COMPARATIVE STUDY ON DOUBLE AND SINGLE MAJORS SCIENCE COURSES (A CASE STUDY OF SOME SELECTED COLLEGES OF EDUCATION)

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Abstract

This research was designed to study the academic performance of double major and single major science students. Where 160 were randomly selected from Isa Kaita College of Education Dutsinma, Katsina State and Kafanchin College of Education Gidan Waya, Kaduna State and were served with questionnaires. The data generated from the questionnaires were processed and the analysis of the result revealed that there is relationship between double major and single major science courses where some courses share the same concept. All the courses deal with practical activities. It was also observed that double major courses have fewer problems compared to that of single major science courses. Suggestions were made as part of the recommendations in the research.

There have been a series of debates on the emphasis of double major science to the study of biology, chemistry and physics, for example students with poor background on double majors subjects; Integrated Science, Physical Health Education and Agricultural Science are at disadvantage in the study of biology, chemistry and physics. Olalaje (1982) observed that important changes in students' academic performance in science are taking place as a result of emphasis that has been given to double major courses. Probably this will have an effect on students' performance in physics, chemistry and Biology. The acquisition of sound double major science knowledge at the Junior Secondary School for a prospective study of biology, chemistry and physics has always been emphasized.

It is also desirable to find out the relationship between student performances in double major science and single major science courses namely; Biology, Chemistry, Physics/Mathematics and Biology/ Mathematics. The problems of studying of double major science courses by the students as requisite for the future study of Biology, Chemistry and Physics.

Integrated Science is important in Biology, Physics and Chemistry and it is here that one begins with descriptive technology and then to inferential analysis (Kola, 1980). It must be noted that teaching Integrated Science in junior Secondary

School is a necessary pre-requisite for technological breakthrough of any country, for simple fact that Integrated Science as a subject is single means of introducing science in primary and junior secondary schools.

Academic performance means three things, the ability to study and remember facts or being able to study effectively and see how facts fit together and from large patterns of knowledge and for one to be able to think in relation to facts and enable one to be knowledgeable enough to deal with the real life situation. Good academic performance is also linked with good organizational skills such as a tidy place to work in and good time management. But this raised the academic performance session focuses and concentrates on having the right mind-set that enables one to raise the academic performance and learn more effectively.

To graduate with a double major, a candidate must fulfill all of the requirements for both the majors. Double major courses allow exploring two potentially very different academic fields in reasonable depth. Also double major leaves for more option for specializing in a certain field and pursuing graduate studies in it.

Single major courses enable one to study only single major courses, where the study were strictly on either Biology, Chemistry or Physics and do not allow to explore the different academic field which enables one to specialize only on single major courses.

Science is seen as a systematic study of anything that can be examined, tested, and verified. The word *science* is derived from the Latin word '*scire'*, meaning "to know." From its early beginnings, science has developed into one of the greatest and most influential fields of human endeavor. Today different branches of science investigate almost everything that can be observed or detected, and science as a whole shapes the way we understand the universe, our planet, ourselves, and other living things. (Microsoft Encarta, 2008).

The term science refers to the organised body of knowledge concerning the physical world, both animate and inanimate, but a proper definition would also have to include the attitudes and methods through which one arrive at the body of knowledge thus, science is both a particular kind of activity and also the results of that activity. Science is both a process of gaining knowledge, and an organised body of knowledge gained by this process.

The scientific process is the systematic acquisition of new knowledge about a system. This systematic acquisition is generally the scientific method, and the system is generally nature. Science is also defined as "The observation, identification, description, experimental investigation and theoretical explanation of phenomena." Science as knowledge especially that gained through experience.

Obioma (1970) "The pure science such as chemistry, biology and physics faced a set of challenges that are unpredictable" As noted by Bajah (1983) "Specialist teachers of biology, physics and chemistry who are called upon to teach double major science courses tend to show bias toward aspects of double major science text related to their specialization and a neglect of other aspects". Ever since the appearance of double major courses as a subject into college of education in Nigeria much has been done and is still being done to promote the teaching and learning of these subjects.

