

AN INVESTIGATIVE STUDY INTO THE ATTENDANT EFFECTS OF MAKING BIOLOGY OPTIONAL IN NIGERIAN SECONDARY SCHOOLS (A CASE STUDY OF SELECTED SCHOOLS IN OGUN STATE)

***Obadipe J.A¹, Sonde P.O¹**

¹Department of Biology, Centre for Degree Programme, Federal College of Education,
Abeokuta in Affiliation with University of Ibadan

E-mail: obadipejohnabiiodun@yahoo.com, obadipemayowa@gmail.com
Telephone: +2348138065315, +2349067713031

E-mail:Patricksonde@hotmail.com, patolas001@gmail.com
Telephone: +2348061265627, +2349071816532

ABSTRACT

The benefits Biology offers can neither be enjoyed nor applied by all Nigerian Secondary School Students due to the new Secondary School Curriculum. This study investigates attendant effects emanating from the new curriculum review (2011) which made Biology optional in senior secondary schools. Three hundred and sixty Biology students and twenty-five Biology Teachers samples randomly selected from public and private senior secondary schools in Odeda Local Government and Abeokuta South Local Government Areas were considered for the study. The study employed a descriptive survey design using a structured questionnaire and oral interview as means of data collection. The data collected were analyzed using a descriptive mean and simple percentage and the hypotheses tested using t- test with the level of significance considered at $P < 0.05$. Findings from the study showed that 76% of the respondents agreed that the new curriculum has led to reduction in students' enrollment for the subject. Moreover, 64% agreed that biology teachers are underutilized. Also, 92% and 49.7% of the teachers and Students respondents respectively agreed that making Biology an optional subjects at secondary school level is not a good decision by the education policy maker. In conclusion, the new curriculum review has given rise to serious attendant problems.

Keywords: Biology; Attendant effect; hypothesis; Curriculum; Descriptive survey Design; Environment

INTRODUCTION

Science education is indeed a veritable tool for the technological and scientific advancement of any nation. Ajayi (2008) agreed that the growth of any nation to the

standard of the 21st century technology should be anchored on the scientific based knowledge of her subjects. Biology, one of the science subjects that secondary school students offer at the senior levels in the Nigerian Secondary Schools has been structured to equip the students with the knowledge of relevant concepts and scientific skills. (Onyegegbu, 2002; FRN, 2004).

The importance of biology has made it a subject or course of impact in the life of individuals and of the nation and in turn prompted the learned to make it a compulsory course of study at the primary, secondary and tertiary level of education (Akinfe, Olofinniyi and Fashiku, 2012). According to Okenyi (2015) citing Nwagbo (2005), educating people in science especially biology has been widely acknowledged as a way of promoting economic development, eliminating poverty and introducing social welfare.

A review of the secondary education curriculum placed biology as an optional subject in the Nigerian Secondary Schools (NERDC, 2011; Adejuyigbe et al. 2016). The educational directive which is now effective has struck out biology as a compulsory subject for all Senior Secondary School students irrespective of departments.

Biology recorded many attendant problems of which poor attitude on the part of students is a factor despite its compulsory status as well as being noted as a distinct choice for all students (Lawal, 2011). In this present situation, students are given the free hand to make their choice from an array of optional subjects and a list of enrichment subjects (NERDC, 2011). The review of the biology curriculum may affect the science students (the lazy and those with negative attitudes) most especially in schools that lack guidance and counsellors or those that have inefficient ones. The students may boycott choice of biology in school and at external examinations, since in their own perception, the liberty is theirs. These set of students and others from the commercial and arts departments who did not choose the subject will not only contribute to reduction in enrollment for Biology but also the enriching knowledge of biology which no doubt is applicable in our day to day lives will not be acquired by them.

However, the attendant effect discussed previously is not worthy of biology considering its impact in the total life (academics, welfare, environmental, health and economic) of a student and the nation at large as it may have negative influence on the students, the standard or quality of the present education as well as the nation as a whole. Hence, this present study seeks to investigate various attendant effects emanated from the recent curriculum review that made Biology optional in Nigerian Secondary Schools.

