

A COMPARISON OF THE EFFECTS OF THE CESAC AND
WAEC TRADITIONAL BIOLOGY PROGRAMMES ON
THE SUBSEQUENT PERFORMANCE OF
STUDENTS IN S. B. S.
BIOLOGY EXAMINATIONS

BY

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1984

DECLARATION

I hereby declare that this project has been written by me and that it is a record of my own research work. It has not been presented in any previous application for a higher degree. All quotations are indicated and the sources of information are specifically acknowledged by means of references.

Josephine E. Kanu


Date: 27th March '84.

APPROVAL PAGE

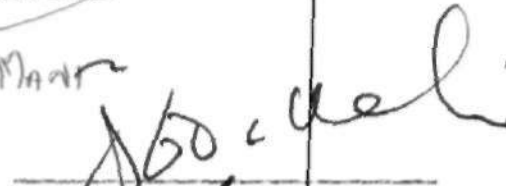
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The undersigned certify that they have read, and recommend to the Faculty of Education for acceptance, an independent study entitled A COMPARISON OF THE EFFECTS OF THE CES/C AND WAEC TRADITIONAL BIOLOGY PROGRAMMES ON THE SUBSEQUENT PERFORMANCE OF STUDENTS IN S.B.S. BIOLOGY EXAMINATIONS, submitted by Josephine Eziukwu KANU, in partial fulfilment on the requirements for the degree of Master of Education in (Science Education).


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ABSTRACT

The Comparative Education Study and Adaptation Centre (CESAC) developed a science programme, the Nigerian Secondary School Science Project (NSSSP) in Biology in 1970. Since June 1974, the West African Examination Council (WAEC) has set special papers on this biology project, popularly referred to as the CESAC biology syllabus or biology O/L alternative.

By June 1981 a total of a hundred and twenty six Secondary Schools had tried this project and a total of twenty one thousand, six hundred and forty-two (21,642) biology students had enrolled in the West African School Certificate (WASC) examination for this WAEC special papers on the CESAC biology syllabus. No study has been made on the subsequent performance of these CESAC biology graduates compared with traditional biology graduates (Non-CESAC) in any immediate post secondary biology programme.

This study compares the performances of CESAC biology graduates with traditional (non-CESAC) biology graduates in School of Basic Studies (SBS) of Ahmadu Bello University, Zaria,

The hypotheses tested were as follows:

1. There will be no significant difference in the performances of CESAC and non-CESAC students in;

- (a) final examination of SBS biology, and
 - (b) the sub-tests (practical biology and continuous assessment) of the SBS biology programme.
2. The performances of CESAC students from Federal Government Colleges, will not be significantly different from those of CESAC students of non-Federal Government Colleges in;
- (a) final examination of SBS biology programme, and
 - (b) the sub-tests (practical biology and continuous assessment) of SBS biology programme.

A population of one hundred and sixteen students was used for the study. The instruments used were, the IJB final examination score, the final practical biology score and continuous assessment score..

The data were analysed using the Statistical Package for Social Sciences (SPSS) programme at the Ahmadu Bello University Computer Centre. The analyses showed that using the Pearson Product moment Correlation Coefficient, all the groups were homogeneous and the correlations were all significant beyond the 0.05 level. The mean scores of each group showed very minor differences in favour of the non-CESAC groups. The ANOVA showed there were no significant difference in performances at 0.05 confidence level, among the groups in all the instruments used.

The hypotheses were all accepted on the basis of this analysis. A brief recall was made of the inputs into the CESAC and traditional biolog programme. To account for the fact that there was no significant difference in performances of the groups, it was inferred that either the instruments used for the study or the teachers of the CESAC biology project in schools, were not achieving the CESAC biology objectives. It was also inferred that some common defects in the CESAC biology project could bring about the results.

On the basis of these findings recommendations were made to Federal Ministry of Education, CESAC and a call for further evaluation of the CESAC biology graduands performance especially in attitude test.

DEDICATION

This work is dedicated to the memory
of late INNOCENT OKWUDILI KAMU, my late
husband, whose sudden death inspired me
to work harder.

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I wish to thank all the people who have assisted in the design, data collection, analysis, reporting and typing of this study.

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Chapter 1

THE PROBLEM

1.1 Introduction

Soon after Nigeria's independence, in 1960 Science became popular and a more concerted effort was made towards indicating its usefulness to the school pupil's and authorities. But because of the earlier wrong emphasis in the classics and arts, there were problems in the development of Science in Secondary Schools. The deficiencies in the pre-independence science curriculum called for the development of new science programmes which would take care of the deficiencies.

Several attempts had been made to arrest the situation. In 1967, the Ford Foundation, through the Federal Ministry of Education, helped to establish the Comparative Education Study and Adaptation Centre (CESAC) at the University of Lagos. Through co-operation between the Science Teachers Association of Nigeria (STAN) and CESAC, a Science Curriculum Development Committee was formed in 1968. This CESAC - STAN joint committee inferred that the widely used WAEC-Syllabus in science was not adequately serving the needs of the majority of secondary school students. Ivowi (1978) said that the WAEC Science Syllabus was not imparting proper

scientific skills and attitudes to the students.

The joint committee developed a new science curriculum, currently referred to as the Nigerian Secondary School Science Projects (NSSSP), but popularly known as the CESAC programme because it is being handled by CESAC.

CESAC Science Objectives. In its curriculum development work in the sciences, CESAC broke away from the traditional (pre-independence) approach. CESAC's approach, according to Ivowi (1978) encourages more active participation by the students. The students are compelled by the structure of the teaching process to learn by enquiry and self-discovery, guided by the teacher. Through the curriculum it was hoped the student derived the following:

1. Good concept formation
2. High level thinking
3. Development of manipulative skills
4. Adequate and non-elaborate explanations
5. Curiosity and creativeness.

WAEC sets special examinations on CESAC science programmes (Physics, Chemistry and Biology) which WAEC refers to as alternative syllabi in these science. Many secondary schools have used these alternative syllabi as either Pilot or Associate Schools; while some schools have

used them on their own as listed in Appendices 1, 2 and 3. By 1981, a total of 2,555; 3,018 and 6,433 students had enrolled in WASC Examination for CESAC, Physics, Chemistry and Biology respectively, according to Ivowi. (Appendix 4 shows a yearly break down of the student enrolment).

A CESAC Newsletter (1983) showed that out of seventy six pilot secondary schools, forty seven associate and three voluntary schools (a total of 126) that had attempted the CESAC science programme in their curricula, only thirty one of the pilot, eight of the associate and two of the voluntary schools (a total of 41), are still using the programme as of June 1983 (appendix 5). One is left to wonder why the continuous decline instead of increase in the number of schools using this programme is taking place or occurring.

One cannot talk of technological development without an adequate number of post-secondary science graduates. Secondary school education is the foundation for tertiary education. If the foundation is weak in any direction, tertiary education is bound to be similarly weak. Yedkar and Gentile (1981) calling for the evaluation of CESAC programmes posited:

World-wide, new programmes often come and sometimes go, to be viewed historically as passing fads, long before an adequate appraisal of each is completed. The CESAC curricula are in danger of a similar fate if Ivowi (1978) is correct that no proper evaluation of the project has been carried out.

1.2 Statement of The Problem

The CESAC Biology syllabus has been taken in the WASC examination for a decade of years by over ten thousand students. The main objective of this study therefore is to determine how well the CESAC biology syllabus enhances School of Basic Studies (SBS) biology programmes .

