Effect of Subject Combination on Students' Performance in Biology: A Case Study of Osun State College of Education, Ila Orangun, Nigeria

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ABSTRACT

The effect of subject combination on the level of students' performance in biology: a case study of Osun State College of Education, Ila Orangun is studied in this work. The study adopts a quasi experimental design with no control group. The Grade Point Average (GPA) of students in Biology Department were analyzed according to subject's combination of BIO/CHE, BIO/CSC, BIO/GEO and BIO/ISC. The mean GPA of the groups were subjected to paired statistical analysis. The results show significant difference between the mean GPA of the various groups. It was observed that the mean GPA of the students offering BIO/CHE is higher than that of the other groups. It is recommended that chemistry should be made a pre- requisite for biology at tertiary institutions because it seems to aid the learning of biology; also course prerequisite should be strictly enforced to ensure the quality of NCE graduates in biology.
Keywords: *Students, Subjects, Performance, Biology, Combination*

INTRODUCTION

When a learner accomplishes a task successfully or succeeds in doing something to the extent of reaching a set goal for a learning experience he/she is said to have achieved (Duyilemi, 1986). Those who cannot pass a standardized test in a course are said to be under-achievers. Performance, on the other hand, has to do with completing and fulfilling an aim in a learning situation. Some authors believe these two terms can be used interchangeably. Many researchers support the hypothesis that students' performance depends on different socio-economic, psychological and environmental factors. The findings of researchers suggest that student performance is affected by different factors such as learning abilities (Chansarkar and Michaeloudis 2001). The authors explain the effects of age, qualification, and distance from learning place on students' performance.

Beaumont-Walters and Soyibo (1998) opine that students' performance depends on their socio-economic background. They observe that High School Students' level of performance is linked to their gender, school location from home, school type and socio economic background. Winston and Zimmerman (2003) focus on students' time–discount behaviour (students' impatience) that influences their academic performance. Hoel, Parker and Rivenburg (2005) studied the effects of roommates on students' performance, and observe the importance of peer quality on students' performance but suggested that classroom effects are more central to students' performance in higher education. According

to them, "few parents are likely to send their children to a particular college because they are likely to have a smart roommate". However, McEwen and Soderberg (2004) suggest that roommate effects are not important determinant of academic outcome. Bruce (2001) however, observes that peers have an impact on grade point average and on decision to join social groups and grades are higher when students have unusually academically strong roommates. At the Nigeria Certificate of Education (NCE) level, two subjects are usually combined in addition to Education and General Studies as a course of study. Biology can be combined with either chemistry, physics, computer science, integrated science or Geography as a course of study. To study biology at higher institutions, a candidate is expected to pass chemistry and Mathematics at credit level in SSCE, although at NCE ordinary pass may be accepted in chemistry or mathematics. The researcher felt the urge to establish subject that may enhance student's performance in biology, which is one of the core subjects for scientific and technological development of any nation hence this study.

METHOD

This study makes use of paired sample statistics to measure the comparative performance between the groups of students under investigation. The groups involved are students offerings various subjects in combination with biology. The groups include: Biology/ Chemistry (BIO/CHE), Biology/Computer Science (BIO/CSC), Biology/Geography (BIO/GEO) and Biology/Integrated Science. (BIO/ISC). The design is to investigate two sets of variable. There is no control group for the quasi experiment. The population of the study consists of the students admitted to Biology Department in Osun State College of Education, Ila Orangun. The results of these students were examined at part I, II and III. Records of academic performance of the students were obtained from the Head of Department of Biology. The variable used in this study were the students' scores Cumulative Grade Point Average (CGPA) and the course combination. Means and standard deviation of the students' scores in biology courses at Part I, II and III were computed. The mean scores of the four groups were subjected to paired sample statistics test. Significance was ascertained at 0.05 confidence level. The results were also analyzed according to gender and subjected to paired sample statistics at 0.05 level of significance.

RESULTS AND DISCUSSION

The pattern of admission into the biology department in 2012/2013 is shown in Figure 1, BIO/ISC combination tops the list with 56 student or 42.75% of the total students admitted. This is followed by BIO/CHE students which constitute 39.69%, the least number of students is observed in BIO/CSC combination which constitutes only 5.34% of students admitted that year. The students' grades point averages are presented on tables 1, 2 and 3. The result shows that the students' GPA differ significantly (at 0.05 level) from each other by subject combination. On the average, BIO/CHEM Students perform significantly better than their counterparts in other combinations with mean GPA of 2.50 at Part I and

2.01 at part II and 2.41 in Part III. This is followed by the performance of students in BIO/ISC combination with GPA of 1.79 in Part I, 1.55 in Part II and 1.68 in Part III. The BIO/GEO students performed least among the groups under investigation. The highest number of unsuccessful students is recorded among the BIO/ISC combination where about two out of every three students carried over (failed) at least one course. Thirty five percent of students in BIO/ISC failed BIO 122 while it is 43% among BIO/GEO. Thirty percent of BIO/ISC students, 50% of BIO/CSC and 17% of BIO/CHE failed BIO 113. In Part I, 35 students failed BIO 122. Thirty two students failed BIO 113 and BIO 114 twenty-four students. In part II, the highest number of student failure is recorded in BIO 213 with 41 students failed; out of these, 24 students offered BIO/ISC or 41% of the students in that combination, 50% of the students in BIO/CSC failed BIO 213 this is also the case with BIO 211. Fifty one percent of the students in BIO/ISC failed BIO 211 whereas it is 11% among students in BIO/CHE. Cases of failed courses reduced in Part III.

