



A Comparison between Public and Private Schools' Coverage of Science Scheme of Work in Upper Basic Secondary Education Curriculum in Nigeria

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

The aim of the study was to compare the extent of coverage of the prescribed science scheme of work in basic secondary school between privately owned schools (private schools) and Government owned schools (public schools) in Yenagoa Local Government of Bayelsa State. Science concepts in the Basic or Junior Secondary School (JSS) were taught in 'Integrated Science' as a subject in the school. To guide the study, two research questions were raised and answered as well as two hypotheses were stated and tested. The population was four secondary schools: two private and two public schools. The investigation covered JSS1, JSS2 and JSS3 of each school selected. The coverage of scheme work of the Integrated Science was examined from first term to third term of the academic session (2013/2014). The major instrument used for the data collection was a check list, questionnaire, and personal observation. It is discovered that both types of schools (private and public) use the same edition of scheme of work but have different coverage extent. In conclusion, the comparative analysis of the private and public schools on the extent of

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scheme of work coverage in integrated science revealed that private schools did better than the public schools. The reason why the private schools cover their scheme of work in science was because of organization of extra-lessons, extension of classes, and organization of holiday lessons. It was therefore recommended that public schools should borrow a leaf.

Keywords: Scheme of work; integrated science; basic secondary school; Nigeria, curriculum; private school; public school.

1. INTRODUCTION

Scheme of works are simplified curriculum, while curriculum is the totality of learning activities to be achieved in a year. Scheme of work are curriculum broken down into terms and weeks. The scheme of work comprises the term to term, week by week learning activities to be delivered by the teacher to the student It is usually, further broken down into lesson periods by the teacher in a bid to bring about specific objective(s) per lesson period. According to [1] the National Council on Education (NCE) approved a new curriculum in basic science in 2006 to suit the present system of Education: 9 years of Universal Basic Education (UBE), 3 years of Senior Secondary Education (SSS) and 4 years tertiary education. In the new curriculum the 9 years basic education was subdivided into 3 structures namely: Lower Basic Education Curriculum (Primary 1-3); Middle Basic Education Curriculum (Primary 4-6); Upper Basic Education Curriculum (JSS 1-3). These educational structures are the same for both private and public schools. There is no distinction in terms of social-cultural context (climate, religious and tradition) between private and public schools. The difference between private and public schools lies in socio-economic status of parents as private schools are more expensive in terms of school fees paid compared to public schools. Public schools are owned and run by the government while private schools are owned and run by individuals for profit.

This new curriculum was prepared in a way in which it ensures continuity and flow of themes, topics and learning experiences from primary to Junior Secondary Schools levels. This implies that any topic or content that is not covered at any stage will hamper the understanding of the next topic in the upper stage. There have been a long lasting competition between the private and public schools. Most people seem to prefer private schools and some others public schools. The important thing in terms of teaching and

learning is the coverage of subject content and not if it is a privately owned school or Government owned school. Since the quality of education do not depend on the structures and name of a school but how well the students are being taught. This opinion is also shared by [2].

With the advent of Universal Basic Education on 29th September 1999, the system of education changed from 6334 (i.e. six years of primary education, three years of junior secondary education, three years of senior secondary education and four years of tertiary education) to nine years of universal basic education known as UBE, three years of senior secondary education and four years of university educational system (934) [3] This also led to the change of the name from integrated science to basic science (for science concepts in the Junior Secondary School Curriculum), in the same vein the content and scheme of work of integrated science was modified. During this era, the number of private schools have risen and out grown that of public schools [4]. Thus the need arose that a comparative study/survey be made to ascertain the extent of scheme of work coverage between the public and private schools especially on the science concepts in the Junior Secondary Curriculum. The coverage of integrated science scheme of work is a task that involves the learner, the teacher and the entire school system. According to [5], the reason why the private schools cover their scheme of work in science was because of organization of extra-lessons, extension of classes, and organization of holiday lessons.