STATEMENT OF PROBLEM

Based on the secondary school 2011 curriculum review, Biology (the study of life) loses her status of being a core compulsory subject for all senior secondary

school students and became subjective to the choice of the students according to their interest and potentials. (Adejuyigbe et al., 2016). Possibility of several attendant effects of this Biology curriculum review may be evident in many Nigerian Senior Secondary schools, since students are given free will to make choice from list of optional subjects (NERDC, 2011). Students with negative attitude to science may avoid the study of biology at school and at external examinations. Also since the choice of the subject is designed to be in accordance with the interest of the learner, reduction in enrollment for the study of Biology may be evident and this may bring about in some schools, Biology teachers (most often vacant ones) teaching some of the newly introduced subjects to meet the pressing need of the new curriculum. Despite the motive of the curriculum designer to allow the interest and potentials of students to thrive, one can say that at the end of secondary school education, not all Nigerian students will have the full knowledge of their body, living things, their environment and its application to life.

Given the possible attendant effects of biology as an optional subject, the assertion of Okenyi (2015) may become real as he noted that despite all the great things biology education can accomplish in Nigeria, its development beyond 2020 seems slim

Significance of the study

The findings of this study will inform the education policy makers especially the curriculum planners on the importance of biology not to only science students but to all students in senior secondary schools for effective living, as no other subject teaches an individual how to understand him/herself and the intermediate environment. The findings of the study will keep the students more informed on the importance of biology not only as prerequisite subject for some science career path, but also knowledge needed of everyone which is vital for everyday living, health well being and understanding of other components in the environment.

Objectives of the Study

The study aims at investigating various attendant effects associated with Optional Status of Biology in Nigerian Senior Secondary Schools, created by 2011 curriculum review. To achieve this, the study focused extensively on the following Objectives:

1. To determine the views of students and teachers on optional status of Biology in Nigerian Secondary Schools
2. To determine the Pattern of studying Biology in Senior secondary schools after 2011 curriculum Review.

Research questions

1. What are the views of students concerning the decision which made biology an optional subject in Nigerian senior secondary schools?
2. What are the views of teachers concerning the decision which made biology an optional subject in Nigerian senior secondary schools?
3. Do biology teachers pick up other subjects (newly introduced) for teaching?
4. What patterns do the studies of biology take in secondary schools after the review?

Hypotheses

H₀₁: There is no significant difference between the view of teachers and students concerning Optional status of Biology created by curriculum review.

H₀₂: There is no significant difference between the view of biology students in public schools and that of private schools.

Research Methodology

Research Design

The study employed the descriptive survey research design. The survey descriptive was considered appropriate for the study because it is associated with the respondents' views and opinions.

Area of the study

The study was conducted in three (public and private) secondary schools in Abeokuta Local government Area and Odeda Local Government Area of Ogun state, Nigeria. The Schools considered were: Baptist Boys High School, Oke Saje; Abeokuta Grammar School, Idi Aba; Egba Comprehensive High School, Asero; Ideal Comprehensive College, OkeSaje; Roseborn College, Idi Aba; Foursquare International Secondary School, Asero; Nawairudeen Grammar School, Obantoko; Salawu Abiola Comprehensive High School, Osiele; EgbaOdeda High School, Odeda; Faith Heritage College, Eleweran; Federal College of Education Model Secondary School, Osiele; Stephen Centre International College, Aregbe.

Participants

The population of the study comprised 360 students across the two Local Government Area. Thirty students were drawn from each of the six schools chosen in a Local Government Area.

