

# Evaluation of the Implementation of National Curriculum for Secondary School Biology and Academic Achievement in Taraba State, Nigeria

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## ABSTRACT

This study aimed at evaluating the implementation of the national curriculum for secondary school Biology in Taraba State. The evaluation model used were the Context, Input, Process, and Product (CIPP) and Curriculum Objective models. The population for the study was 156 Biology teachers and 15,427 Biology students. A sample of 1110 respondents which consists of Biology teachers and Biology students was drawn using a multistage random sampling technique. A structured response questionnaire which was validated by experts was used to collect data. The internal consistency of the instrument was determined using Cronbach Alpha. The reliability estimate for BIEQT was 0.74. Three research questions and two null hypotheses were tested at a 0.05 significant level. Descriptive statistics were used to answer the research questions. One-way Analysis of Variance (ANOVA) was used to test hypotheses. Among the major findings of the study were that: Teachers' qualifications, aims, and objectives of the National Curriculum, and evaluation techniques used by Biology teachers significantly influence the implementation of the Biology curriculum in secondary schools in Taraba State. It was thus recommended among others that, adequate Biology teachers should be employed; the Biology content should be monitored periodically to assess the extent to which the objectives are being achieved; and the Ministry of Education monitoring unit should ensure that Biology teachers use the recommended evaluation techniques in assessing their students.

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**KEYWORDS:** Evaluation, Curriculum Implementation, Teachers' Qualification, Aim and Objectives of Biology, Evaluation Techniques

## 1. INTRODUCTION

Science education provides a body of knowledge for use in addressing various forms of human, material, and environmental problems. It can also be viewed as composed of two major complementary modes: the accumulation of knowledge through exploration and discovery efforts about the natural world and the use of such knowledge for human and material development. Science is studied and practiced in all parts of the world, including Nigeria. Nigeria is a developing nation with an increasing demand for science-based skilled labor. The achievement of this can start with the learning and application of science subjects such as biology, chemistry, and physics at the secondary school level. Among these science

subjects, only the biology curriculum will be evaluated.

Evaluation is a process of gathering information on a program using various techniques in order to ascertain the value of such a program. Evaluation of the implementation is the process of evaluation that exposes in a comprehensive way, the worth and the true picture of what happens to the curriculum at its implementation. Olajide (2019) is of the view that evaluation is a systematic process of determining the extent to which instructional objectives are achieved in pupils. The author also sees evaluation as a process for finding out how far the learning experience as developed and organized is actually producing the

desired result. The process of evaluation involves identifying the strengths and weaknesses of the plan. The evaluation also checks the effectiveness of particular instruments such as the teachers and other conditions that are being used to carry forward the instructional program.

Adufe in Kaddelu (2017) defined curriculum as a course of study that intends to produce well-educated, balanced, focused, and purposeful learners who will be functional and have the capacity to adapt to the changing phase and pace of society. The biology curriculum has a spiral arrangement of content. The contents of the biology curriculum are concepts of living; basic ecological concepts; plant and animal nutrition; variations and variability; evolution; and genetics. Based on this spiral arrangement, the concepts to be taught are arranged in such a way that topics are repeated yearly throughout the three years of the course to cover the 62 units in the Biology Curriculum. Any repeated concept is discussed in greater complexity and depth as the course matures over the three-year period.

A close examination of the senior secondary school biology results in WASSCE in Taraba State in the last five years (2016–2020) shows that the results were generally poor. Students who scored credit and above are regarded as those who achieved well. The majority of the students scored less than a credit in public examinations. In Taraba State particularly, the WASSCE result analysis also revealed that only 51.18%, 51.72%, 67.63%, 55.17%, and 60.98% of the candidates had credit passes or above in biology for the years 2016, 2017, 2018, 2019, and 2020, respectively (Taraba State Educational Recourse Center, Jalingo, 2020). From this data, it can be seen that from 2016 to 2020, the average percentage of candidates that passed biology at the credit level and above was below 60%. Thus, the results show candidates' poor achievement in biology in the same year-period under review (2016–2020). The poor performance of students in biology could be attributed to many factors, including poor implementation of the biology curriculum for senior secondary schools. This issue ought to be empirically investigated rather than speculated upon; hence, the need for the present evaluation of the implementation of the National Curriculum for Secondary School Biology (NCSSB) in Taraba State.

It is worrisome to note that the Biology curriculum implemented since 1985 still produces students who perform poorly in Biology. There is therefore a need for an evaluation of the implementation of the National Curriculum for Secondary School Biology in Taraba State, Nigeria, to ascertain the extent to which

teacher qualification, the stated aims and objectives of the Biology Curriculum, and the evaluation techniques used by Biology teachers in evaluating their students influence the implementation of the Biology Curriculum.