In pursuing this problem, the subjects of the study were grouped into two: CESAC Versus Non-CESAC students. The problem was therefore re-stated in its specific form as:

1. Which of the two groups performs better in SBS biology programme?
2. In which one of the sub-tests in SBS biology programmes do the CESAC students perform better than their non-CESAC counterparts?
3. It is generally held that students from Federal Government Colleges are better oppertuned in their programmes than their counterparts in other Colleges, due to additional Federal Government support that would otherwise not be available to non-Federal Government Colleges.

A third question was therefore formulated as follows:

- a. Do CESAC students from Federal Government Colleges do significantly better in SBS biology programmes than their counterparts from non-Federal Government Colleges?

- b. Do CESAC students from Federal Government Colleges do significantly better in any of the sub-test in SBS biology programme than their counterparts from non-Federal Government Colleges?

1.3 Hypotheses

The above questions to be answered are stated in the null form as follows:

1. There will be no significant difference in the overall performances of CESAC and Non-CESAC students in SBS biology programme.
2. There will be no significant difference in the performances of CESAC and Non-CESAC students in the sub-tests (Practical Biology and Continuous Assessment) of SBS biology programmes.
3. The performance of CESAC students from Federal Government Colleges will not be significantly different from that of CESAC students of Non-Federal Government Colleges in the SBS biology programmes.
4. The performance of CESAC students from Federal Government Colleges will not be significantly different from that of CESAC students of Non-Federal Government Colleges in the sub-tests (Practical Biology and Continuous Assessment) of SBS biology programme.

1.4 The Significance of The Study

The findings from such a study have important implications for researchers and educators. Teachers and administrators are interested in curriculum evaluation to better judge the effectiveness of programmes. Curriculum developers need feedback in order to modify and improve programmes.

It is therefore hoped that the study would:

1. Determine to some extent the success of the CESAC biology programme.
2. Identify weaknesses (if any) in CESAC programme for the purpose of revisions and teacher training.
3. Assist teachers and school administrators in making decisions regarding the adoption of the CESAC biology programme.
4. Formulate problems for further research.

1.5 Limitations of The Study

The scope of the study will be limited by the following:

1. The ease of mobility
2. The number of CESAC students found in the Post-secondary institutions in Zaria and Kaduna environ.
3. The time available for the study
4. The funds available for the study.

1.6 Definition of Terms

- (a) CESAC Biology Programme. This is a biology syllabus designed by STAN - CESAC Committee for Nigeria. This syllabus is been used in some Nigerian senior secondary schools for WASC Ordinary level (O/L) biology certificate. WASC refers to this CESAC Biology programme as "Biology O/L (alternative)" syllabus.
- (b) CESAC Graduands. These are individuals who were exposed to CESAC biology syllabus and took the WASC O/L biology (alternative) examination on this syllabus.
- (c) Non-CESAC Graduands. These are individuals who were exposed to WASC traditional biology O/L syllabus and took the WASC O/L biology examination on this syllabus.
- (d) Traditional Biology Programme. This is a biology syllabus designed by WASC for all West African member countries. This syllabus is used in senior secondary schools for WASC O/L biology certificate. WASC refers to this traditional biology syllabus as "Biology O/L", syllabus.

- (e) School of Basic Studies. This is a calendar year intensive sixth form equivalent programme, preparatory to university and run by the Ahmadu Bello University, Zaria, Nigeria.
- (f) S.B.S. Biology Programme. This is a biology programme which is immediately post-secondary. This programme is preparatory to a wide range of academic training and specialisation in University biology related courses.
- (g) Federal Government Colleges. These are secondary schools, staffed and financed solely by Federal Ministry of Education.
- (h) Non-Federal Government Colleges. These are secondary schools, staffed and financed by any State or Organization.

1.7 Abbreviations

B.S.C.S.	-	Biological Science Curriculum Study
C.B.A.	-	Chemical Bond Approach.
C.E.S.A.C.	-	Comparative Education Study And Adaptation Centre.
F.G.Col.	-	Federal Government Colleges
I.J.M.B.	-	Interim Joint Matriculation Board.
N.S.S.S.P	-	Nigerian Secondary School Science Programme

S.B.S.	-	School of Basic Studies
S.T.A.N	-	Science Teachers Association of Nigeria
W.A.E.C.	-	West African Examination Council
W.A.S.C.	-	West African School Certificate

LITERATURE REVIEW

2.1 Review of Needs, And Guidelines On Evaluation
of Educational Programmes

Kelly (1980) observed that a singular attribute of curriculum developments is that they are partially out-of-date by the time they are completed. He saw these problems as certainly intractable if not insoluble. Kelly posited that one cannot expect to make judgements about the success of curriculum development with the precision one would have wished for. He suggested that we have to aim to be roughly right and make certain that we are not actually wrong. That the criteria for success will vary, according to the content of the curriculum and the age and background of the students for whom it is intended.

Kelly also posited that in the evaluation of student achievement, its validity rests on two fundamental matters, one of which is the quality and relevance of the tests, observations and assessments used for measuring achievement.

Bakar (1969) citing Bloom (1967) posited that in evaluation studies, the environment is a major source of the behavioural changes. Bakar suggested therefore that evaluation should be as much concerned with the characteristics of the environment which produced the changes in student behaviour

as it is with the appraisal of the changes themselves.

Bakar's environment here referred to the school or educational institution including the schools material and manpower resources used to produce the changes in the student behaviour.

McNamara (1975) elaborating on McDonald's (1971) definition of curriculum evaluation, said:

Curriculum evaluation is the collection and provision of evidence on the basis of which decisions can be taken about the feasibility, effectiveness and educational value of curricula.

McNamara went further to say that when discussing problems of educational value, decision makers might make reference to the evaluators data in coming to a decision, but it can never be the only evidence or experience upon which educational decisions are made.

Doll (1974) writing on evaluation of curriculum improvement programmes said that programmes and practices in elementary and secondary schools are changing rapidly. He observed,

.....the practices, devices and arrangements which the newer ideas and materials supplant had dominated the educational scene for years, with little evaluation to gauge their worth.

Doll therefore, feared that the innovations and reforms will themselves remain unevaluated. And if such occurred,

that we would be faced with another accretion of uncertain ways of behaving in a field which is so important to so many people.

Yoloye (1982) writing on evaluation in the Nigerian educational system, highlighted, that ordinarily, evaluation means the passing of judgement as to the value of a given entity based on certain criteria. That the basic evaluation question is how knowledgeable a pupil is after going through a curriculum programme.

In order to answer the question, Yoloye suggested that, we first need to find out how much (in this case biology) the pupil knows, or operationally, how many biological problems within a given curriculum he can solve correctly. That after finding out how many problems he solves correctly in a given test, that we can evaluate how knowledgeable he is by comparing his score with the total possible, or with the score of his colleagues.

Yoloye posited that the conventional examination is a means of answering the question - How much? as a prelude to answering the evaluation question - How adequate? How efficient? How knowledgeable? which are variations of the question - How good?

2.2 Specific Evaluation Studies On Some Recent Science Programmes.

Tanner (1971) reporting on researches on curriculum change, cited Wallace (1963) evaluation programme on achievement in the BSCS and control groups.

Wallace evaluation revealed that although the BSCS population outscored the control group on the BSCS Comprehensive Final, that the control group out performed the BSCS population on the old College Board Biology achievement examination.

The evaluation also revealed that control group also showed a slight but significant superiority over the BSCS population on the BSCS Impact Test, which was designed to measure understanding of scientific principles and scientific reasoning capability.

