Advanced Level Programming Course In Federal College Of Education (Tech.) Bichi, Kano State, Nigeria

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Abstract: This study investigates the academic achievement of NCE Computer students in Advanced level programing language course by comparing Hybrid course model instruction and traditional face-to-face instruction in Federal College of Education (Technical) Bichi, Kano State, Nigeria. Two research questions were answered, and three hypotheses were also tested at 0.05 level of significant. Quasi-experimental non-randomized pre-test post-test control group research design was adopted for the study. The population of the study consisted of 290 NCE 3 Computer Science Education students in Federal College of Education (Technical) Bichi, Kano State. The sample size was made up of 167 Computer Science Education Students of Federal College of Education (Technical) Bichi, Kano State. Purposive sampling technique was adopted as intact classes were selected as experimental and control groups. The instrument used for data collection was an achievement test. The instrument was validated by two experts and the reliability of the instrument yielded a coefficient of 0.79. The instrument was administered as pre-test to both experimental and control groups. The teaching approaches were applied for five weeks after which the post-test was administered. Mean and standard deviation were used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance. The study revealed that Hybrid course model approach had a significant effect on students' achievement in Advanced level programing language course than the conventional classroom approach. The results also show that male students did not significantly differ from female students in their achievement scores in Advanced level programing language when taught with Hybrid course model approach. It was recommended, among others that, lecturers in NCE Computer Education Department should be encouraged to use Hybrid course model approach as it improves students' achievement in the course.

Keywords: Academic achievement, Hybrid course model, NCE Computer Education, Advanced Level Programming Language Course.

I. INTRODUCTION

BACKGROUND TO THE STUDY

Computer programming is a course that involves skill in designing algorithm, writing program, understanding the syntax as well as the logic of the program. It is an art that requires the individuals' ability to interpret challenges into solutions. Computer Science Education students on Nigeria Certificate in Education are required to take several programming courses as structured in their 3-year program. The objective of NCE computer education is to contribute to national development by producing teachers who: will teach computer studies at both primary and junior secondary school

levels, write accurate computer program, and who can demonstrate high level of competence for further studies in computer science (NCCE, 2020). But in recent time, the attention of researchers have been drawn to incessant failure in programing courses among the computer students in higher institution of learning (Edem & Kibar, 2016, Shaw ,2017)

Kofi, John & Yaw (2015) in their study, attributed poor performance of students in computer programming courses to lack of previous programing experience, that is lack of background knowledge, inadequate computer laboratory to conduct practical work, lack of interest and participation of students, and poor teaching methods among other.

It is quiet unfortunate that the goal of incorporating these programming courses into the programme of teacher education at NCE level of education had not been fully actualized going by the available record of performance of students in programming courses. For instance, the students' records from Examination Office of Federal Colleges of education(Technical) Bichi from 2015/2016 to 2019/2020 sessions on advance programing level course in computer department are tabulated as follows:

SESSION	GRADE A	GRADE B	GRADE C	GRADE D	GRADE E	GRADE F	TOTAL
2015/2016	51	60	67	76	68	30	352
2016/2017	33	70	100	163	155	58	579
2017/2018	12	28	55	60	155	46	356
2018/2019	6	18	44	52	86	56	262
2019/2020	0	27	38	55	38	22	180
TOTAL	102	203	304	406	502	212	1729
PERCENTAGE	6	12	18	23	29	12	100

Table 1 Source : School of Secondary Education (Science) Exam office FCE(T) Bichi (2022)
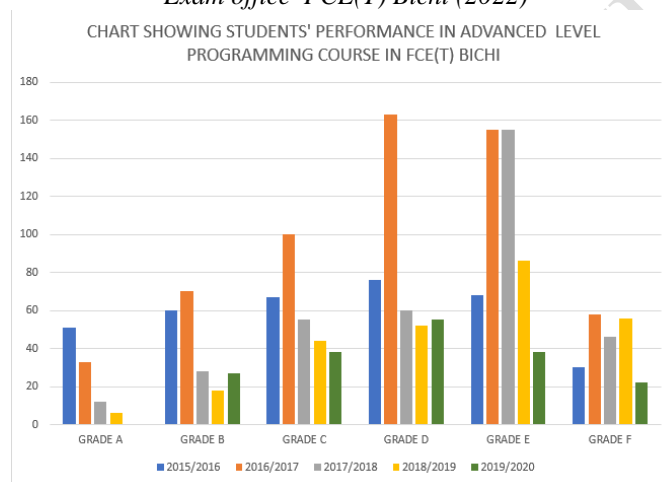