However, since the dynamic changes in pure science pattern have rendered post analytical techniques ineffective and outdated. It becomes apparent that many problems arising from biology, chemistry and physics, which could be solved by the application of double major science methods, this practice led to the search for biology, physics and chemistry.

Knowledge of Biology, Chemistry and Physics are pre-requisite for admission into Nigerian Universities for double major science courses and some other pure science. It is also an entry requirement into certain employment.

Sufficient knowledge of double major science such as that of integrated science is necessary for student in senior secondary to read in new branches; biology, chemistry and physics with some understanding. Consequently, today's world rests on science and science in turn rests on integrated science for exact description, formulation, observation and experiment. There is correlation between the performance in Integrated Science as double major science and single major Science at semester examination results (Arbon, 1972).

Statement of the Problem

Current preaching by the National Commission for Colleges of Education (NCCE) is emphasis on single major courses, while double major courses are abandoned. This can be seen in the new NCCE 2008 Minimum Standard that all subjects should be single major (NCCE, 2008). This prompted the need to carry out a case study in the two 'majors' where IKCOE Dutsinma and KCOE Gidan waya were considered, since no research of this nature had been conducted in the selected study areas.

It is generally believed that a sound knowledge of double major science subjects such as Integrated Science and Agricultural Science to some extent determines the future study of Biology, Chemistry and Physics as a single science subject. Therefore the students' academic performance in double major science may be closely related to the academic performance of students offering single major courses. In view of this the following questions are to be answered in the course of this research.

1-Does knowledge of double major courses related to the study of Biology, Chemistry and Physics?

2-What is the relationship between the students' academic performance in the double major courses and students' academic performance in single major courses?
3-What are the associated problems relate to the study of double major and single science courses?

Hypothesis

There is no significant difference in academic performance between students of Isa Kaita College of Education (IKCOE) Dutsinma and that of Kafanchin College of Education Gidan Waya (KCOE) Gidan waya.

Research Design and Procedure

Research Instrument: Two instruments were used for gathering data in this research; questionnaires and Semester examination results

Design of Questionnaire: The questionnaire was designed based on two sections where section (A) contains personal data and section (B) contains the main questions.

Population and Sampling: The total number of students in the study area was estimated to be about six hundred (600). Stratified random sampling was applied in the selection of eighty (80) NCE III students in each of the two Colleges of Education of the study area, representing fourty (40) double major and fourty (80) single major students from six departments; Integrated Science, Physical Health Education and Agricultural Education(double major disciplines) and Biology, Chemistry and Physics (single major disciplines). This made a total of one hundred and sixty (160) students from the two colleges of education.

Validation of Research Tool: The instrument was developed by the researcher by using related literature and having consultation with psychologists and educationists in test & measurement and mathematics educators.

Questionnaire Administration: One hundred and sixty (160) questionnaires were distributed to the respondents and were completed and retrieved the same day. NCE III students; first and second semesters examination results were recorded and analysed in terms of total number of those above one point and total number of those below one point, number of those without carry over and number with carry over.

Results: The data obtained from the respondents in the questionnaires are as follows:

Table 1: Career Choice after Graduation

Career Choice	Double Major		Single Major	
	Teaching	Others	Teaching	Others
Male	59 (74%)	5 (6%)	57 (72%)	5 (6%)
Female	13 (16%)	3 (4%)	13 (16%)	5 (6%)
Total	72 (90%)	8 (10%)	70 (88%)	10(12%)
	80		80	

Table 1: Showed that 79% of the respondents are male while only 21% of the respondents are female. Therefore, the percentage showing that the male sex is higher than female. There is correlation between the male responses and females responses, where the majority chose teaching as their future career. The number of female appears to be low in the sample; this implies that there are less number of female in the population, hence there is need to consider the issue of low intake of females in science and science related disciplines. With the current emphasis on science and Technology, boys and girls are expected to have equal opportunities of choosing science related disciplines like doctors, engineers, biotechnologists and so on: every effort should be made to make science teaching and learning easy for all. (Olarewaju, 2006).