Sample and sampling technique

The multi-stage sampling technique was used to collect data from 360 students. The first stage was the purposive selection of Ogun state based on accessibility to the respondents. Second stage also involved the purposive selection of Two (2) local governments based on accessibility and time. The third stage involves the simple random selection of Six (6) schools per local government. The final stage involved simple random selection of Thirty (30) students per school making a total of One hundred and Eighty (180) in a Local Government Area and Three hundred and Sixty (360) students from the two Local Government Areas selected for the study.

Research Instrument

The questionnaire titled "BAOSAAE" derived from the research questions and oral interview were employed as the instruments for the study. It contained Sixteen (16) items with four point'slikert scales of Strongly Agreed (SA), Agreed (A), Strongly Disagreed (SD) and Disagreed (D) for the students, and one (1) free response item. While Fifteen Items on the same four points Likert scale and three free response Items were used for the teachers.

BAOSAAE means Biology As an Optional subject And its Attendant Effect.

Validation of the instruments

The reliability as well as face, content and construct validity of the instruments used for data collection was tested using Cronchbach's Alpha reliability statistics.

Method of data collection

The questionnaire was administered randomly to selected sampled senior secondary school biology students and biology teachers. It was distributed and collected at the spot to ensure its reliability in the study area to achieve various responses.

Method of Data Analysis

The data collected were analyzed using descriptive statistics of mean, standard deviation and simple percentage. The hypotheses were tested using t-test analysis with the level of significance considered at $p < 0.05$.

Findings of the Study

RESEARCH QUESTION 1: What are the views of students concerning the decision which made biology an optional subject in Nigerian senior secondary schools?

TABLE 1: Mean and Standard deviation table on the students' views concerning the optional status of Biology in Nigerian senior secondary schools.

S/N	ITEMS	AGR.		S. DA		UND		X	SD
		Freq.	%	Freq	%	Freq	%		
5	Making biology an optional subject is a good decision by the education policy maker.	178	49.4	179	49.7	3	0.8	2.5222	1.05003
6	The curriculum is not enriching if students cannot afford themselves the knowledge about human being, other living things and the environment in which they live.	280	77.8	74	20.6	6	1.7	3.0056	1.03691
7	Any student who does not offer biology in secondary school can still have adequate knowledge of the human body, other living things and the environment as biology will teach it (even if they will not offer Biology related course in tertiary institution).	183	45.2	196	54.5	1	0.3	2.3500	1.05806
8	Biology is really necessary for study by all students in secondary schools, irrespective of their departments (Arts, Commercial or Science).	286	79.4	72	20	2	0.6	3.1639	.98078
9	Most students might not choose biology as a choice subject since it is not compulsory.	247	68.7	105	29.1	8	2.2	2.7528	1.05951
10	I would prefer if biology is studied by all students (Arts, Commercial and Science) and be made compulsory again in Nigerian Senior Secondary Schools.							3.1167	1.08561
4	I chose Biology because it is a subject that teaches student about their environments, living things and non - living things.							3.3611	.86892
11	To gain knowledge through trade subjects is far better than biology (knowledge of human body, other living things and the environment).	124	34.5	232	64.4	4	1.1	2.1444	1.05620
16	Any student who does not offer biology in secondary school can still have adequate knowledge of the human body, other living things and the environment as biology will teach it (even if they will offer Biology related course in tertiary institution).	181	50.3	177	49.2	2	0.6	2.4028	1.05898

WM= 2.757

The weighted mean of research question one is 2.757 which means the students did not have a negative view. However, many items under this research question revealed their disapproval of the decision. From Table 1, Item five (5) shows that 178 (49.4%) of the respondents agreed that making biology an optional subject is a good decision by the education policy maker while 179(49.7%) respondents disagreed with 3(0.8%) respondents undecided. In the same way, items eight and item 10 also revealed that majority of the respondents agreed that Biology is necessary for study by all students, irrespective of their departments and they preferred if biology is studied by all students. Also, Item six (6) had 280(77.8%) of the respondents agreed that the curriculum is not enriching if students cannot afford themselves the knowledge about human being, other living things and the environment in which they live, while 74(20.6%) respondents disagreed and 6(1.7%) were undecided.