Figure 1 Source: School of secondary Education(science) Exam office FCE(T) Bichi (2022)

It was revealed from figure 1 above that no candidate had grade "A" in 2019/2020 session in advanced level programing course and majority of the students struggled to pass at grades "D" and "E" respectively. Even though in other sessions there were few students that had grade "A", majority of the students managed to pass at grades "D" and "C". All these point to the fact that there have been poor learning achievements which may not guarantee high level of man power development as contained in the overall objective of computer education in the NCCE 2020 Minimum standards for Computer education. According to NCCE (2020) the

objectives of the computer education programme for Colleges of Education, students on completion of Nigeria Certificate in Education (NCE) should be able to:

✓ Teach computer studies at primary and secondary school levels;
✓ Write program and process data with maximum speed and accuracy;
✓ Demonstrate reasonably high level of competence for further studies in computer science
✓ Motivate pupils' interest in the study of computers by appropriately using ICT teaching/learning strategies.
✓ Apply the use of computer as an aid in daily life activities.

It is very obvious from the table 1 above that there is serious declined in student performance in programming courses in NCE computer programme and hence making the objectives of introducing this progaramme to NCE to no longer been obtainable. Various studies conducted that investigate causes of failure in computer education courses especially in programming courses in Colleges of Education had pointed to poor methods of teaching been adopted by the teachers handling those courses among others.

Despite various interventions that Colleges of Education are receiving from Tetfund and other NGOs especially in provision of ICT facilities and equipment to various institution of learning, then the question is to what extent are these ICT facilities been deployed or applied by teachers and students for teaching and learning activities which are the purposes for which these facilities were given to serve. Though there may be hinges such as epileptic power supply, poor or lack of network for internet access, among others, but when teachers decide to make move toward increasing the quality of the educational experience in their classroom, they must understand how to best meet these obstacles with a positive, can-do attitude. The teacher must consistently strive to accomplish one thing: to teach in the way that fits the best interest of the students, whatever way that might be to allow students as much success as possible.

The essentialist approach to the current classroom environment is one that is becoming obsolete, and students subjected to this type of learning are not reaching their potential especially in programming courses. According to Edrem & kibar, 2016, the "use of hybrid learning technology could provide students with the flexibility to learn at their own pace since learning is not restricted to four corners of classroom, teaching situation can be recorded and re-played by students for better understanding". Researchers actually decided to use this approach because it has been proven by different researchers to be effective in handling critical situation in teaching and learning especially when the adopted pedagogies are not yielding expected outcome.

Take for instance, a similar study by Kazu & Demirkol, (2018) have shown that when comparing blended learning environment consisting of a focus on student directed, student led, technology infused instruction with a traditional learning environment consisting of a focus on direct, teacher led instruction, "the academic achievement average of the students who have studied in blended learning environment has been found higher than the academic achievement average of the students who have studied in traditional learning environments" this similar approach is a confirmation that

Hybrid learning offers an opportunity for higher student achievement that may not be available to students otherwise. The logic for offering a hybrid learning environment in an educational setting is one that gives students much more flexibility in their learning as well as more depth and richness to their studies.

Hybrid course model is an educational approach that combines traditional classroom instruction and online instruction. It was initially designed to ease students into the online transition and overcome anxieties related to the online learning environment (Oh & Park, 2014). In a hybrid classroom, instructors utilize technologies, specifically online instructional components, to replace and augment portions of classroom instruction.

The introduction of hybrid course model offer opportunities to both teachers and learner to communicate in both conventional and nonconventional method of teaching thus resulting into an improved learning outcome (Parker & Nelson, 2015). According to Saito, (2014) in hybrid learning approach a teacher can create a Learning Management System (LMS) for any course involving all the students belonging to that class and can also include more teachers for the same subject, which helps the learners to gain additional ideas on the same topic from multiple teachers as well as online resources too for further sustenance. The topics to be covered and the reference materials may be intimated to students well in advance so that students can come well prepared for the topic and this can bring better interaction between teacher and students in the overall learning. The students get notification to their emails, devices installed with the same app whenever an activity is initiated in the Moodle and Google Classroom, like posting any announcements, assignments, etc. by the facilitator, when a learner of the class asks any question related to any topic, or even when they start a new discussion all that are involved will always received message alerts. In addition to this Moodle and Google Classroom fits perfectly into the LMS which are becoming increasingly popular.