The results of the BSCS Impact Test were indeed an unanticipated outcome. In view of the stated objectives of BSCS, Tanner was of the opinion that BSCS students would score significantly higher than the students in conventional classes on both the BSCS Impact Test and the Purdue Scales.

Asubel (1966) in his evaluation of the BSCS Approach to High School Biology observed that though the Yellow and Blue BSCS versions were admirably thorough, accurate, and up-to-date, that they were ineffectively presented, organised and so impossibly sophisticated for their intended audience.

According to Ausubel,

.....except for the Green Version, the BSCS textbooks do notconstitute much of an improvement over the better conventional texts..... and most pedagogic respects, they fail below the standard of the typical conventional text.

Tanner (1971) also reported evaluation study on Chemical Bond Approach (CBA) project. Tanner observed that on the College Entrance Examination Boards Chemistry Achievement Test, CBA students obtained lower scores than those in conventional chemistry courses. That only on the CBA devised achievement tests did the CBA students produce higher scores than those in conventional classes. King (1967) posited that failure of many able students as chemistry majors in college was due to curriculum reform programmes in high school concentrating on improved courses, equipment and teachers while the student was to do too much, too fast and too soon.

Chuche (1974) investigated in United States, the academic achievement of Nigerian undergraduates as a function of previous educational experiences. He observed from the investigation that previous educational experiences as measured by the grade in the school certificate examination, of Nigerian undergraduates attending institutions of higher learning in the United States could not be used to predict satisfactorily the academic achievement of such students as

measured by their cumulative grade point averages.

Tasir and Jungwirth (1975) carried out an investigation titled: "Students growth as a result of studying BSCS Biology for several years." Tasir and Jungwirth compared the Israel BSCS with non-BSCS students. They observed that the performance and progress of the BSCS students in biological knowledge, inquiry skills and the understanding of science, did demonstrate the feasibility of the BSCS adaptation program for students in academic city schools as well as for those in the kibbutz rural schools. They observed that BSCS programme was less adequate for most students in agricultural schools. The result of their investigation indicated

1. that achievement in biology was not unidimensional and that different students reach different levels of achievement with different measures.
2. That opponents of process-centered science curriculum, usually expressed the fear that pupils would assimilate less subject matter than pupils in content centered curricula, BSCS students did perform significantly better than non-BSCS students.
3. That in the practical, non-BSCS students demonstrated distinct deficiencies as compared to BSCS students in solving open-ended problems using

experimental procedures in the laboratory.

Tahir and Jungwirth attributed the superiority of the BSCS students to the nature, philosophy and orientation of the BSCS course. They concluded that their investigation results might be helpful to other countries which either have adapted or were considering the adaptation of programmes such as the BSCS.

Wideen (1975) investigated the effectiveness of SAPA as compared to traditional science teaching on the basis of scores from cognitive, process, interest, attitude and classroom perception measures. His results indicated that in a general way, students exposed to SAPA do better on cognitive, process oriented tasks than students in traditional classrooms but that neither treatment had much effect on affective outcomes. Wideen from his investigation posited:

The success of SAPA as compared to traditional science teaching clearly lies in the area of improving cognitive and process oriented skills. The commonly accepted notion in curriculum change that new science programmes have a general effect of elevating a number of attributes is not supported by the results of the study.

Oludotun (1981) investigated the performance of selected physics teachers relative to the objectives of CESAC programme. He observed that CESAC physics teachers involved in his study

were not teaching in line with the stated objectives of the programme. His investigations results showed that the teachers still used the lecture approach rather than demonstrations, pupil-activity, problem-solving and discovery approaches. That, in terms of the organization of the content, the teachers still use the traditional approach.

Kelly (1980) said:

.....a measure of student achievement can only fully reflect the value of a curriculum development if a teacher has implemented it faithfully.

From the reviews, it is necessary to find out what CESAC Biology programme as a new science programme has imparted to its students as compared to the traditional biology programme which CESAC Biology is aspiring to displace.

Intellectual growth is a highly desirable educational goal, and every curriculum is designed to develop particular intellectual skills in students. Efforts are made to include the best possible experiences in the best sequence for the greatest majority and hopefully for every individual in the classroom.

Chapter 3

PROCEDURE

3.1 Pilot Study

The pilot study was carried out in the following post secondary institutions:

1. Advanced Teachers' College, Ahmadu Bello University, Zaria.
2. College of Advanced Studies, Zaria.
3. Kaduna Polytechnic, Kaduna
4. School of Basic Studies, Ahmadu Bello University, Zaria.

For each of these institutions to be selected for the study, it should have had at least twenty students among its 1982/83 Year One students who took CESAC Biology in WASC Examination. A letter of introduction was used as an authority to carry out the pilot study (Appendix 6).

A short questionnaire (Appendix 7) to identify CESAC graduands in the above post-secondary institutions was administered to all first year students doing biology in the respective institutions. The completed and returned questionnaires showed the following:

1. There was not a single CESAC graduand out of a hundred and twenty-five returned questionnaires from the Advanced Teachers' College, Zaria.

2. There were only two CESAC graduands out of three hundred and seventeen returned questionnaires of College of Advanced Studies, Zaria.
3. There were sixty four CESAC graduands out of four hundred and eighty-seven returned questionnaire from School of Basic Studies, A.B.U., Zaria.

It was observed that due to the nation-wide Polytechnic Academic Staff strike, currently then, the students of Kaduna Polytechnic were not available for the study.

The result of this pilot study, showed that only school of Basic Studies, qualified for the study.

3.2 The Main Study

Subjects

All the CESAC graduands of SBS who were not repeating the biology programme were selected. A total of fifty-eight CESAC graduands were finally selected for the study.

These were grouped into two as following:

- (a) CESAC graduands who attended Federal Government Colleges.
- (b) CESAC graduands who attended non-Federal Government Colleges (that is, State owned or owned by any other body not Federal Government of Nigeria).

The grouping evened out as each group had twenty-nine CESAC graduands.

The non-CESAC graduands were sorted out into two groups as follows:

- (a) Non-CESAC graduands who attended Federal Government Colleges.

(b) Non-CESAC graduands who attended non-Federal Government Colleges.

Those repeating the SBS biology programme were dropped, and the draw hat method of random sampling was used to select twenty-nine subjects from each group.

Finally, four groups of the subjects were arrived at for the study and arranged as follow:

- Group 1: CESAC subjects from Federal Government Colleges.
- Group 2: Non-CESAC subjects from Federal Government Colleges.
- Group 3: CESAC subjects from non-Federal Government Colleges.
- Group 4: Non-CESAC subjects from non-Federal Government Colleges.

There were ten female subjects in Groups 1 and 2 and four female subjects in Groups 3 and 4 respectively. The States of location of schools attended by subjects are shown in Appendices 8 to 11.

3.3 Instrument

The study involved performances in the SBS biology programme, therefore all aspects of the complete programme were considered. The scores of each subject in the various class written assignments including practical and the end of the programme examination were used as instruments for

measuring performance in the programme. The instruments were:

1. The IJMB examination.
2. The Final IJMB Practical examination.
3. Continuous Assessment.

The IJMB examination was the obvious source of test-items since these were constructed by an accredited Interim Joint Matriculation Board, made up of specialist lecturers and examination moderators at the SBS and similar institutions elsewhere in Nigeria. The questions for the IJMB examination is shown in Appendix 12.

The final practical biology test was internally constructed and moderated by biology lecturers of SBS. The questions for the test (Appendix 13) measured a summary of all the students had done in all the practical lessons of the entire SBS biology programme. The result of all the weekly practical assignments and the end of first term and second term tests were averaged for each student and used as the Continuous Assessment score.