However some failures were observed in BIO 312, 323, 322 and 311. Twenty nine percent of students in BIO/ISC failed BIO 312. BIO 313, 314 and 315 recorded lesser number of failures. It was observed that more students were admitted to BIO/ISC combination than other combinations, this might be due to the admission process which allows students with one other science subject in addition to biology to be qualified to register for that combination. The implication of this is that a non-science student who has passes in biology and mathematics is qualified to study BIO/ISC. The same is applicable to students having passes in biology and agriculture. Such students are not properly integrated into science and hence this might explain the high rate of failure in this combination.

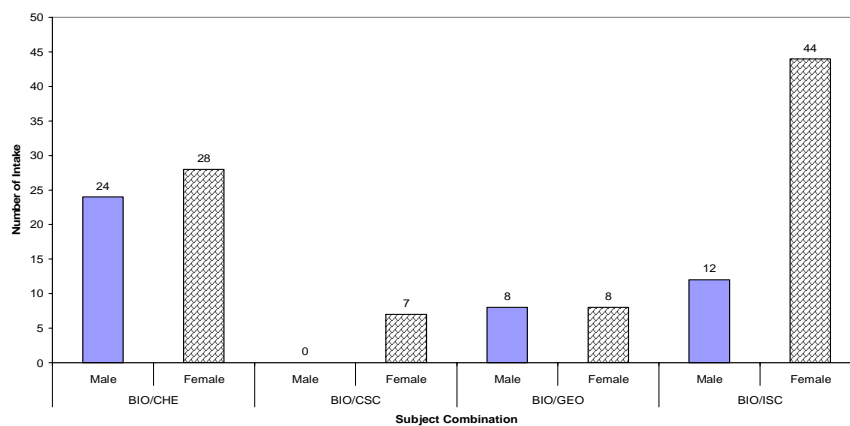**Fig. 1: Distribution of Students into Various Combinations**

Table 1: Means and Standard Deviation of the Students' Scores at part I

Combination		N	Mean	Sd
BIO/CHE	Male	24	2.65	1.08
	Female	28	2.35	0.89
BIO/CSC	Male	-	-	-
	Female	7	1.67	0.89
BIO/GEO	Male	8	0.95	0.87
	Female	8	1.77	0.91
BIO/ISC	Male	12	1.78	1.55
	Female	44	1.81	0.95
TOTAL		131		

Source: Biology Department, Osun State College of Education, Ila Orangun, Nigeria

Table 2: Means and Standard Deviation of the Students' Scores at Part II

Combination		N	Mean	Sd
BIO/CHE	Male	20	2.31	0.99
	Female	32	1.88	0.81
BIO/CSC	Male	-	-	-
	Female	6	1.56	0.95
BIO/GEO	Male	10	1.36	0.64
	Female	10	1.53	0.87
BIO/ISC	Male	9	1.58	1.38
	Female	42	1.52	0.82
TOTAL		129		

Source: Biology Department, Osun State College of Education, Ila Orangun, Nigeria

Table 3: Means and Standard Deviation of the Students' Scores at Part III

Combination		N	Mean	Sd
BIO/CHE	Male	20	2.56	0.94
	Female	31	2.37	0.83
BIO/CSC	Male	-	-	-
	Female	6	1.71	0.92
BIO/GEO	Male	7	1.27	0.86
	Female	10	1.81	0.71
BIO/ISC	Male	9	1.65	1.49
	Female	42	1.71	0.93
TOTAL		125		

Source: Biology Department, Osun State College of Education, Ila Orangun, Nigeria

Table 4: Paired Samples Statistics for Part I

		Means	N	Std. deviation	Std. Error means
Pair 1	BIO/CHE	2.4171	7	1.32690	.50152
	BIO/CSC	1.6714	7	.88667	.33513
Pair 2	BIO/GEO	1.3600	16	1.04637	.26159
	BIO/ISC	1.8281	16	1.51055	.37764
Pair 3	BIO/CHE	2.7194	16	1.13901	.28475
	BIO/GEO	1.3600	16	1.04637	.26159
Pair 4	BIO/CHE	2.4794	48	1.00795	.14548
	BIO/ISC	1.7340	48	1.07632	.15535
Pair 5	BIO/CSC	1.6714	7	.886671	.33513
	BIO/GEO	1.0271	7	.12599	.42558
Pair 6	BIO/CSC	1.6714	7	.88667	.33513
	BIO/ISC	1.6043	7	1.76233	.66610