1.1 Historical Perspective of the Subject 'Integrated Science'

The subject integrated science was first introduced in the Nigerian secondary schools in 1970 by the Science Teachers Association of Nigeria (STAN). According to [6], the subject was called Nigeria Integrated Science Project (NISP) by STAN. The integrated science project comprised disciplines drawn from biology,

chemistry, physics and the health science. Due to the dynamic nature of the society and changes in the national policy on education, integrated science as a subject has always been affected. This has resulted into changing the content and name of integrated science severally [4]. Again due to problems encountered in the teaching and learning of Integrated Science, it has also led to modifying the content of integrated science [1].

First, it was the Basic Science for Nigerian Secondary Schools (BSNSS). This was also the first science curriculum development project undertaken in Nigeria between 1963 and 1967 at the Comprehensive High School Aiyetoro Abeokuta in Ogun State. The BSNSS was a curriculum in general science which covered only the first two years of secondary school education. Due to the short falls of BSNSS, the Nigerian integrated science project (NISP) came into being in 1971. The NISP curriculum/content also covered the first two years in the secondary schools. [6], as a result of lapses created in the content of NISP, it metamorphosed into the Nigerian Secondary Schools Science Project (NSSSP). This project was sponsored by the comparative education study and Adaptation Centre (CESAC). This curriculum came as an alternative syllabus for form three to five of secondary schools. Its content was biology, chemistry and physics: this was treated as individual subjects. [6], further stated that (NSSSP) had its deficiencies such as low readability of the textbooks, difficulty of the topics, inadequate teaching facilities etc.

In a bid to tackle the problems of NSSSP, according to [6] the National science curriculum came into being as a result of the National workshop on secondary education curriculum which was organized by Nigerian Educational Research Council (NERC) whose report was submitted in 1978, [7], this workshop enables the educational system to have a basic philosophy for science curriculum which is now in use in all junior and senior secondary schools throughout the federation. This led to having a new policy on education in 1985 which introduced the six years of primary education, three years of junior secondary education, three years of senior secondary education and four years university education [7]. The integrated science curriculum was made to be taught at the junior secondary schools, (JSS1 to JSS3). By this period there were very few private schools in existence.

1.2 Statement of Problem

The need to compare the extent of scheme of work coverage in integrated science between private and public schools arose because of the importance of integrated science and problems associated with teaching and learning of integrated science. Since science and technology form the bed rock for any meaningful development to take place in any society there is need to ensure that the foundational level of this science (Integrated Science) is well taught and covered so as to enable students proceed to do the individual science subjects in their senior secondary school. The problem of shortage of integrated science teachers is another factor that has prompted this investigation. Many schools in the time past and even presently employ biology or physics or chemistry teachers to teach the subject integrated science [8]. Many institutions are yet to have such a department and this poses a threat to the teaching, learning and covering of the subject at the secondary school level. Incompetent teachers when given integrated science class to teach may skip part of the scheme of work because they are either not familiar with the subject or lack the confidence to teach the topic. Also with the government interference on the schools calendar, and so many public holidays, it's worth finding out how the public and private schools are fairing in the scheme of work coverage especially on integrated science since all the topics in integrated science form the basis for all other science subjects (Biology, Chemistry and Physics) in the senior secondary.

1.3 Research Questions

The following two research questions have been posited for this study:

1. Is there any difference between private and public school scheme of work on integrated science?
2. What is the extent of coverage of the integrated science scheme of work between public and private schools?

1.4 Research Hypotheses

Two hypotheses were also coined from the two research questions and tested at 0.05 level of significance. The hypotheses are stated in null (H_0) and alternate (H_1) form:

1. H₀: There is no difference between the scheme of work of public and private schools in integrated science.
H₁: There is a difference between the scheme of work of public and private schools in integrated science.
2. H₀: There are no differences in the extent of coverage of integrated science scheme of work between public and private schools.
H₁: There are differences in the extent of coverage of integrated science scheme of work between public and private schools.