RESEARCH QUESTION 2: What are the views of teachers concerning the decision which made biology an optional subject in Nigerian senior secondary schools?

TABLE 2: Mean and Standard deviation table on the view of teachers concerning the decision which made biology an optional subject in Nigerian senior secondary schools.

S/N	ITEMS	AGR		S.DA		UND		X	SD
		Freq.	%	Freq.	%	Freq.	%		
1	The review of biology curriculum (optional status) has led to reduction in students' enrollment for the study of biology.	19	76	06	24	—	—	3.0000	1.08012
2	Biology teachers' association were involved in the curriculum review	13	52	11	44	1	4.0	2.2800	1.13725
3	Making biology an optional subject in the secondary school level is a good decision.	02	08	23	92	—	—	1.9200	.64031
4	Biology is necessary for all secondary school students (science, arts and commercial department)	24	96	01	04	—	—	3.6800	.55678
6	The curriculum is not enriching if all students cannot afford themselves the knowledge about human beings, other living things and the environment in which they live.	23	92	02	08	—	—	3.3200	.85245

S/N	ITEMS	AGR		S.DA		UND		X	SD
		Freq.	%	Freq.	%	Freq.	%		
8	Any student who does not offer biology in secondary school can still have adequate knowledge of the human body, other living things and the environment as biology will teach it (even if they will not offer it at tertiary institution).							1.8800	.78102
9	Biology has been put in a worse situation.	13	52	12	48	—	—	2.4400	1.04403
14	The new curriculum is based on students' interest and potentials. Students with negative attitude to science (even if they are science students) may tend to avoid offering biology.	11	44	13	52	1	4.0	2.0400	1.05987
15	Any student who does not offer biology in secondary school can still have adequate knowledge of the human body, other living things and the environment as biology will teach it (even if they will offer it at tertiary institution).							1.8400	.74610

WM= 2.488

The weighted mean for research question 2 is 2.488. This implies that teachers have a view in contrary to the decision that made Biology an optional subject in Nigerian secondary schools. The various views according to each item under the research question are expressed in percentage. From table 2, Item one (1) revealed that 19(76%) of the respondents agreed that the review of biology curriculum (optional status) has led to reduction in students' enrollment for the study of biology while 6(24%) disagreed. Moreover, Item four shows that 24(96%) of the teachers agreed that Biology is necessary for all secondary school students (science, arts and commercial department) while 1(04%) of the teachers disagreed. Item six (6) revealed that 23(92%) majority of the teachers agreed that the curriculum is not enriching if all students cannot afford themselves the knowledge about human beings, other living things and the environment in which they live while only 2(8%) of the teachers disagreed.

Item nine (9) revealed that 13(52%) of the teachers agreed that Biology has been put in a worse situation while 12(48%) of the teachers disagreed.

RESEARCH QUESTION 3: Do Biology teachers pick up other newly introduced subjects for teaching?

TABLE 3: Mean and Standard deviation table of students' Response on if biology teachers pick up other subjects (newly introduced) for teaching.

S/N	ITEMS	AGR.		S DA		UND		X	SD
		Freq.	%	Freq	%	Freq.	%		
12	Our biology teacher teaches other subjects like Civic, trade subjects etc.	80	22.2	272	75.6	8	2.2	2.0195	.96135
13	I am aware of other biology teachers who do not teach biology at all but teach the newly introduced subjects.	140	38.9	213	59.2	7	1.9	2.1778	1.03776

Item twelve (12) in table 3 shows that 80(22.2%) of the respondents agreed that their biology teacher teaches newly introduced subjects such as Civic, trade subjects etc. while 272(75.6%) of the respondents disagreed. In the same way, **Item thirteen (13)** shows that 140(38.9%) of the respondents agreed that they are aware of other biology teachers who do not teach biology at all but teach the newly introduced subjects while 213(59.2%) of the respondents disagreed. subjects.