On career choice, 90% of the double major respondents chose teaching career while 10% choose other career. In the single major respondents 88% chose teaching career, while 12% chose other career. The majority of the respondents both single and double major science courses chose teaching career then the other careers. This may be ascribed to how education training is being appreciated by the society. The result indicated higher percentage of those that chose teaching as their career even though double major courses had higher positive responses to teaching compared with double major courses.

Table 2: Problems Associated With Double Major and Single Major Science Courses

Alternatives	No of Respondents		
	Double Major	Single Major	Total
Yes	13 (16%)	73 (91%)	86 (54%)
No	67 (84%)	7 (8.7%)	74 (46%)
Total	80	80	160 (100%)

Table 2: Showed 84% double major respondents disagreed that there are problems associated to double major science courses, while 16% of the double major respondents agreed that there are problems associated to double major science courses. This could be due to the low population which enabled them to have

adequate laboratory equipments and the number of lecturers to cater for the low population of the students, with this conclusion drawn, there is less problems associated with double major science courses compared with the single major science courses.

However 91% of the single major respondents agreed that, there are problems associated with single major science courses, while 9% do not agree that there are problems with single major science courses. Majority of the respondents (54%) believe that there are problems associated with it, and this could be due to one of the following reasons; Inadequate instructional materials, Lack of enough manpower, Inadequate laboratory equipments and lecture halls, Students over population and the narrow chances of studying other courses in the university.

Table 3: Availability of Instructional Materials

	No And Percentage of Respondents		**Total**
	Double Major	**Single Major**	
Yes	26 (32%)	29 (36%)	55 (34%)
No	54 (68%)	51 (64%)	105 (66%)
Total	80	80	160 (100%)

Table 3: Showed that 64% of the respondents disagreed that, there is availability of instructional materials in the single major courses while 36% of the respondents agreed. Moreover 68% of the respondents agreed in the double major courses and 32% disagreed that instructional materials were available. Sixty six percent (66%) of both single and double major courses believe there are insufficient instructional materials.

Semester Examination Results

The first twenty candidates in the two semester broadsheets for examination results of the 2008/2009 session from both (IKCOE) Dutsinma and (KCOE) Gidan waya, across the six departments were recorded and analyzed in the tables below;

Comparison among Single Majors' Candidates: The number of single major candidates with or without carryover obtained, at the two Colleges, against the three combinations are shown in Fig 1. Physics/Chemistry, showed 30 numbers of candidates with carryover as the highest. This followed by Biology/Chemistry with 16 numbers of candidates with carryover. Mathematics/Physics recorded the least with 9 numbers of candidates with carryover.