2. METHODS

The study design is a case study design involving a private and a public schools which were randomly selected from Yenagoa metropolis of Bayelsa State. Consent letters were sent to the participating schools detailing the research aims and objectives as well as the methodology. Positive response of willingness to participate in the research was received. The investigation covered JSS1, JSS2, and JSS 3 of each of the selected schools. Three students were randomly selected from each class making a total of 9 students from each school, and total of 36 students for the four schools involved in the study. Also each class teacher was interviewed making a total of 12 teachers in all; bringing the total sample size for the study to 36 students and 12 teachers.

Three instruments were used to collect data for this study and these are a checklist for student notes and teacher's lesson plan (this was used to find out if the lesson notes prepared by the teacher were actually taught. The same checklist also investigated if the topics are in line with the scheme of work); the second instrument employed in the study was Questionnaire for the class teachers (this was to investigate the problems encountered by the teachers from the scheme and elicit complains from teachers. Also it was used to find out which edition or the scheme of work the schools are using); the third instrument employed was personal non-structured observation by the researcher.

The checklist was prepared using the National Curriculum gotten from the Bayelsa Ministry of Education. With the help of the class teachers, the purpose of the checklist was made know to the students, each item on the checklist was

properly explained to the students and they were told that they are free to ask questions on any item that posed a problem to them.

Point Biserial correlation coefficient was used to test the hypotheses formulated for the study. A point-biserial correlation is used to measure the strength and direction of the association that exists between one continuous variable and one dichotomous variable. It is a special case of the Pearson's Product-moment correlation, which is applied when you have two continuous variables, whereas in this case one of the variables is measured on a dichotomous scale that is: coverage and non-coverage of the scheme of work of integrated science in Junior Secondary one to three (JS1-3) in private and public schools. The formula is below:

Equation: The Point Biserial Correlation Coefficient

$$r_{pb} = \frac{X_p - X_g}{SD} \sqrt{pg}$$

Where

\bar{X}_p = mean score for private school

\bar{X}_g = mean score for public school

p = proportion of score for the private to the whole sample scores.

G = proportion of scores for the public in the whole sampled scores.

SD = standard deviation of the whole sampled scores of both schools

Like all other correlation (r), Point Biserial makes use of same decision table which helps in the acceptance or rejection of the hypothesis (- 1 ≥ r ≤ + 1) Point Biserial measures the strength of association of two dichotomous variables in a simple measure ranging from - 1 to + 1.

Where

- 1 indicates a perfect Negative association

+ 1 indicates a perfect positive association

0 Indicates no association at all.

3. RESULTS

It was observed that both private and public schools are using the 2009 edition of integrated science scheme of work given to them by the

State Ministry of Education. It was also observed that all the schools involved in the study are using the national curriculum. Table 1 shows the number of themes in the integrated science curriculum for JS 1-3 in the three terms (1st, 2nd and 3rd terms).

These are the actual number of themes per term for each class as found in the national curriculum. The total science concepts for upper basic education curriculum (JS 1-3) is 58 themes which are bases for preparation for the various science subjects (biology, chemistry and physics) in the senior secondary school (SS 1-3).

The analysis below shows the extent of coverage of these themes between the private and the public schools under investigation in this study. Responses from the check-list on how many lesson notes the teachers wrote per term for each class are presented in Table 2.

A thorough examination of teachers' lesson plan/notes shows that all the teachers in the private schools under investigation completely

wrote their lesson note per class for the three terms, while in the public schools the teachers could not complete one or two of their lesson notes for the terms.

The teachers' lesson notes were then compared to the student lesson note to ascertain the number of lesson(s) the teacher was able to teach the students. Response from the check-list on how many lesson the teacher was able to teach their students are presented on Table 3.

From Table 3, students' note indicated that one hundred and seven topics have been taught in public schools but Table 2 indicated that one hundred and three lesson plans/notes only were prepared. This implies that some of the teacher's in the public schools did not write some lesson notes but had delivered such topics to the students (observation shows that most of the teachers were corp. members); it was also observed that students of both schools make some mistakes while writing their notes and some diagrams were not well drawn.