TABLE 4: Mean and Standard deviation table of teachers' Response on if biology teachers pick up other subjects (newly introduced) for teaching.

S/N	ITEMS	AGR.		S.DA		UND		X	SD
		Fre q.	%	Freq	%	Freq	%		
12	Some biology teachers teach one or some of the trades/newly introduced subjects.	16	64	09	36	—	—	2.6000	1.08012

16. How many biology teachers (by discipline) are there in your school?
17. How many of the teacher(s) above (in 16) are/is teaching biology?

TABLE 4.1: Information gathered from the free response question from the Biology students.

KEY	ITEMS		
	sixteen (16)	Seventeen (17)	Other subject taught
1	All the teachers said five	Majority said two	Two (2) teachers indicated Health Education . 1 teacher indicated Animal husbandry .
2	Majority said seven teachers	Majority said five teachers	
3	Majority said one	Majority said one	
4	Two teachers	Two teachers	
5	Two teachers	One	
6	Two teachers	Two teachers	
7	Majority said six teachers	Majority said six teachers	
8	All the teachers said three teachers	All the teachers said three teachers	
9	All the teachers said two teachers	All the teachers said two teachers	
10	One	One	
11	Four teachers	Four teachers	
12	One	One	

KEYS

1. BBHS: Baptist Boys' High School, OkeSaje. ; 2. AGSI: Abeokuta Grammar School, Idi Aba; 3. ECHS: Egba Comprehensive High School, Asero; 4. ICC: Ideal Comprehensive College, OkeSaje; 5.RC: Roseborn College, Idi Aba.; 6. FISS: Foursquare International Secondary School, Asero. 7. NGSO: Nawairudeen Grammar School, Obantoko;8. SACHS: Salawu Abiola

Comprehensive High School, Osiele; 9. EOHS: EgbaOdeda High School, Odeda; 10. FHC: Faith Heritage College, Elewera; 11. FCEMSS: Federal College of Education Model Secondary School, Osiele; 12. SCA: Stephen Centre, Aregbe.

From table 4, Item twelve (12) indicated that 16(64%) of the teachers agreed that some biology teachers teach one or some of the trades/newly introduced subjects while 9(36%) of the teachers disagreed. Also, the column with 'sixteen (16)' in Table 4.1 shows the response of teachers or the majority of the teachers in each school with respect to the number of biology teachers (by discipline) in their school. The column with 'Seventeen (17)' shows the number of teachers out of those mentioned in 'sixteen (16)' who teaches Biology. This does not mean that those mentioned in column 'Seventeen (17)' do not teach other subjects from biology.

HYPOTHESES

H_{01} : There is no significant difference between the students' view and the Teachers' views on optional status of Biology in senior secondary schools.

Table 6: t- test comparison of Students and Teachers' views based on their mean difference

GROUPING	N	MEAN	STANDARD DEVIATION	T	Df	Sig
STUDENTS' VIEW	360	24.81	3.77	3.116	383	0.02
TEACHERS' VIEW	25	22.40	3.55			

($t=3.116$; $*p<0.05$; $df=38$). * indicates significant difference

Table 6 shows that $P_{cal.} (0.02) < 0.05$. Hence, this implies that there is a significant difference between the views of students and that of teachers. Hence, the null hypothesis which states that there is no significant difference between the views of students and teachers with respect to optional status of Biology in Nigerian secondary schools is rejected.

H_{02} : There is no significant difference between the views of the private schools Biology Students and Public Schools Biology students.

Table 7.0: Student t- Test table comparing the views of private-school and Public-school students with respect to optional status of Biology

GROUPING	N	MEAN	STANDARD DEVIATION	T	Df	Sig
PRIVATE	180	44.16	6.48	0.0576	358	0.565
PUBLIC	180	44.53	5.57			

($t=0.576$; $*p>0.05$; $df=38$). * represents significance difference.