Source: Biology Department, Osun State College of Education, Ila Orangun, Nigeria

Table 5: Paired Samples Statistics for the Students' Scores in Part II

		Means	N	Std. deviation	Std. Error means
Pair 1	BIO/CHE	1.8583	6	.64960	.26520
	BIO/CSC	1.5617	6	.94916	.38749
Pair 2	BIO/CHE	2.3055	20	.99866	.22331
	BIO/GEO	1.4470	20	.74673	.16697
Pair 3	BIO/CHE	2.0545	51	.91125	.12760
	BIO/ISC	1.5347	51	.92923	.13012
Pair 4	BIO/CSC	1.5617	6	.94916	.38749
	BIO/GEO	1.0750	6	.61004	.24905
Pair 5	BIO/CSC	1.5617	6	.94916	.38749
	BIO/ISC	1.3867	6	1.46384	.59761
Pair 6	BIO/GEO	1.4470	20	.74673	.16697
	BIO/ISC	1.5555	20	1.05492	.23589

Source: Biology Department, Osun State College of Education, Ila Orangun, Nigeria

Table 6: Paired Samples test for the Students' Scores in Part III

		Means	N	Std. deviation	Std. Error means
Pair 1	BIO/CHE	2.6717	6	1.08054	.44113
	BIO/CSC	1.7100	6	1.00821	.41160
Pair 2	BIO/CHE	2.6141	17	.90459	.21939
	BIO/GEO	1.5859	17	.79712	.19333
Pair 3	BIO/CHE	2.4056	50	.88196	.12473
	BIO/ISC	1.7223	50	1.03279	.14606
Pair 4	BIO/CSC	1.7100	6	1.00821	.41160
	BIO/GEO	.9817	6	.43185	.17630
Pair 5	BIO/CSC	1.7100	6	1.00821	.41160
	BIO/ISC	1.4305	6	1.56146	.63746
Pair 6	BIO/GEO	1.5859	17	.79712	.19333
	BIO/ISC	1.7808	17	1.19490	.28981

Source: Biology Department, Osun State College of Education, Ila Orangun, Nigeria

CONCLUDING REMARKS

The high rate of enrolment in BIO/CHE is understandable. Traditionally, biology and chemistry are complementary. There are areas of overlap in both subjects that are likely to influence the understanding of each of the courses. Enrolment is not very high in BIO/GEO. This may be as a result of geography being a social science subject and hence belongs to another school entirely. Students might possibly want to avoid it since it may involve shuttling between two schools. Another reason may be due to the fact that students are classified at the senior secondary school level as belonging to science, social science, languages or commerce.

This classification makes the choice of subject across various classes difficult except the compulsory ones. The least number of students recorded in BIO/CSC combination may be due to the fact that computer is a numerate course and students would prefer to combine it with other numerate courses such as mathematics or physics that will aid the understanding of the course. Therefore, it is recommended that chemistry should be made a pre- requisite for biology at tertiary institutions because it seems to aid the learning of biology; also course prerequisite should be strictly enforced to ensure the quality of NCE graduates in biology. Statistical results show that students in BIO/CHE combination

performed significantly better than others. It may also be due to the function of the influence of prerequisite rather than superior intelligence of the students offering the courses. At the degree level, credit in chemistry is a prerequisite to study biology. This might have prompted the students to work hard in both courses. The low GPA of students in BIO/ISC might be due to the fact that ISC is an all comers' subjects. Students that are not well grounded in science are allowed to study ISC combinations. The weak GPA of geography students is understandable; most of them offered biology at secondary school because one science subject is compulsory; ordinarily they may not have sufficient knowledge of science.

REFERENCES

Beaumont-Walters, Y. and **Soyibo, K.** (1998). An Analysis of High School Students' Performance on five Integrated Science Process Skills. *Research in Science and Technical Education,* 19 (2), 133-145.

Bruce, S. B. (2001). Peer Effects with Random Assignment: Result for Dartmouth roommates. *The Quarterly Journal of Economics,* 116 (2), 681-704.

Chansarkar, B. A. and **Michealoudis, A.** (2001). Student Profiles and Factors Affecting Performance. *International Journal of Mathematics Educations Science and Technology,* 32 (1), 97-104.

Duyilemi, E. O. (1986). The Problem of biology Teaching in Nigerian Secondary Schools: Case of Yearly Mass Failure. *The Science Journal of the School of Pure Science,* 1 (2), 76-79.

Hoel J., Parker J. and **Rivenburg J.** (2005). *A Test for Classmate peer Effects in Higher Education. Institutional Research Report.* Reading UK: Read College.

McEwen, J. P. and **Soderberg, K. A.** (2004). *Roommate Effects on Grades: Evidence from First year Housing Assignments.* Dublin: Social Science Summer Research Programme, Wesley College.

Winston, G. C. and **Zimmerman, D. J.** (2003.) Peer Effects in Higher Education. *NBER Working Paper* No 9501.