### 1.1. Statement of the Problem

One of the major goals of science education in Nigeria is to produce scientists for national development. In spite of Nigerian government's desire to promote science education in the country, the quality of science students produced by the secondary schools seems to be deteriorating. Despite the importance of Biology as a science subject, it has been observed that students in Taraba State still perform poorly in this subject at national examinations. The WASSCE result analysis between 2016 – 2020 revealed that only 51.18%, 51.72%, 67.63%, 55.17%, and 60.98%, of the candidates who sat for the examination had credit pass and above in Biology (Taraba State Educational Recourse Center, Jalingo, 2020). This could be attributed to challenges related to implementation of the national Biology Curriculum. Consequently, there is need to empirically evaluate the implementation of the National Curriculum for Secondary School Biology.

### 1.2. Purpose of the Study

The main purpose of the study is to evaluate the factors influencing the implementation of the National Curriculum for Secondary School Biology (NCSSB) in Taraba State. Specifically, the study sought to:

- A. determine the extent to which teachers' qualifications influence the implementation of the Biology Curriculum of Secondary Schools in Taraba State.
- B. determine the extent to which aims and objectives of the National Curriculum influence the implementation of the Biology Curriculum of Secondary Schools in Taraba State.
- C. determine the extent to which teachers' evaluation techniques influence the implementation of the Biology Curriculum of Secondary Schools in Taraba State.

### 1.3. Research Questions

This study was guided by the following research questions.

- A. To what extent does teachers' qualification influence the implementation of the Biology Curriculum of Secondary Schools in Taraba State?
- B. To what extent does the aims and objectives of the National Curriculum influence the implementation of the Biology Curriculum of Secondary Schools in Taraba State?

C. To what extent does evaluation techniques used by Biology teacher influence the implementation of the Biology Curriculum of Secondary Schools in Taraba State?

#### 1.4. Statement of the Hypotheses

Two hypotheses were formulated and tested at a 0.05 level of significance.

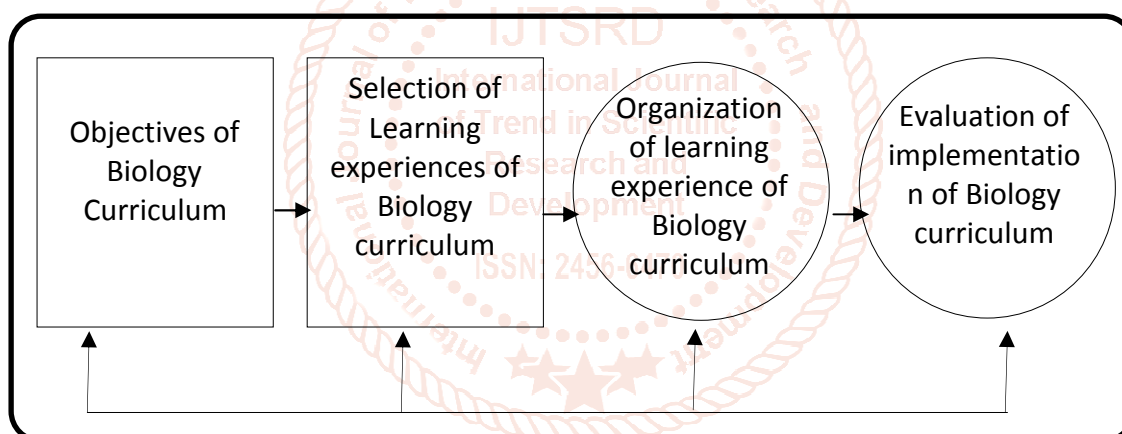
H<sub>02</sub>: There is no significant influence of the aims and objectives of the National Curriculum on the implementation of the Biology Curriculum of Secondary Schools in Taraba State

H<sub>04</sub>: There is no significant influence of evaluation techniques used by Biology teachers on the implementing of the Biology Curriculum of Secondary Schools in Taraba State.