Table 7 above shows that there is no significant difference in the response of private school students and that of public school students as Pcal. (0.565) is greater than 0.05. Therefore, the null hypothesis which states that there is no significant difference in the response of private and public students as regard to optional status of Biology in Nigerian secondary schools.

DISCUSSION

Biology used to be a compulsory subject in the Nigerian Senior Secondary School curriculum but the review made it optional while trade subjects and civic education were made compulsory subjects in replace. The students however advanced their appreciation of Biology as a subject as the findings revealed that the students opined that to gain knowledge through trade subjects is not far better than Biology (knowledge of human body, other living things and the environment). This revelation in line with Okoye et al. (2015) who noted that the introduction of Civic education and one trade subject at the senior secondary school without necessary adjustment by the examination bodies is a disadvantage to the students as some of them (students) drop vital subjects which may be useful to them for admission, course prerequisite or some other reasons in future yet, NECO and WAEC according to the author still maintained that each candidate register nine (9) subjects only.

Findings obtained from this study revealed that, majority of the students declared that their Biology teachers do not teach other subjects like Civic Education and Trade subjects. Likewise, they also denied their awareness of any Biology teacher in their school who do not teach biology at all but teaches the newly introduced subjects. The students in this aspect of response may out of fear for their teachers not want to expose those Biology teachers who teach another subject.

Majority of the Biology students under study declared that most students in Nigerian Secondary Schools might not choose Biology as a choice subject of study since it is no longer a compulsory subject. This declaration by the students under study can be said to be in alignment with the revelation gotten from the teachers with respect to students' enrollment for the subject after the review of the curriculum. The result of the findings from the teachers revealed that the review of the curriculum has led to the reduction in students' enrolment.

Contrary to the students' view as reported, Majority of teacher's respondents reported that some Biology teachers teach the newly introduced subjects. Some of the teachers even included the newly introduced subject they teach in the questionnaire while some specified it during an oral interview. Hence underutilization of biology teachers is an attendant effect of making biology optional in Nigerian Secondary School. This finding is in line with Ementa, 2013; Ajibola 2008; Okoye and Ogunleye 2015; Ahmadi and Lukman 2015. Also, Okoye et al. (2015) noted that lack of professionals to teach the Trade subjects is apparent in Nigerian Secondary Schools in which he observed that there were no enough teachers to handle vocational and technical subjects in the old curriculum which was a major factor mitigating its better implementation. Okoye et al. (2015) further reported that the issue of dearth of vocational and technical teachers should have been resolved by the policy maker before introduction of additional more demanding subjects. Ahmadi et al. (2015) corroborate this finding as the author also reported that the new curriculum comprising the trade's subjects lacks qualified implementers (teachers). The author revealed that in most cases teachers are compelled to teach subjects that are not their area of specialization.

It was also revealed from the findings that higher percentage of the teachers and the students' respondents agreed that making biology an optional subject at the secondary school level is not a good decision by the policy maker. This goes in line with the illustration of Adejuyigbe et al. (2016) when analyzing the danger optional subjects like physics, chemistry and biology can cause students who did not study it especially when admission into the university is sought.

CONCLUSION

In conclusion, it is clearly evident from the study the incidence of underutilization of biology teachers in secondary schools as a result of the 2011 curriculum review as well as the study of Biology that takes different pattern across secondary schools in Nigeria. Hence, at the end of Secondary School, not all Nigerian students will possess the knowledge of Biology which is no doubt needed some career paths, for everyday living and survival. This is a great attendant effect.

RECOMMENDATIONS

Based on the findings from this study the following measures are recommended:-

1. Government should consider the sustenance of life and the environment as paramount to human existence. Hence the need to teach all young ones right from secondary school. It is imperative that Biology be taught and offered compulsorily by all students.
2. Also, teachers, guidance and counsellors and school administrators should strive to ensure that students' choice of subjects meet their career needs and that students gained all important knowledge needed for them to make sound decisions in matters relating to their personal, community, health and the larger society.

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