There is a lot to be gained by having such technology embedded into our educational system since most of our educational Institutions and colleges of education do not have enough funds for full implementation of E-Learning. So, we can best utilize all these approaches by using an appropriate tool that is freely accessible to everyone following the Educational Social Responsibility.

As quoted by Kenney & Newcombe, (2015) "Major reasons for adoption of the hybrid technique are to increase student engagement and involvement in the learning process and improve student learning", thereby increasing their level of academic achievement. Not only used to improve achievement, but hybrid learning is also used by some institutions to help strengthen their pedagogical goals. Students' attitudes toward their academic achievement are also an area of concern for teachers and are an added concern for the scope of this research. Since students' achievement has a bearing on their employment, attitude toward their profession, as well as the learning that on in their individual classes – understanding the students' mentality toward a certain way of learning is equally important and all these are part of consideration of hybrid learning approach.as one possible way of reaching this goal. It is imperative that teachers, schools, and educational institutions continue to search for the best ways in which to prepare students for their future.

In applying the Hybrid learning approach, educational resources for the lessons can be made available for the students via a Learning Management System (LMS). A Learning Management System (LMS) is a software application that coordinates the learning activities of an organization which includes teaching, assessing, tracking results, getting feedback and presentation of reports of the entire process. As defined by News Ghana (2013), it is a software application that is an excellent medium for training and evaluating students which enables teachers to deliver the right kind of content to the learners. This implies that LMS can provides a platform for interaction between lecturer and students outside the classroom through threaded discussion forum which further enhances students' participation in the educational process. There are many Learning Management Systems (LMS) that can be applied for either fully online learning or hybrid learning approaches. Examples include, but not limited to, Blackboard, Google classroom, Moodle, Canvas, ecollege, and aTutor,.

Other online platforms that can be used for hybrid learning activities include blogs, social networking sites such as Facebook, Whatsapp, Instagram, Youtube and so on. In this study, the LMS that was employed as the virtual learning environment for the hybrid learning approach is Moodle. Moodle (Modular Object Oriented Development Learning Environment) is an open source Learning Management System that enables teachers to arrange their materials in a student-friendly manner. Moodle is a free open source LMS built on a sound educational philosophy through collaboration from members of the Moodle community (Cole, 2017). It is open source because each user has access to the software source code and can design the environment to suit any peculiarities. As a result, Moodle can be used in the hybrid learning approach as teachers can post educational resources and links online which can be accessed by students at any time and place as long as there is internet connection.

Academic achievement refers to the extent to which a student is able achieve the short term goals of a course, measured in the scores obtained after a test. As it applies to education, academic achievement refers to the attainment of outcomes that are tied to educational experiences (York, Gibson, & Rankin, 2015). Students are exposed to educational experiences within a given period and then assessed to see the outcomes of such exposure. The results of the assessments are computed and then used as the achievement of the students.

Gender can be a factor that could influence the application of technology in the teaching and learning process. That is male and female computer science education students may differ in their response to the usage of LMS in teaching and this may influence their achievement. As pointed out in Eze, Ezewalor and Abidemi (2016), that have conducted similar research in financial accounting, reported that male and female students who were taught financial accounting using problem based method did not differ significantly in their academic performance and retention scores in the course. Male and female students" achievement and retention in advance programming course may differ when the course is taught with innovative approaches. Advance programing

course in Federal college of education (Technical) Bichi, over the years has been taught using the conventional classroom approach. The lecturer delivers the learning content in class as students participate by asking questions and doing class activities. However, students" achievement in advance programming course over the years, has been shown to be below average and poor (Exams record, FCE(T) Bichi). This gave rise to the need to try new approaches to teaching of Advance Programming Language to see whether it can yield better results.

It is on this background that researchers undertake this study, to find out the effectiveness of hybrid course model (learning approach) in handling Advance programming language course and also to determine whether hybrid learning approach can improve students' achievement in advance programming course better than the conventional classroom approach among NCE 3 students of computer department in Federal College of Education (Technical) Kano state.