The scores in the three instruments were finally compiled by the IJMB and used to grade the result of the subjects (Appendix 14). Authority letters (Appendices 6 and 15) were used to obtain the raw scores and IJMB final grades, from their respective sources.

Chapter 4

RESULTS AND ANALYSIS

4.1 The data of the study were grouped into four categories, namely:

- (a) CESAC students of Federal Government Colleges
- (b) Non-CESAC students of Federal Government Colleges.
- (c) CESAC students of Non-Federal Government Colleges.
- (d) Non-CESAC students of Non-Federal Government Colleges.

A total of three types of data were collected, namely:

- (a) IJMB (Interim Joint Matriculation Board) biology examination scores of subjects.
- (b) Practical Biology Scores of subjects in SBS biology programme.
- (c) Continuous Assessment scores.

The data were analysed using the statistical package for the Social Sciences (SPSS programme at the Ahmadu Bello University Computer Centre, Zaria and a confidence level of 0.05 was set as the criterion for all tests.

4.2 All the groups appear to be homogeneous as Table 1 shows. The Pearson Product-Moment Correlation Coefficient for the subjects taking two at a time are all significant beyond 0.05 confidence level.

Table 1

Homogeneity Of Subjects in The Various Sub-Tests

Groups	Pearson Product Moment Co-efficient Correlation		
	IJMB	Practical	Continuous Assessment
CESAC Versus Non-CESAC From F.G.Cs.	0.98	0.97	0.95
CESAC Versus Non-CESAC From Non-F.G.Cs.	0.97	0.96	0.95
CESAC From F.G.Cs Versus CESAC From Non-F.G.Cs	0.97	0.94	0.98

4.3 Subjects scores for the sub-tests were obtained from head of Department of Biology and verified at the IJMB Examination Centre in Zaria. The mean-scores and standard deviations of the subjects in the sub-tests are summarised in Table 2

Table 2
Mean Scores And Standard Deviations of Subjects
In The Various Sub-tests
 (N = 116)

Groups	Group size	Sub - tests					
		IJMB		Practical		C.Assessment	
		Mean Score	Standard Deviation	Mean Score	Standard Deviation	Mean Score	Standard Deviation
CESAC From FGCs	29	45.69	6.35	47.28	12.05	58.28	6.54
Non-CESAC "	29	45.90	7.01	50.04	10.24	57.97	6.00
CESAC From Non F.G.Cs.	29	44.41	7.84	50.04	9.22	57.14	8.53
Non-CESAC from Non-F.G.Cs.	29	46.66	7.47	49.48	12.27	58.66	8.66

The between group mean scores in the IJMB examination are close, ranging between 44.41 and 46.66. The CESAC group from non-Federal Government Colleges has the lowest mean score of 44.41 and a standard deviation of 7.84, while non-CESAC group from non-Federal Government Colleges has the highest mean score of 46.66 and standard deviation of 7.47.

The performance of the respective groups in the practical range between 47.28 and 50.04. The non-CESAC group from Federal Government Colleges and the CESAC group from non-Federal Government Colleges, each has a mean score of 50.04.

The CESAC group from Federal Government Colleges has the lowest mean score of 47.28 and the highest standard deviation of 12.65.

The mean scores of Continuous Assessment range between 56.20 and 58.66 and the standard deviations range between 6.54 and 8.66. The non-CESAC group from non Federal Government Colleges has the highest mean score of 58.66 and a standard deviation of 8.66.

The CESAC group from Federal Government Colleges has the lowest mean score of 56.28. The CESAC group from Federal Government Colleges has the lowest mean score in Continuous Assessment and Practical SB tests when compared with the other three groups.

4.4 The first main hypothesis was to test the difference in the performances of CESAC groups and non-CESAC groups in the SBC biology programme.

Group scores in the final LMB examination were compared using Analysis of Variance. Tables 3 and 4 show the summaries of the ANOVA.

Table 3

A Summary of One-way Analysis of Variance on The
 Difference in Performance Between CESAC Versus
 Non-CESAC Federal Government Colleges
 Subjects in The LJMB Examination

(N = 58)

Sources of Variation	Sum of Squares	Degree of Freedom	Variance Estimated	Calculated F. Value	Sign. F Value
Between Groups	26.22	1	26.22	.01	.91
Within Groups	2796.76	56	49.94		
Total	2822.98	57	-	-	-

The computed value of F is .01 and this not significant at the .05 confidence limit. The analysis of Variance in LJMB examination, shows there is no significant difference in performance between CESAC group from Federal Government Colleges when compared with non-CESAC group from Federal Government Colleges.

Table 4

A Summary of One-way ANOVA on The Differences
in Performance Between CESAC Versus Non-
CESAC Non-Federal Government Colleges
Subjects in The LWB Examination

(N = 58)

Source of Variation	Sum of Squares	Degree of Freedom (df)	Variance Estimated	Calculated F-Value	Sign. F-Value
Between Group	77.4	1	77.4	1.34	.25
Within Group	3229.1	56	57.66		
Total	3306.5	57	-	-	-

The computed value of F is 1.34 which is not significant at the .05 confidence limit. The ANOVA shows there is no significant difference in performance of CESAC group from non-Federal Government Colleges in LWB examination when compared with non-CESAC group from non-Federal Government Colleges.

4.5 The second hypothesis of this study was to test the difference in the performance of CESAC groups and non-CESAC groups in the sub-tests (Practical and Continuous Assessment) in the SBS biology programme.

Group scores in the Practical and Continuous Assessment sub-tests were compared respectively using one-way Analysis of Variance. Table 5 to 8 shows the summaries of the ANOVA.

Table 5

A Summary of One-Way Analysis of Variance On The
Differences in Performance Between CESAC
Versus Non-CESAC Federal Government
Colleges Subjects in Practical
Biology Sub-test

(N = 58)

Sources of Variation	Sum of Squares	Degree of Freedom	Variance Estimated	Calculated F.Value	Sign. F.Value
Between Groups	110.35	1	110.35	.83	.37
Within Groups	7416.76	56	132.44	-	-
Total	7527.1	57	-	-	-

The comparison of group scores gives the computed value of F as .83 and this is not significant at the confidence limit of .05. The analysis of Variance, shows there is no significant differences in performance of Federal Government Colleges subjects, whether CESAC or Non-CESAC in Practical Biology sub-test.

Table 6

A Summary of One-Way Analysis of Variance On The
Differences In Performance Between CESAC
Versus Non-CESAC, Non-Federal Government
Colleges Subjects In Practical
Biology Sub-test

(N = 58)

Sources of Variation	Sum of Squares	Degree of Freedom	Variance Estimated	Calculated F-Value	Sign. F-Value
Between Groups	4.41	1	4.41	.04	.85
Within Groups	6600.21	56	117.86	-	-
Total	6604.62	57	-	-	=

The analysis of Variance gives the computed F. Value as .04.
 not
 This is /significant at the confident limit of .05. There is
 no significant difference between the groups.

Table 7

A Summary of One-Way Analysis of Variance On The
Differences in Performance Between CESAC
Versus Non-CESAC Federal Government
Colleges Subjects In Continuous
Assessment Biology Sub-test

(N = 58)

Sources of Variation	Sum of Squares	Degree of Freedom	Variance Estimated	Calculated F-Value	Sign. F-Value
Between Groups	68.43	1	68.43	1.83	.18
Within Groups	2095.72	56	37.42	-	-
Total	2164.15	57	-	-	=

The computed value of F is 1.83 (table 7) which is not significant at the .05 confidence limit. The ANOVA shows that there is no significant differences in performance between the groups.