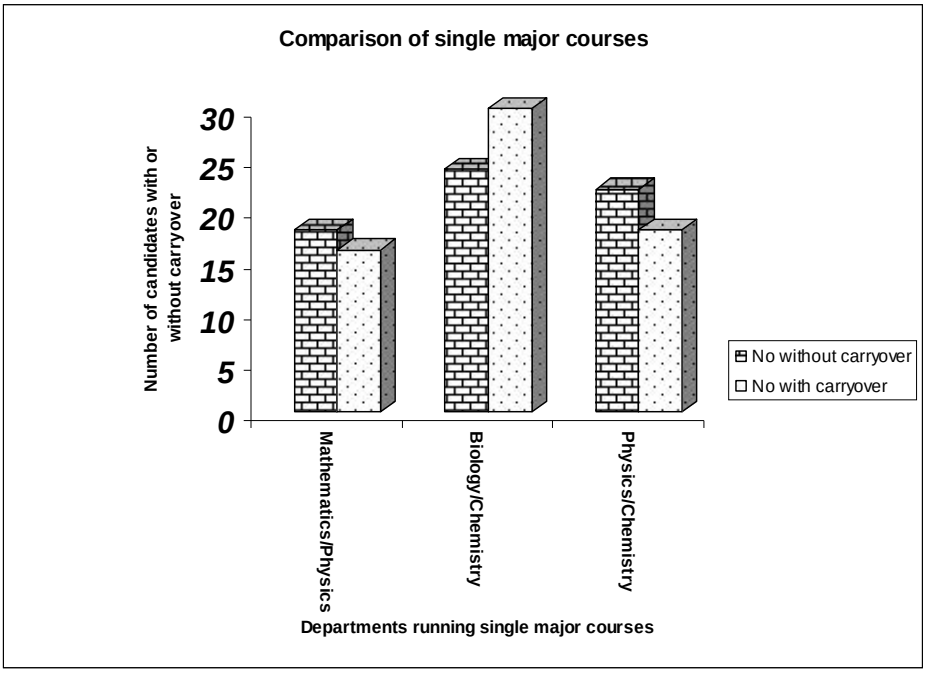

Figure 1: Comparison among single majors' departments, against the number of candidates, with or without carry-over in the broadsheets of 2008/2009 session.

Comparison among Double Majors' Candidates: The number of double major candidates with or without carryover obtained, at the two Colleges, against the three combinations are shown in Fig 2. Integrated Science, showed 18 numbers of candidates with carryover as the highest. This followed by Agricultural Science with 16 numbers of candidates with carryover. PHE recorded the least with 12 numbers of candidates with carryover.

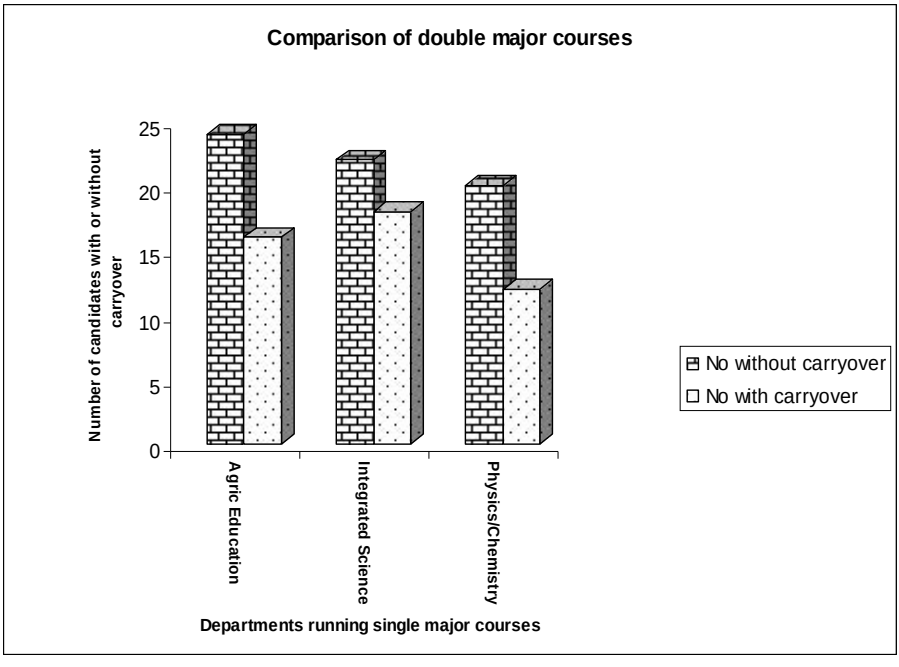

Figure 2: Comparison among double majors' departments, against the number of candidates, with or without carry-over in the broadsheets of 2008/2009 session.