STATEMENT OF THE PROBLEM

It is important to note that no nation can boast of generating adequate manpower if the programme implementation (in which pedagogy is one) for manpower development is faulty. The students' performance in advance programing course as revealed in the table 1 and other programing courses especially in Federal Colleges of Education (Technical) in Kano state is becoming worrisome and such has become a matter of concern to a lot of computer educators, parents and employers of labour. This problem of poor performance also negates the purpose of ensuring adequate man power training as well as skill acquisitions for self-reliance thereby leading to production of low quality man power to the society. It can also affect the candidate in terms of going for further educational qualification as their chance of having the minimum required grade could be truncated, the crucial area of this problem is that any student that could not ohtain at least pass at grade "E" within the maximum number of years (5 years) stipulated for NCE programme will be issued a compulsory withdrawal. and when a student is withdrawn from school, apart from time and resources been wasted ,there is possibility for such student to become nuisance or criminals to the society in which he/she belong.

However, in recent years, there have been studies of Kofi et al (2013), Cheng, & Chau (2015) and Shaw,(2012). which examined "causes of failure in computer programming course", "relationship between students' level of satisfaction and academic performance", as well as "views about learning environments" have increased seriously. More so, most of these investigations were carried out at university level. There were no enough studies regarding Nigeria Colleges of education on how to improve students' performance in computer programming courses through application of better pedagogy. Thus, this study aims to fill this gap by investigating the effects of hybrid learning approach in comparism with conventional teaching method on students' academic achievement especially in advanced level programing course.

OBJECTIVE OF THE STUDY

The main objective of this study therefore, is to examine the "Effect of Hybrid Course Model (learning approach) on student achievement in advanced level programing course in College of Education in Kano state Nigeria" specifically the study;
✓ determine the effectiveness of hybrid learning approach by comparing with conventional teaching method on the teaching and learning of advanced level programing language course in Colleges of Education in Kano state
✓ determine the influence of hybrid learning approach by comparing with conventional teaching method on students' achievement in advanced programing language course in Colleges of Education.in Kano state
✓ determine the influence of hybrid learning approach by comparing with conventional teaching method on male students taught advance programming course in colleges of education Kano state
✓ determine the influence of hybrid learning approach by comparing with those taught with conventional teaching method on female students in advance programming course in colleges of education Kano state

RESEARCH QUESTIONS

This study was guided by the following research questions:
✓ What is the difference in mean academic achievement scores of computer education students taught advance level programming language using hybrid learning approach and those taught using conventional classroom approach?
✓ What is the difference in mean academic achievement scores of male and female students taught advance level programming language using hybrid learning approach as compare to their counterpart taught with conventional teaching method?

RESEARCH HYPOTHESIS

The following hypotheses were tested by the study at the probability of 0.05 level of significant at relevant degree of freedom;

Ho1: There is no significant difference in the academic achievement of the student taught using conventional teaching method (control group) and those taught with hybrid course model (experimental group) in the college of education, Kano state

Ho2: There is no significant difference in male students academic achievement of the student taught using conventional teaching method (control group) and those taught with hybrid course model (experimental group) in the college of education, Kano state

Ho3: There is no significant difference in female academic achievement of the student taught using conventional teaching method (control group) and those taught with hybrid course model (experimental group) in the college of education, Kano state

SCOPE OF STUDY

This study was delimited to Federal College of Education (Technical) Bichi, in Kano state, Nigeria that offer Computer Education Programme. This study was also be delimited to all NCE 3 students in Computer department of the institutions. More so, the study was delimited to the application of two teaching methods namely, Hybrid Course Model approach and Conventional teaching method (lecture method) for teaching only advanced level programing course which is one of the NCE courses at second semester year 3.

RESEARCH DESIGN

This study adopted quasi-experimental design, pre-test-posttest design. This design is considered most appropriate for the study as randomization of the students into experimental and control groups was not very possible in the present situation.