Table 8

A Summary of One-Way Analysis of Variance On The Differences in Performance Between CESAC Versus Non-CESAC, Non-Federal Government Colleges Subject In Continuous Assessment Sub-test (N=58)

Sources of Variation	Sum of Squares	Degree of Freedom	Variance Estimated	Calculated F.Value	Sign. F.Value
Between Groups	64.16	1	64.16	.9	.35
Within Groups	3977.72	56	71.03		
Total	4041.88	57			

The comparison of group scores gives the computed value of F as .9. This value of F (.9) is not significant at the .05 confidence limit. The ANOVA shows that there is no significant differences in performance as shown in table 8.

1.6 The third hypothesis was to test the difference in the performances of CESAC groups from Federal Government Colleges and CESAC groups from non-Federal Government Colleges in the SSN biology programme.

One-way analysis of variance was used to compare the group scores in the final IJMB examination. Table 9 shows the summary of the ANOVA.

Table 9

A Summary of One-Way Analysis of Variance on The Difference in Performance Between Federal Government Colleges And Non-Federal Government Colleges CESAC Subjects in The IJMB Examination (N=58)

Source of Variation	Sum of Squares	Degree of Freedom	Variance Estimated	Calculated F-Value	Sign. F-Value
Between Group	26.22	1	26.22	.53	.47
With Groups	2796.76	56	49.53	-	-
Total	2822.98	57	-	-	-

The comparison of group scores gives the computed F Value as .53 and this is not significant at the .05 confident limit. The analysis of variance, (table 9) shows there is no significant differences in performance between the groups.

4.7 The final hypothesis of this study was to test the difference in the performances of Federal Government Colleges and non-Federal Government Colleges, CESAC Subjects in the sub-tests (Practical and Continuous Assessment) of 535 biology programme.

Group scores in the Practical and Continuous Assessment sub-tests were compared respectively, using One-way Analysis of Variance. Tables 10 and 11 show the summaries of the ANOVA.

Table 10

A Summary of One-Way Analysis of Variance on The Differences in Performance Between Federal Government Colleges And Non-Federal Government Colleges CESAC Subjects In The Practical Biology Subtest (N=58)

Source of Variation	Sum of Squares	Degree of Freedom	Variance Estimated	Calculated F-Value	Sign. F-Value
Between Groups	110.35	1	110.35	.9	.35
Within Groups	6864.76	56	122.59	-	-
Total	6975.11	57	-	-	-

The computed F Value is .9. This is rather significant at .35 instead of the confidence level of .05 set as the criterion for the test.

The ANOVA, therefore shows there is no significant differences in performance between the groups in table 10.

Table 11

A Summary of One-Way Analysis of Variance on The
Differences in Performance Between Federal
Government Colleges And Non-Federal
Government Colleges CES.C Subjects
in The Continuous Assessment
Sub-test (N = 58)

Source of Variation	Sum of Squares	Degree of Freedom	Variance Estimated	Calculated F, Value	Significant F, Value
Between Groups	10.78	1	10.78	.19	.67
Within Groups	3235.24	56	57.77	-	-
Total	3246.02	57	-	-	-

The F Value .19 of table 11 is not significant at the .05 confidence limit but at .67. The analysis of variance shows that there is no significant differences in performance between the groups.

4.8 Summary of Results And Analyses

A summary of the results and analyses shows the followings:

1. All the groups are homogeneous
- 2(a) The CESAC group from Federal Government Colleges had the third position mean score of 45.69 in ICMB examination and the lowest mean scores of 47.23

and 56.28 in the IJMB final Practical and Continuous Assessment sub-tests, respectively, of SBS biology programme? when compared with other three groups.

- (b) The Non-CESAC group from Federal Government Colleges had the second position mean score of 45.90 and 57.97 IJMB examination and Continuous Assessment sub-test respectively. This group tied with CESAC group from Non-Federal Government Colleges in the final IJMB Practical sub-test. They had the highest mean score of 50.04 when compared with the other two groups.
- (c) The CESAC group from Non-Federal Government Colleges had the last and second to the last position mean scores of 44.41 and 57.14 in IJMB Examination and Continuous Assessment sub-test respectively when compared with other three groups.
- (d) The Non-CESAC group from Non-Federal Government Colleges had the highest mean scores of 46.66 and 58.66 in IJMB examination and Continuous Assessment sub-test respectively. This group had the third position mean score of 49.48 in the final IJMB Practical sub-test of SBS biology programme when

compared with the other three groups.

3. The Analysis of Variance showed the following:
- (a) There is no significant differences in the performance of -
- (i) CESAC group and Non-CESAC group from Federal Government Colleges in LJMB examination.
 - (ii) CESAC group and Non-CESAC group from non-Federal Government Colleges in LJMB examination.
 - (iii) CESAC group ^{from} Federal Government Colleges and CESAC group ^{from} Non-Federal Government Colleges in LJMB examination
- (b) There is no significant differences in the performances of -
- (i) CESAC group and Non-CESAC group from Federal Government Colleges in Practical sub-test of SBS Biology programme.
 - (ii) CESAC group and Non-CESAC group from non-Federal Government Colleges in practical sub-test of SBS biology programme.
 - (iii) CESAC group of Federal Government Colleges and CESAC group ^{from} Non-Federal Government Colleges in Practical sub-test of SBS biology programme.
- (c) In the Continuous Assessment sub-test of SBS biology programme, there are no significant differences in the performances at the 0.05 confident limit of the followings:
- (i) CESAC group and Non-CESAC group from Federal Government Colleges.

- (ii) CESAC group and Non-CESAC group from Non-Federal Government Colleges.
- (iii) CESAC groups ^{from} Federal Government Colleges and Non-Federal Government Colleges.

SUMMARY, DISCUSSION AND CONCLUSIONS

5.1 Summary

In this study four groups of randomly selected students performances were compared in the IJMB final examination and sub-tests of SBS biology programme, using Pearson Product Moment Correlation Coefficient and Analysis of Variance.

The Pearson Product Moment Correlation showed that all the groups appear to be homogeneous and correlations are all significant beyond 0.05 confidence level.

A summary of the mean scores of each group showed very minor differences in favour of the non-CESAC groups in the respective tests. The comparison of group scores in the IJMB examination and sub-tests of SBS, using analysis of variance showed there were no differences in performance among the groups.

The four following hypotheses are all accepted.

1. There will be no significant difference in the performances of CESAC and non-CESAC groups in the IJMB examination.
2. There will be no significant difference in the performances of CESAC and non-CESAC groups in the sub-tests of SBS biology programme.

3. There will be no significant difference in the performances of CESAC group from Federal Government Colleges when compared with the CESAC group from non-Federal Government Colleges in the IJMB examination.
4. There will be no significant difference in the performances of CESAC group from Federal Government Colleges when compared with CESAC group from non-Federal Government Colleges in the sub-tests of SBS biology programme.

5.2 Discussion

- (1) Input Into CESAC Biology Programme. Considerable funds and efforts have gone towards the development and implementation of CESAC biology.
 - (a) Manpower. The Federal and States' Ministries of Education fund the annual long vacation science courses, organised by CESAC to acquaint participating teachers with the philosophy and the teaching of the CESAC programme.
 - (b) Laboratory and Equipment. The objectives of the CESAC biology programme compel schools embarking on this programme to have a well-stocked and equipped laboratory. The schools need

spacious laboratories with basic infra-structures.