Table 1. Number of themes as contained in the national curriculum of integrated science

Class/Term	No. of themes	Class/Term	No. of themes	Class/term	No. of themes
JS1- 1 st Term	4	JS2- 1 st Term	6	JS3- 1 st Term	9
2 nd Term	6	2 nd Term	9	2 nd Term	7
3 rd Term	4	3 rd Term	8	3 rd Term	5
Total	14	Total	23	Total	21
Grand total of themes JS 1-3 = 58					

Table 2. Number of lesson notes wrote per term for each class

Terms	Total no of topic covered	
	Private	Public
JSS1 1 st term	8	7
2 nd term	12	10
3 rd term	8	7
JSS2 1 st term	12	12
2 nd term	18	16
3 rd term	16	5
JSS1 1 st term	18	17
2 nd term	14	13
3 rd term	10	9
Total	116	103

Table 3. Number of lesson(s) covered as contained in students' lesson note

Terms	Total no of topic covered	
	Private	Public
Jss1 1 st term	8	8
2 nd term	12	10
3 rd term	8	7
Jss2 1 st term	12	12
2 nd term	18	16
3 rd term	16	15
Jss1 1 st term	18	17
2 nd term	14	13
3 rd term	10	9
Total	116	107

Hypothesis 1

H₀: There is no difference between the scheme of work of public and private schools in the integrated science.

H₁: There is a difference between the scheme of work of public and private schools in integrated science.

Both the private and the public schools visited in this study make use of the same scheme of work. So there is no difference in the scheme of work of integrated

science between private and public schools.

Hypothesis 2

H₀: There are no differences in the extent of coverage of integrated science scheme of work between the private and public schools.

H₁: There are differences in the extent of coverage of integrated science scheme of work between the private and public schools.

From the data on Table 3 using Point biserial correlation coefficient formula to test hypothesis 2; the total number of topics covered were: Private = 116; Public = 107; Terms total JS1-3 = 9. Using the equation:

$$r_{pbi} = \frac{X_p - X_g}{SD} \sqrt{pg}$$

$$X_p = 116/9 = 12.89; X_g = 107/9 = 11.89; \text{Total } 107 + 116 = 223; P = 116/223 = 0.52; g = 107/223 = 0.48$$

Next is to find the standard Deviation (SD) of the entire distribution:

Table 4. Standard deviation (SD) of the entire distribution

	X	X - \bar{X}	(X - \bar{X}) ²
Priv	8	4.4	19.36
	12	0.4	0.16
	8	4.4	19.36
	12	0.4	0.16
	18	+ 5.6	31.36
	16	3.6	12.96
	18	5.6	31.36
	14	1.6	2.56
Publ	10	2.4	5.76
	8	4.4	19.36
	10	2.4	5.76
	7	5.4	29.16
	12	0.4	0.16
	16	3.6	12.96
	15	2.6	6.75
	17	4.6	21.16
	13	0.6	0.36
	9	3.4	11.56
	223		230.27

$$\bar{X} = 223/18 = 12.4$$

$$V = 230.27/18 = S.D = \frac{\sqrt{\sum(X - \bar{X})^2}}{N} = \frac{\sqrt{230.27}}{18}$$

$$S.D = \sqrt{12.79} = 3.58$$

$$r_{pbi} = \frac{X_p - X_g}{S.D} \sqrt{p_g}$$

$$= \frac{12.89 - 11.89}{3.58} \times \sqrt{0.52 \times 0.48}$$

$$= 1/3.58 \times \sqrt{0.2496}$$

$$= 0.28 \times 0.50; \therefore r = 0.14 \approx 0.1; -1 \geq r \leq +1$$

From the calculation above $r = 0.14$ indicated a positive direction of association. This means there is a difference in the extent of coverage of integrated science scheme of work between public and private schools. The null hypothesis was then rejected and the alternate hypothesis was accepted.