POPULATION OF THE STUDY

The study was carried out in Federal College of Education (Tech) Bichi. The target population for the study was total number of students offering Advanced programing language (CSC 321) at NCE III second semester

Below is the table of population distribution of NCE 3 Computer education students in Federal college of education (Technical) Bichi, Kano state

DEPT. LECTURE, GROUPING	NCE 3 COURSE COMBINATION GROUP MEMBER	STUDENT POPULATION
A	COMPUTER BIOLOGY (SE/19/31051-SE/19/37867)	90
B	COMPUTER BIOLOGY (SE/19/378497-SE/19/39212)	74
C	COMPUTER/CHEMISTRY	45
	COMPUTER/INTEGRATED SCIENCE	41
D	COMPUTER/MATHEMATICS	25
	COMPUTER/PHYSICS	15
NCE 3 STUDENT TOTAL POPULATION		290

Source: Computer Department, Federal College of Education (Technical), Kano State)

SAMPLE AND SAMPLING TECHNIQUE

The sample for the study was made of 167 NCE 3 Computer Science Education students in FCE(T) Bichi offering advance level programming language course in computer education department in Kano state. The sample size was comprised of 53 computer education students sampled (students with android phones or personal computers to complement computer laboratory facilities) in group A & C (24 males and 29 females), and 114 computer education students of group B & D (49 males and 65 females). Purposive sampling technique was used in selecting from the intact classes into grouping arrangement for the study. The sampled from group A & C were grouped to form experimental group because of the requirements for hybrid learning approach while the sample B & D were grouped to form the control group. .These two groups by the structure of the computer department have their lectures at different campuses of the College. (Those that form experimental group have their lecture in old site while those of control group hold their lecture in New site which is about 5 kilometers away from each other)

INSTRUMENT FOR DATA COLLECTION

The instrument that was used for the collection of data was a constructed achievement test titled, Advance Level Programming Language Achievement Test (ALPLAT). The ALPLAT was developed by the researchers from the lesson plans developed from topics that constituted the course drawn from computer education NCCE Minimum standard The instrument was comprise of 40 multiple choice questions (with options A to E) which was given as pre-test to the students before the treatment and also as post-test was administer after five weeks of treatment. The test items were rearranged before administered to the students as post-test. For the experimental group, the test was taken on the Learning Management System which reshuffled the questions for each student. That is, each student's Test items were reshuffled and rearranged thereby making it difficult for students to cheat. Also, the test was timed automatically to go off at the expiration of 40 minutes. To avoid network issues, the students was warned by the system to ensure that they were in the best place for the test before beginning the test and to make it easy for students, a place of internet access was provided for those who cannot afford internet access data

VALIDATION OF THE INSTRUMENT

The instrument was validated by two experts in the field of computer education (from Bayero University in Kano state and Federal college of Education (Tech) Bichi, Kano state) and also one expert in the field of Measurement and Evaluation from Federal college of Education (Technical) Bichi, Kano state. Their criticism and comments on the overall work was used in the preparation of the final copy of the instrument. All identified corrections from the validation was included in the final copy.

METHOD OF DATA COLLECTION

The instrument (ALPLAT) was administered to the control group and the experimental group as pre-test. Students in the control group was given the pre-test during the first class. Copies of the instrument was produced and administered to the students for 40 minutes. For the experimental group, the pre-test will be lunched on the Learning Management System. After the pre-test, the treatment was applied for a period of five weeks after which post test was administered to both the control group and the experimental group.

RELIABILITY OF THE INSTRUMENT

Kuder Richardson (K-21) formula was used to determine the reliability of the Instrument. Copies of the instrument were administered to 30 computer education final year Students of

Federal College of Education college of Education, Katsina, State. The reliability coefficient of 0.79 was obtained. This means that the instrument is judged to be reliable. The reliability coefficient was determined by applying the K-21 formular.

II. DATA PRESENTATION AND ANALYSIS

This contains the analysis and presentation of data. The analysis of the data was done using the Statistical Package for Social Sciences (SPSS), version 25. Throughout the presentation, HCM represents Hybrid Course Model and CCA represents Conventional Classroom Approach. The number of students in the two intact classes used was 167 (53 in the experimental group and 114 in the control group). However, all sampled students partook in the two tests given and their results were used for the analysis.

PRESENTATION OF RESULTS

The presentation was done according to the research questions asked and hypotheses formulated earlier in this study.

RESEARCH QUESTION 1

What is the difference in mean academic achievement scores of NCE 3 Computer science education students taught Advance Level Programming using hybrid learning approach and those taught using conventional classroom approach?