Comparison between IKCOE Dutsinma and KCOE Gidan Waya The numbers of (single and double majors) were compared among the candidates in the same College and between the two Colleges, against the number of candidates with or without carryover across the six combinations (six departments) as shown in Fig 3. Mathematics/Physics recorded 17 as highest carryovers, then Physics/Chemistry has 11, Integrated Science recorded 10 while the rest have comparatively negligible number of candidates with carryover. The student from KCOE Gidan Waya has the least number of candidates with carryover. The number of carryover Mathematics/Physics from both Colleges was observed to be higher. This is in line with Joshua (2007) He found out that achievement in Mathematics and Integrated Science had a high positive linear relationship.

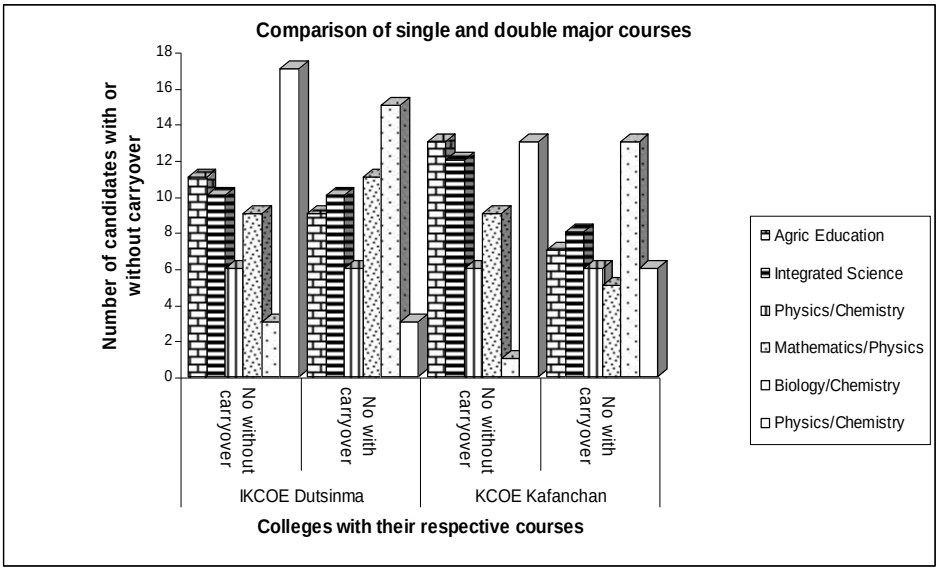

Figure 3: Comparison between IKCOE Dutsinma and KCOE Gidan waya single and double majors' candidates against the number with or without carry-over in the broadsheets of 2008/2009 session.

Test of Hypothesis

The F-Test for the Variances of the two-samples testing the academic performance between student of single and double majors against the number of candidates with and without carryover was used to test the hypothesis as the basis for acceptance or rejection of the hypotheses at (0.05 level of significance).

The hypothesis stated that, there is no significant difference in academic performance between students of Isa Kaita College of Education (IKCOE) Dutsinma and that of Kafanchin College of Education Gidan Waya (KCOE) Gidan waya. The result revealed P- values 0.638 which indicated no significant differences in academic performance between students of the two colleges ($P< 0.05$), therefore the null hypothesis was accepted.

Conclusion

The research attempted to compare the academic performance of double and single major students. The similarities and differences observed among the double major science courses and other single major science courses include: the sharing of the same concept of study, Both single and double major dealt with practical activities and as such assist in studying each other

The single and double majors differ in the sense that, single major courses are deeper in content, while double major courses are narrow in content. Finally It is hoped that further research in the same area will cover Katsina state or Nigeria at large.

Recommendations

The following are recommendations made:

- The government should provide adequate instructional materials to both departments in double and single major science courses
- More staff (academic and non academic) should be employed to cater for the growing population of the students.
- Practicals are inevitable aspect of science teaching which requires well equipped laboratories. The absence of good and well maintained science laboratory can lead to student's poor performance in examination. The government should endeavour to provide well equipped laboratory in the departments.
- Special attention should be given in the classes to female students in both single and double major courses.
- Counselors should participate fully in the school programme so that their presence would be felt.

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