This might be the reason for choosing all Federal Government Colleges as CESAC pilot Schools.

- (c) Time Consumption. The CESAC biology syllabus is very wide and it has been found difficult to cover enough ground of the syllabus before the WASC examination. Biology takes four to five teaching periods weekly per class. The teacher and the laboratory assistant put in a lot of time into scouting for materials and setting up activities to meet with the demands of this syllabus.
- (d) Student Population. For effective implementation of the CESAC biology programme, the student population in a class should not exceed twenty-five to thirty-five students.
- (ii) Input Into Traditional WASC Biology Programme. A meagre fund is required in the teaching of the traditional WASC biology syllabus when compared with the teaching of CESAC biology syllabus.
- (a) Manpower. A university science degree holder or an M.C.E graduate does not need an orientation course on how to teach this syllabus effectively.

- (b) Laboratory and Equipment. The WAEC biology syllabus does not require an elaborate laboratory infra-structure or a lot of expensive equipment. Most of the laboratory teaching can be done by teacher demonstration. This seems to be the main fault in this syllabus. Some expensive pieces of equipment like microscopes, bioviews, autoclaves, reffridgerators etc and scarce indicators such as Bromothymol Blue, Methyl Cellulose MS 222, Pyrogallol or Pyrogallic acid solution are not pre-requisites to teach any specific aspect of traditional biology. The teacher can rely on the laboratory assistants for most of the preparations.
- (c) Time Consumption: The traditional biology syllabus could be taught and completed before the WAEC examination using a maximum of three periods weekly per class.
- (d) Student Population. A teacher has to handle over fifty students in a traditional biology class.

into

Considering the inputs of each of the two syllabi, one would expect a difference in student performance in this study. The question arises. Why were there no differences? Could it be from the instruments used, or the teachers of CESAC programme or some defects in the CESAC programme itself. Let us examine the possible reasons more closely.

1. The IJMB examination seem to test the lower levels of cognitive. For example, most of the question in paper I (Appendix 12) such as question number 2, 3, 4, 5, 6 and 7 are testing recall of facts. This examination seem not to measure understanding, ability to apply, synthesise, evaluate knowledge etc, envisaged in the CESAC objectives. The IJMB examination seems to favour students exposed to the WAEC traditional biology approach, both in teaching and learning.
2. Teachers of CESAC biology may not be teaching in line with the stated objectives of CESAC programme. This assumption arises from Oludotun's (1981) investigation of selected CESAC physics teachers' performance relative to the CESAC objectives. Oludotun observed that the teachers involved in his study still used the lecture approach rather than demonstrations, pupil-activity, problem-solving and discovery approaches. His study

reveals that there is a gap between the ideas of the CESAC programme innovators and the practical implementation of it by the teachers.

A similar gap was observed by Mani (1982) while investigating the gap between the intended and the operational forms of the Nigerian Integrated Science Project (NIS) curriculum .

Mani in his investigation observed that the teachers were not emphasising all the possible instructional objectives, more especially the higher order cognitive, process skill and the attitude objectives.

Hart and Towns (1980) were of the opinion that the degree of teacher commitment to the philosophy of BSCS programme (in this case, CESAC biology programme) might influence the realization of course objectives.

3. Ogunlyi (1976) pointed out some common problems to various recent science programmes in various countries as follows:

- (a) Over emphasis on process of science to the exclusion of products of science and vice-versa.
- (b) The rigid nature of the so called conceptual schemes which appears to be more suitable to physical rather than biological sciences.
- (c) Lots of materials are needed to effectively carry out the programme and hence costly to run.

- (d) Much reliance of teachers on in-service programme.
- (e) Much learning material appear to relegate slow learners to the background of the average and above average pupils.

Finally and perhaps most important, Ogunniyi states: "The activities are so many and so diverse as to make a thorough completion of any unit impossible."

5.3 Conclusion And Recommendations

Whatever the reasons for the result of this study, it would nevertheless appear as if CESAC biology programme is not achieving its objectives.

This study has only evaluated cognitive and psychomotor objectives :

1. Some similar work to measure attitude is recommended.
2. The performance of science teachers, especially those teaching in Federal Government Colleges, relative to the objectives of CESAC programme and other new science curricula, should be investigated.
3. The CESAC should consider deploying expert hands as representatives either in each state or region, who would make more frequent visits to CESAC schools to render advices, guidelines, and a closer supervision.

4. To have more dedicated and devoted teachers in Federal Government Colleges, the Federal Ministry of Education should try to promote her classroom teachers in line with other Federal and States Ministries.

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APPENDIX 1

PILOT SCHOOLS

Anambra State

1. Federal Government College Enugu
2. Federal Government Girls College, Onitsha
3. Adada Secondary School, Nkpologu, Nsukka
4. Girls Secondary School, Osubulu, Onitsha

Bauchi State

5. Federal Government College, Azare
6. Federal Government Girls College, Bauchi
7. Government Secondary School Toro
8. Government Secondary School, Kaltungo

Bendel State

9. Federal Government Girls' College, Benin
10. Federal Government College, Warri
11. Edo College, Benin City
12. St Patrick's College, Asaba

Benue State

13. Federal Government Girls College Gboko
14. Federal Government College, Ukwolawo
15. Government College, Makurdi
16. Government College, Katsina-Ala

Borno State

17. Federal Government College, Maiduguri
18. Federal Government Girls' College, Potiskum

19. Government Secondary School, Maiduguri
20. Government Secondary School, Waka Biu

Cross River State

21. Federal Government Girls' College, Calabar
22. Federal Government College, Ikot-Ekpene
23. Asutan Ekpe Comprehensive Secondary School, Uyo

Gongola State

24. Federal Government College, Wukari
25. Federal Government Girls College, Yola
26. Government Secondary School, Mubi
27. General Muritala Mohammed College, Yola

Imo State

28. Federal Government College, Okigwe
29. Federal Government Girls' College, Owerri
30. Trinity High School, Oguta
31. Government College, Umuahia

Kaduna State

32. Federal Government Girls' College, Bakori
33. Federal Government College, Kaduna
34. Government Secondary Technical School, Zaria
35. Government Secondary Technical School, Mashi

Kano State

36. Federal Government College, Kano
37. Federal Government Girls' College, Kazaure
38. Suafa College, Kano
39. Government Secondary School, Hadejia.

Kwara State

40. Federal Government College, Ilorin
41. Federal Government Girls College, New Bussa
42. Government Secondary School, Ilorin
43. Queen Elizabeth School, Ilorin.

Lagos State

44. Kings College, Lagos
45. Federal Government College, Ijanikin
46. Queen's College, Yoba
47. St. Finbarr's College, Akoka
48. Ansar-ud-Deen College, Isolo

Niger State

49. Federal Government Girls College, Bida
50. Federal Government College, Minna
51. Government Technical College, Eyagi
52. Government Secondary School, Suleija

Ogun State

53. Federal Government College, Odogbolu
54. Federal Government Girls' College, Sagamu
55. Comprehensive High School, Aiyetoro
56. Adeola Odutola Comprehensive School Ijebu-Ode.

Ondo State

57. Federal Government Girls' College, Akuru
58. Federal Government College, Idoani
59. Victory College, Ikare
60. Manuwa Memorial Grammar School, Ijero

Plateau State

61. Federal Government College, Jos
62. Federal Government Girls' College, Langtang
63. Government Secondary School, Kuru
64. Government College, Keffi
65. Airforce Military School, Jos.