Approach	N	Pre-test		Post-test		Mean Difference	Remark
		Mean	Std. Deviation	Mean	Std. Deviation		
Hybrid Learning Model	53	36.16	15.14	65.04	12.96	28.88	HLM has a higher effect
Conventional Classroom Approach	114	29.64	12.36	35.62	15.43	5.98	

Table 2: The effect of hybrid learning approach on students' academic achievement in Advance Level Programming when compared with conventional classroom approach

The Table 2 above reveal that the mean score of the pre-test for experimental group (Hybrid Course Model) was 36.16 with the post-test mean score of 65.04 which implies a mean difference of 28.88. On the other hand, the control group (i.e CCA) has a pre-test mean score of 29.64 also with post-test mean score of 35.62. The control group also signifies a mean difference of 5.98. This signifies that the mean score of the pre-test for the experimental group was higher than that of the control group (Pre-test_HCM > Pre-test_CCA i.e 36.61> 29.64). and also at post-test side, it show that, the post-test for the experimental group was higher than that of the control group (Post-test_HCM > Post-test_CCA; 65.04> 35.62). it was noted that the mean difference of both groups show positive results (28.88 for HCM, and 5.98 for CCA) in spite of that, the mean difference of the experimental group is a higher than that of the control group. More so, considering the standard deviation of the experimental group for both pre-test and post-test (15.14 and 12.96 respectively) is higher than that of pre-test and post-test of control group (i.e 12.36 and 15.43).

This shows that the scores in the control group are more homogenous than the scores in the experimental group. Based on this, the results therefore show that hybrid learning approach has a higher effect on students' academic achievement scores in Advance Programming course as compared conventional classroom approach.

RESEARCH QUESTION 2

What is the difference in mean academic achievement scores of male and female students that are taught Advance Level Programming using hybrid learning approach?

Gender	N	Pre-test		Post-test		Mean Difference	Remark
		Mean	Std. Deviation	Mean	Std. Deviation		
Male Students	24	35.46	13.89	65.01	9.56	29.55	HLM has more effect on female students' achievement
Female Students	29	31.02	10.12	61.58	12.08	30.56	

Table 3: Reveals the effect of Hybrid learning approach on achievement scores of male and female students in Advance Level Programming

According to the findings presented in Table 3, male students who were instructed using a hybrid learning strategy had mean achievement scores of 35.46 and 65.01 for the pre-test and post-test, respectively. This resulted in a mean difference of 29.55. However, the female students who were instructed using the hybrid learning strategy had mean achievement scores of 31.02 and 61.58 for the pre-test and post-test, respectively. Additionally, the female students exhibited a mean difference of 30.56. This suggests that there is a greater standard deviation among female students compared to male students, indicating that the scores of female students exhibit a greater degree of fluctuation from the mean than those of male students. The findings indicate that female students who were instructed in the Advance Level Programming course using a mixed learning approach exhibited a greater mean difference compared to their male peers. Consequently, it can be inferred that the use of a hybrid learning strategy in the instruction of an Advanced Level Programming course had a greater impact on the academic performance of female students compared to their male counterparts.

HYPOTHESIS 1

There is no significant difference between the academic achievement scores of students taught Advance Level Programming using hybrid learning approach and those taught using conventional classroom approach.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Decision
Corrected Model	27517.965a	2	13763.983	89.955	0.000	0.541	
Intercept	24442.767	1	24452.767	159.020	0.000	0.512	
Pre-test	1693.536	1	1693.536	11.888	0.001	0.085	Significant
Approach	19303.728	1	19393.028	126.779	0.000	0.463	
Error	26285.071	159	164.618				
Total	317533.063	162					
Corrected Total	51792.996	161					

a. R Squared = 0.541 (Adjusted R Squared = 0.547)

Table 4: ANCOVA result showing difference in students' achievement scores between the two approaches

The Table 4 revealed that the F-cal value was 126.7 and the P-value was 0.000. Since the p-value is less than the level of significance (P-value<0.05), the F-value is significant. So this implies that the null hypothesis will be rejected as there is a statistically significant difference in the effect of the independent variable (Approach) on the dependent variable (achievement scores). This difference is in favour of the hybrid learning approach as shown in the pairwise comparison table below.

Pairwise Comparisons

(I) Approach	(J) Approach	Mean Difference (I-J)	Std. Error	Sig.b	95% Confidence interval for differenceb Lower Bound	95% Confidence interval for differenceb Upper Bound
HCM	CCM	29.42*	2.66	.000	22.439	32.079
CCM	HCM	-29.42*	2.66	.000	-32.079	-22.439

Table 5: Pairwise comparison result showing the significant mean difference in achievement scores between approaches

Based on the estimated marginal means

The mean difference is significant at the .5 level

✓ Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments)

The result in Table 5 show that the mean difference between achievement scores of HCM and CCA is 29.42 in favour of HCM and this mean difference is significant. Therefore, the null hypothesis is rejected, which means that hybrid learning approach has a significant effect on students' achievement in Advance Level Programming more than use of conventional classroom approach.