Concerning the extent of coverage of integrated science, it was observed that all the private schools visited completed their scheme of work for the entire session, no topic was left while in the public schools they tried but one or two topics of the term were not taught by the teachers. In the private school also, all the teachers completely wrote their lesson notes that were marked by their Heads of Department, a situation not found in the public schools.

Again, concerning complain by the teachers on the scheme of work, the private had little or no issues to complain. While the public schools had many reasons and faults on the scheme of work which include:

- Lengthy aims and objectives of some topics;
- Some topics are so broad;
- Extra curricula activities encroaches into the lesson periods;
- Students slow rate of understanding some topics and lack of laboratory for the practical.

This finding also is in line with [9], findings on integrated science.

4. DISCUSSION OF FINDINGS

It was found out that both schools (private and public) make use of the same edition of scheme of work from the Federal Ministry of Education. This means that they have equal opportunity of covering the scheme of work within the same time, since both schools run the same academic calendar and are situated in the same environment i.e. state and local government. Another observation on the scheme was that almost all the schools uses the curriculum to teach, and not scheme of work per say. This led to some teachers to follow the textbooks that have broken down the theme into specific topics. The hypothesis tested indicates no significant difference in the scheme of work used by the schools.

Furthermore, it was observed that what the students of the private schools have in their notes corresponded with to their teachers note, but in the public schools, some of the topics or sub topics were not taught. They attributed this to the fact that the integrated class where being handled by coppers (corp. member who are posted to the school for only awhile). Sometimes their posting to a school will occur in the middle of the term depending on the National Youth Service Corp (NYSC) calendar. This obstruction of the flow of normal academic calendar could jeopardize the teaching of the affected subject. Corp members are usually used in the teaching of the science subjects as there is a dearth of qualified science teachers in public schools. The later finding (dearth of science teachers especially integrated science teachers) is not

only peculiar to Nigeria as it collaborates with earlier findings by in Kenya.

From the afore mentioned findings, it is very obvious that privately owned schools cover the approved integrated science scheme of work than the government owned secondary schools (public schools) and this has being attributed to the factors outlined above which include the lack of experienced teachers (resulting to the use of fresh graduates: coppers); lack of commitment on the parts of public school teachers; inadequate supervision of public school teachers, as well as lack of laboratories for practical in public schools.

This difference can be improved by government employing more qualified experienced science teachers, provide science laboratories and increase supervision of teachers in public schools.

5. CONCLUSION

In conclusion, the comparative analysis of the private and public schools on the extent of scheme of work coverage in the instruction of integrated science revealed that private schools did better than the public schools. The private schools tried to cover their entire scheme of work for the session while the public had few topics uncovered. There are no differences between the scheme of work of public and private schools. Finally, there are complains about the scheme from teachers of both schools. The limitation of this study is that its findings cannot be generalized due to the fact that investigation is based on a comparative analysis of one public secondary school to one private secondary school.

6. RECOMMENDATIONS

Based on the findings, the following recommendations are made:

- Principal's of public schools should effectively managed and monitor their teacher's to enable the teachers or coppers write their note as at when due.
- State Ministry of Education should encourage the public schools to have extra lessons and holiday lessons to aid in the scheme of work coverage.
- State Ministry of Education should organize a capacity building workshop to

educate both the private and public schools on the new 2009 national curriculum on how to plan the time table to suit the four subjects that now makes up the Integrated Science (Basic Science and Technology).

- Bayelsa State Ministry of Education should endeavor to break down the National Curriculum into scheme of work, for it is not in the capacity of teachers to do so. For instance, some themes are meant to run from first term, second term and third term (spiral curriculum). But if not broken down, teachers tend to teach such theme at a stretch to the detriment of the students.
- State Government should employ more science teachers into the public schools system to avoid the use of Corpers, who are temporary staff, and when one leaves it takes a couple of weeks or months to replace another, thereby creating room for some topics not to be covered.
- Finally, teachers in both the private and public schools should monitor the notes that students write, if possible mark the students notes regularly to ensure that they copy note without much mistakes.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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