Rivers State

66. Federal Government Girls' College, Abulema
67. Federal Government Girls' College, Port Harcourt
68. Government Comprehensive Secondary School, Borikiri
69. Kalabari National College, Buguma.

Sokoto State

70. Federal Government College, Sokoto
71. Federal Government Girls' College, Gusau
72. Government Secondary Technical School, Farfara
73. Government Secondary Technical School, Gusau.

Oyo State

74. Federal Government College, Ogbomosho
75. Federal Government Girls' College, Oyo

APPENDIX 2

ASSOCIATE SCHOOLS

Anambra State

1. National Secondary School, Nike
2. D. M. G. S., Onitsha
3. Q. R. C., Onitsha
4. Merchants of Light School, Oba Nnewi
5. Abakaliki High School, Abakaliki
6. Joseph Memorial Secondary School, Aguleri
7. Girls' High School, Nsukka
8. Ezeagu Secondary School, Isiowu Umanna
9. Girls' High School, Awka
10. St. Peter's Secondary School, Achina, Nnewi
11. Christ High School, Abor, Enugu.

Bauchi State

12. Government Girls' Secondary School, Gombo

Cross River State

13. St. Prisca's Secondary School, Obubra
14. West Africa Peoples Institute, Calabar
15. Secondary School, Oti-Oron.

Imo State

16. National High School, Aba
17. Government Secondary School, Afikpo
18. Enuda High School, Abiriba
19. Ihie High School, Ihie
20. Boys High School, Ihube, Okigwe
21. Girls' Secondary School, Egoke
22. St. Catherine's Secondary School, Nkwere
23. Bishop Shannahan Secondary School, Orlu
24. Government Secondary School, Owerri
25. Ife Secondary School, Ife Ezinihite

Kaduna State

26. Government College, Kaduna

Lago State

27. Egbobi College, Yaba
28. Badagry Grammar School, Badagry
29. Amaratul Islamiyyah Grammar School, Surulere
30. Reagan Memorial Baptist Girls School, Yaba
31. Methodist Girls' High School, Yaba
32. Jubril Martin Memorial Grammar School Iponri

Ondo State

33. Ekiti Baptist High School, Igodo-Ekiti

Plateau State

34. Government Secondary School, Pankshinn
35. Government Secondary School, Lafia
36. Government Girls Secondary School, Shendam
37. Government College, Pankshinn

Rivers State

38. County Grammar School, Ikwerre Etche
39. Baptist High School, Port Harcourt
40. Birabi Memorial Grammar School, Bori
41. Okrika Grammar School, Okrika
42. Archdeacon Crowther Memorial Girls' School, Elelenwa
43. Western Abioda County High School, Abioda
44. Bishop Dimieari Grammar School Yenagoa

Sokoto State

45. Government Secondary School, Yolwa

Borno State

46. Government Secondary School, Bama
47. Government Secondary School, Fika

APPENDIX 3

VOLUNTARY SCHOOLS

Andel State

1. Pilgrim Baptist Grammar School, Isulo-Uku
2. Nsukwa Grammar School, Nsukwa

Lagos State

1. Government College, Agege

APPENDIX A

Enrolment In WASC Examinations For CESAC Biology
Programme 1974 to 1981

Year	Enrolment
1974	169
1975	307
1976	227
1977	1,493
1978	2,029
1979	5,013
1980	5,951
1981	6,453
Total	21,642

APPENDIX 5

Secondary Schools Currently Using CESAC Programme
As of June, 1983

Anambra State

- 1 P Federal Government College, Enugu
- 2 A Christ High School, Abor-Enugu

Bauchi State

- 3 P Federal Government Girls' College, Bauchi
- 4 A Government Girls Secondary School, Gombe

Bendel State

- 5 P Federal Government College, Warri
- 6 P Edo College, Benin
- 7 P St. Patrick's School, Asaba
- 8 V Nsukwa Grammar School, Nsukwa

Benue State

- 9 P Federal Government Girls' College, Gboko
- 10 P Government College, Makurdi

Borno State

- 11 P Government Secondary School, Maiduguri

Gongola State

- 12 P Government Secondary School, Mubi

Imo State

- 13 P Federal Government Girls' College, Owerri
- 14 P Trinity High School, Oguta

Kaduna State

- 15 P Federal Government Girls College, Bakori
- 16 P Government Secondary Technical School, Soba, Zaria
- 17 P Government Secondary Technical School, Mushi
- 18 A Government College, Kaduna.

Kano State

- 19 P Federal Government College, Kano
 20 P Federal Government Girls College, Kazaure
 21 P Rumfa College, Kano
 22 P Government Secondary School, Hadejia

Kwara State

- 23 P Federal Government Girls' College, New Bussa
 24 P Government Secondary School, Ilorin
 25 P Queen Elizabeth School, Ilorin

Lagos State

- 26 P Federal Government College, Ijanikin
 27 A Jubril Martin Memorial Grammar School, Ipuri
 28 V Government College, Agege

Niger State

- 29 P Government Secondary School, Suleija

Ogun State

- 30 P Federal Government College, Odogbolu

Plateau State

- 31 P Federal Government College, Jos
 32 P Federal Government Girls College, Lantang
 33 P Government Secondary School, Kuru
 34 P Airforce Military School, Jos
 35 A G.G.S.S., Shendam
 36 A Government College, Pankshinn

Rivers State

- 37 A County Grammar School, Ikwerre Etche
 38 A Okrika Grammar School, Okrika

Sokoto State

- 39 P Federal Government College, Sokoto
 40 P Government Secondary Technical School, Farfara
 41 P Government Secondary Technical School, Gusau

Key to the Appendix: P represents a Pilot Secondary School
 A " an Associate Secondary School
 V " a Voluntary Secondary School.

APPENDIX 6
DEPARTMENT OF EDUCATION
AHMADU BELLO UNIVERSITY, ZARIA, NIGERIA

February 15th 1983

The Principal
School of Basic Studies
Ahmadu Bello University
Zaria.

Dear Sir,

The bearer of this letter is Mrs. Josephine Kanu. Mrs Kanu is a Post-graduate student in the Department of Education, and is engaged in a research project concerned with IJMB biology results, of former CESAC and non-CESAC students.

I would be very grateful if Mrs. Kanu could be given access to the data she needs for her project, and if she could be permitted to have your students to complete her questionnaire.

Yours sincerely

Dr. D. I. Brown
Supervisor.

APPENDIX 7

INTRODUCTION

I am planning to conduct a research survey on the relative merits of the WAEC syllabuses (CESAC and International). At this point I am trying to establish which students in S.B.S., A.T.C., C.A.S., Zaria and Kaduna Polytechnics, studied using one or other of the two syllabuses. I would very much appreciate it if you could answer the short questionnaire on the other side.

Thank you.

J. E. Kanu (Mrs)
Department of Education, A.B.U.,
Zaria.

PRELIMINARY QUESTIONNAIRE

1. Your Full Name
 2. Name of Last School Attended
- In the following questions underline the appropriate answer.
3. Are you studying Biology? Yes/No
 4. Which Biology Syllabus did you offer for School Certificate?
International (Biology Ordinary Level) or CESAC (Alternative Biology Ordinary Level)
 5. What was your grade in WASC Biology result? A₁ A₂
A₃ C₄ C₅ C₆ P₇ P₈*

Thanks very much for your kind co-operation.