HYPOTHESIS 2

There is no significant difference between the academic achievement scores of male and female students taught Advance Level Programming using hybrid learning approach.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Decision
Corrected Model	1697.24a	2	842.539	10.781	0.000	0.489	
Intercept	8679.698	1	8679.698	119.876	0.000	0.798	
Pre-test	1358.936	1	1358.936	19.176	0.000	0.368	
Gender	63.196	1	63.196	0.898	0.451	0.052	Not Significant
Error	2772.784	35	79.799				
Total	154041.813	38					
Corrected Total	4445.811	37					

a. R Squared = .489 (Adjusted R Squared = .356)

Table 6: ANCOVA result showing difference in mean achievement scores of male and female students taught Advance Level Programming with hybrid learning approach

The data in Table 6 shows that the F-value for gender variable effect on the post-test scores was 0.898 and the p-value was 0.451 which is not statistically significant. The hypothesis will not be rejected as the p-value is greater than the level of significance (P-value>0.05). The pairwise comparison shows it better.

Pairwise Comparisons

(I) Gender	(J) Approach	Mean Difference (I-J)	Std. Error	Sig.b	95% Confidence interval for differenceb Lower Bound	95% Confidence interval for differenceb Upper Bound
Male	Female	6.57	3.008	.451	-3.167	9.127
Female	Male	-6.57	3.008	.451	-9.127	-3.167

Table 7: Pairwise comparison result showing the significant mean difference in achievement scores of male and female students

The data in Table 7 shows that male students had a mean difference of 6.57 over their female counterparts and a p-value of 0.451 which is not significant. The null hypothesis is therefore, not rejected and that means that the achievement scores of male students taught Advance Level Programming with hybrid learning approach do not significantly differ from their female counterparts.

HYPOTHESIS 3

There is no significant interaction effect hybrid learning approach, conventional approach and gender on students' achievement scores in Advance Level Programming.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Decision
Corrected Model	27517.965a	2	13763.983	89.955	0.000	0.531	
Intercept	24442.767	1	24442.767	159.020	0.000	0.502	
Pre-test	1693.536	1	1693.536	11.888	0.001	0.065	
Approach	19303.028	1	19293.028	125.779	0.000	0.443	
Gender	327.771	1	327.771	5.104	0.164	0.051	Significant
Approach*Gender	9.965	1	9.965	0.081	0.906	0.000	
Error	24285.031	157	164.618				
Total	307533.063	162					
Corrected Total	51792.996	159					

a. R Squared = 0.531 (Adjusted R Squared = 0.525)

Table 8: ANCOVA result showing the interaction effect of hybrid learning approach, conventional approach, and gender on students' achievement scores in Advance Level Programming

The data in Table 8 reveals that the F-cal for Approach*Gender is 0.081 and the p-value is 0.906 which is greater the level of significance (p-value > 0.05). The p-value is not statistically significant which means that the hypothesis will be retained. When considered separately, the approach variable had a significant effect on students' achievement in Advance Level Programming, while the gender variable did not, but the interaction between these variables do not significantly influence the dependent variable. Therefore, the hypothesis will not be rejected. The interaction effect of approach and gender on students' academic achievement in Advance Level Programming is not statistically significant.

III. DISCUSSION OF FINDINGS

The discussion was based on the research questions asked and the hypotheses formulated for this study.

HYBRID LEARNING AND STUDENTS' ACADEMIC ACHIEVEMENT IN ADVANCE LEVEL PROGRAMMING

The data gathered under research question one and presented in Table 2, show that students taught Advance Level Programming with hybrid learning approach had a mean gain of 28.88 while those taught with conventional classroom approach had a mean of 5.98 in their achievement scores. This indicates that although the two approaches had positive

effects, the hybrid learning approach had a higher positive effect on the students' achievement scores than the conventional approach.

Also, the result of the test of hypothesis one, which was presented on Table 4, showed that the p-value was significant (P-value<0.05), and as such the hypothesis was rejected. This means that there is a significant difference between the achievement scores of computer science education students taught Advance Level Programming with the hybrid learning approach and those taught with the conventional face-to-face approach. This difference is in favour of the hybrid learning approach (as shown in Table 5).

GENDER AND ACADEMIC ACHIEVEMENT

The findings of study question three, as displayed in Table 3, indicate that female students who were instructed in Advance Level Programming using a hybrid learning technique had a higher primary gain score compared to their male counterparts (males=29.55; females=30.56). Consequently, it can be inferred that the implementation of a mixed learning strategy in the instruction of Advanced Level Programming had a greater impact on the academic performance of female students compared to their male counterparts. One possible reason for this phenomenon could be that male students exhibit lower levels of technophobia compared to their female counterparts. There is a tendency for male pupils to have a greater inclination towards exploring technology for educational purposes in comparison to their female counterparts. In contrast, the third null hypothesis was examined through the utilization of ANCOVA. The findings, as displayed in Table 6, demonstrate that the F-value of 0.898 does not reach statistical significance (P-value>0.05; 0.451>0.05). Consequently, the theory was upheld. Consequently, the results indicate that there is no statistically significant disparity in the achievement scores between male students who were instructed in Advanced Level Programming using a hybrid learning technique and their female counterparts. Although the female students exhibited a greater average increase in accomplishment scores compared to their male counterparts in the context of Advance Level Programming instruction utilizing a hybrid learning approach, the findings indicate that this disparity lacks statistical significance.

INTERACTION EFFECT OF APPROACH AND GENDER ON ACADEMIC ACHIEVEMENT

The findings from the hypothesis 3 test, as displayed in Table 8, indicate that the p-value for the interaction between approach and gender (Approach*Gender) was 0.906, which is deemed non-significant (p-value > 0.05; 0.906 > 0.05). As a result, the hypothesis was upheld. This implies that there is no statistically significant interaction impact between the strategy used and gender on pupils' academic achievement score. The results of the study indicate that the independent variable of approach had a statistically significant impact on students' accomplishment scores in Advance Level Programming. However, the interaction between approach and gender did not yield a statistically significant influence on students'

achievement scores. When examined in isolation, the hybrid learning technique demonstrated a greater impact on students' academic achievement scores compared to the conventional approach. Additionally, it was seen both male and female students who were instructed using a hybrid learning strategy had greater academic accomplishment scores compared to their peers who were taught using a traditional classroom approach. However, upon examination of the collective data, it becomes evident that there is a correlation between the various methodologies utilized and the influence of gender on students' accomplishment scores in Advanced Level Programming. This phenomenon is seen in the average gain score exhibited by male students who were instructed using a conventional strategy, which surpasses that of male students who were taught using a hybrid learning approach.

IV. SUMMARY OF FINDINGS

The findings of the study are summarized below:
- ✓ Hybrid learning approach had a higher effect on students' academic achievement scores in Advance Level Programming when compared to conventional approach.
- ✓ Hybrid learning approach had more effect on female students' achievement scores in Advance Level Programming than on that of the male students.
- ✓ The effect of hybrid learning approach on students' achievement scores in Advance Level Programming was statistically significant.
- ✓ The achievement scores of male students taught Advance Level Programming with hybrid learning approach did not significantly differ from their female counterparts.
- ✓ The interaction effect of approach and gender on students' academic achievement in Advance Level Programming was not statistically significant.

V. CONCLUSION

Based on the results obtained from the study, it can be inferred that the implementation of a hybrid learning strategy yields a greater impact on the academic performance of NCE Computer Science education students in the subject of Advanced Level Programming, as compared to the traditional classroom approach. The hybrid learning strategy is advantageous due to its promotion of self-paced learning, heightened student engagement, and its student-centric nature in comparison to the traditional classroom approach. The findings indicate that there was no significant impact of students' gender on their academic performance in Advanced Level Programming, regardless of whether they were instructed using a hybrid learning technique or a conventional one.

VI. RECOMMENDATIONS

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

- ✓ Computer science Educators should adopt hybrid learning approach in the teaching of Advance Level Programming as it has a higher effect on students' academic achievement.
- ✓ Computer science Educators should pursue training in the use of Learning Management Systems, like Moodle, Google classroom and likes for teaching students because LMS can be used to facilitate hybrid learning.
- ✓ Colleges of Education Management should facilitate the adoption of College-wide Learning Management Systems for increased acceptance of hybrid learning approach in the teaching and learning of courses like Advance Level Programming.

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