APPENDIX 8

Federal Government Colleges Attended by
CESAC Group

Name of School	Town	State	No of Students
Federal Government Girls College	Bakori	Kaduna	4
" " " "	Bauchi	Bauchi	2
" " " "	Gboko	Benue	1
Federal Government College	Kano	Kano	6
" " Girls College	Kazaure	Kano	3
" " College	Odogbolu	Ogun	3
" " "	Sokoto	Sokoto	8
" " "	Warri	Bendel	2

APPENDIX 9

Federal Government Colleges Attended by
Non-CESAC Group

Name of School	Town	State	No of Stu.
Federal Government College	Azare	Bauchi	1
Federal " Girls' College	Bakori	Kaduna	2
" " " "	Bauchi	Bauchi	3
" " " "	Benin	Bendel	2
" " " "	Bida	Niger	1
" " College	Ijanikin	Lagos	1
" " "	Ilorin	Kwara	4
" " "	Jos	Plateau	1
" " "	Kaduna	Kaduna	6
King's College,	Lagos	Lagos	3
Federal Government College	Maiduguri	Borno	3
" " "	Oghomoso	Oyo	1
" " "	Port-Harcourt	Rivers	1

APPENDIX 10

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Non-Federal Government Colleges Attended by
CESAC Group

Name of School	Town	State	No of Students
Government Secondary School	Ilorin	Kwara	1
Queen Elizabeth School	Ilorin	Kwara	1
Government Secondary School	Kaltungo	Bauchi	2
Rumfa College	Kano	Kano	6
Government Secondary School	Kuru	Plateau	5
Government Secondary School	Maiduguri	Borno	4
Government College	Makurdi	Benue	2
Government Secondary School	Mubi	Gongola	2
Government Sec. Technical School	Soba	Kaduna	2
Government Secondary School	Suleija	Niger	2
Igbobi College	Yaba	Lagos	1
Methodist Girls High School	Yaba	Lagos	1

APPENDIX 11

States of Location of Non-Federal Government
Colleges Attended by Non-CESAC Group

State of School Location	Number of Students
Bauchi	1
Dendel	1
Benue	3
Borno	1
Imo	1
Kaduna	8
Kano	7
Kwara	2
Lagos	1
Niger	2
Plateau	1
Sokoto	1

APPENDIX 12

AHMADU BELLO UNIVERSITY, ZARIA

Interim Joint Matriculation Board Examination

Tuesday May 31, 1983.

BIOLOGY

Paper I

Time Allowed: 3 hours

INSTRUCTIONS: Answer any FOUR questions including question No. 1 = 40 marks. The rest 20 marks each.

Candidates are warned that misreading a question may lead to a considerable loss of marks.

1. Maize is cultivated widely in the guinea savanna region for human consumption. A high-yielding maize variety was grown in this region. Two fields were selected at random for the evaluation of yield, and 40 plants in each field were harvested. Each maize plant produced one ear 'cob'. The mature ears differed in length, the number of grain rows per ear, and the number of grains per row. Data are shown in the following Table below:

Number of Plants harvested in each field	Characters of the ear 'cob'		
	Length, cm	Number of rows of grains	Number of grains per row
<u>First Field</u>			
Group (i) 10	20	16	40
Group (ii) 20	20	18	40
Group (iii) 10	30	20	50
<u>Second Field</u>			
Group (i) 10	30	16	50
Group (ii) 20	30	18	50
Group (iii) 10	20	20	40

- (a) Which of the two fields produced greater number of grains?
 (b) What group of plants sampled gave the highest percentage of grains?
 (c) What is the percentage of the group of plants that produced the lowest yield of grains?
 (d) For the plant yield expressed as the number of grains of shelled ear, compute the mean yield per plant in each field separately.

Turn over

AHMADU BELLO UNIVERSITY, ZARIA

Interim Joint Matriculation Board Examination

Friday June 3, 1983.

BIOLOGY

Paper II

Time Allowed: 3 hours

INSTRUCTIONS: Answer any FOUR questions.

1. (a) Describe the functional anatomy of the human kidney.
(b) What excretory devices exist in
(i) Protozoa
(ii) Flatworms
(iii) Earthworm
(iv) Insects?
2. (a) What do you understand by the concept "Green Revolution"?
(b) Briefly discuss the role of the Federal Government of Nigeria in this programme.
3. (a) Describe the mammalian lymphatic system.
(b) What are the main functions of the system?
4. (a) By means of two neat, well-labelled diagrams only, show the differences in structure between a young dicotyledonous stem and a young monocotyledonous stem.
(b) Why, and how does a young dicotyledonous stem increase in girth?
5. (a) What animals are called vertebrates?
(b) Classify the group and state at least two major characteristics of each class.

Turn over

(iv) Mineral element requirement for plant growth.

Mineral element	Effect of deficiency on plant growth
(a) Iron (b) Molybdenum (c) Magnesium (d) Potassium (e) Calcium (f) Phosphorus	

(v) Dispersal of fruits and seeds.

Name of Plant	Structure Dispersed	Mode of Dispersal
<u>Coconut</u>		
<u>Crotalaria</u>		
<u>Tridax</u>		
<u>Acanthospermum</u>		
<u>Boerhaavia</u>		

(vi) Germination of seeds.

Name of Plant	Mode of Germination
Castor oil	
Maize	
African Yam bean seed	
Cowpea	

7. Briefly describe the skeletal system of a man
8. What evidences can you give to support the claim that evolution has taken place?

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APPENDIX 13

School of Basic Studies
Ahmadu Bello University, Zaria.

Biology Section (Science Division)

Final Practical Examination - Biology

Time Allowed: 3 hours

Date: Sat. 14th May, 1983

Instructions: (Answer All Questions. Draw large and clearly labelled diagrams wherever appropriate.)

1. Specimen A consists of food substances. Carry out appropriate tests to identify the organic compounds present in specimen A. Record your work in three columns, namely, Procedure: Observation: Inference. You are to use only the following reagents for your tests as appropriate:
 - Iodine Solution/Iodine in Potassium iodide
 - Fehlings solution I
 - Fehlings solution II
 - Millon's reagent

(20marks)
- 2(a) Describe the floral structure of specimen B.
- (b) Draw one part of each whorl of specimen C and label. Write the floral formula of specimen C.

(25marks)
- 3(a) What are the common characteristics shared by specimens D, and F that you can observe?
- (b) What observable differences can you notice between specimen D, and F? Tabulate your answers.
- (c) To what classes do specimen D, and F belong?
- (d) Draw a dorsal view of specimen D with the wings on one side extended and label fully.

(25Marks)
4. Identify specimen G, H, I and J giving reasons in each case.

(20 marks)
5. Identify without giving reasons specimens K, L, M, N, O, P, Q, R, S and T.

(10marks)

APPENDIX 14

Summary of LJMB Grades for Each Group

Grades	Federal Government Colleges		Non-Federal Government Colleges	
	CESAC Group	Non-CESAC Group	CESAC Group	Non-CESAC Group
A	-	-	-	-
B	-	-	-	1
C	9	9	7	9
D	4	7	5	8
E	12	8	12	6
F	4	5	5	5

APPENDIX 15

DEPARTMENT OF EDUCATION
ABIMBAYO BELLO UNIVERSITY, ZARIA, NIGERIA.

16th November, 1983

Mr. Daring
IJMB Office
Institute of Education
Annexe, ABU, Zaria.

Dear Sir,

The bearer of this letter, Mrs. Josephine Kana, is a post-graduate student in the Department of Education. In order to satisfactorily complete her M.Ed Project she needs to know the raw scores of IJMB Biology students in 1983. Such scores will be treated with extreme confidentiality and in her final report no names will be divulged. I would be very grateful therefore, if you could assist her.

Yours faithfully

Dr. D. P. Brown
(Supervisor)