#### 2. Tyler's Objective Model of Curriculum

Ralph Winfred Tyler an American scholar developed Tyler's Objective model of curriculum in 1940. The model was published in the book Basic Principles of Curriculum and Instruction for his students to give them an idea about principles for making a curriculum. The model consists of four steps: Determine the school's purposes (aka objectives);

identify educational experiences related to purpose; organize the experiences; evaluate the purposes. According to Vaughan (2018), the model provided a clear direction for the entire curriculum development process through its clear and precise objectives; and this in turn gave the teacher a clear outline of what they hope their students to achieve. These objectives can be carefully managed, making it easy to monitor attained outcomes (Brady & Kennedy, 2010). Tyler's model can be applied to all learning areas and levels and it is easy to find the appropriateness of a subject's content, activities and teaching methods based on the objective evaluation. The sequence of curriculum elements is logical and the model is useful for easily forecasting final results (Chen, Chen & Cheng, 1996; Brady & Kennedy, 2010). Brady and Kennedy in Vaughan (2018) also claimed that Tyler's objectives model had an extremely progressive effect due to the fact that it assumed teacher professionalism and focused attention on improvement of the school curriculum. This encouraged teachers to think about and reflect openly on the educational goals and objectives they had in mind for their students.



**Fig. 1. Modified Tyler's Objective Model of Curriculum Implementation**

According to Figure 1 above, the curriculum model presented by Tyler, comprised the objectives of the Biology curriculum, selection of Biology curriculum learning experiences, organization of Biology curriculum learning experiences, and evaluation of Biology curriculum implementation. Curriculum implementation is one of the parts that should be evaluated to determine the extent of implementation. According to that, pursuant to the Model Curriculum submitted by Tyler, the evaluation should be done on aspects of the implementation of the curriculum. Therefore, Biology curriculum implementation for the program educational objectives (PEO) and learning outcomes (PLO), which will be conducted at the public secondary schools in Taraba State, needs to be studied to see how far the effectiveness of the implementation is.

#### 3. Methodology

##### 3.1. Study Design

The research work adopted the evaluation research design. Evaluation design, according to Ifeobu (2014), seeks to provide data for making value judgments about some events, objects, methods, and materials within the context of the phenomenon evaluated. This design is considered appropriate for the present study because the study is aimed at determining the influence of teachers' qualifications, aims, and objectives of the Biology national curriculum, contents coverage, and evaluation techniques used by teachers to assess their students, on the implementation of the National Curriculum for Senior Secondary School Biology in Taraba State.

### **3.2. Area of the Study**

The study area of this study is the Taraba State of Nigeria. The study covered the national curriculum of senior secondary schools Biology.

### **3.3. Population**

The population of the study is 15,583 which comprised 156 Biology teachers and 15,427 senior secondary school (SS2) students in all the 299 public senior secondary schools in Taraba State. The use of only public senior secondary schools is based on the ground that they operate uniform Biology Curriculum standards and are more accessible to the researcher.

### **3.4. Sample and Sampling**

The total sample for this study is 1,110 which consists of 156 Biology teachers and 954 senior secondary school (SS2) students in some selected public senior secondary schools in Taraba State. The sample was selected through a multistage random sampling technique.

### **3.5. Instrumentation**

An instrument was used for collecting the data for the study. The instruments are; Biology Implementation Evaluation Questionnaire (BIEQT) for Teachers and students. The teachers' and students' questionnaire is divided into two sections. Section A is concerned with the demographic data of the respondents while the last section is concerned with the information required for the study.

### **3.6. Validation of the Instruments**

The instruments BIEQTS was subjected to face and content validation by experts in Educational Measurement and Evaluation and experts in Science Education from the Taraba State University Jalingo. These experts were requested to examine the instruments with regard to the relevance of the items, appropriateness of the content, and representation of the various areas of the study. The 0.82 validation indices for the instrument were obtained.

### **3.7. Reliability of the Instruments**

The instruments were trial-tested at Zing Education zone in Taraba State. The schools were selected from Zing Education Zone of Taraba State which is outside the sample area. From three schools, 12 Biology teachers and 38 students were selected and the questionnaire was administered to them. The internal consistency of the instruments was determined using Cronbach Alpha. A consistency level of 0.74 was obtained.

### **3.8. Administration**

The researcher administered the questionnaires to the respondents. The copies of the questionnaires were administered and collected through direct delivery and recovery method to enhance the high return rate.

### **3.9. Method of Data Analysis**

To determine the teachers qualifications in Biology, extent to which the objectives of the Biology Curriculum is achieved, extent to which the content objectives of Biology are achieved, determined the assessment techniques used by Biology teachers and the utilization of instruments and equipment, descriptive statistics was used to analyze research findings. Descriptive statistics in the form of percentage, mean and standard deviation were applied to answer the research questions. Allocation of scores to scale are 4, 3, 2, 1 for responses HE, ME, LE, VLE for items designated as positive (+) scale. The average mean is therefore 2.5 obtained by adding the point scales and dividing by four (4). Based on the nature of how the items were structured in the instrument, that is positively toned: a high mean score stands for high extent while a low mean score stands for a very low extent. This decision will be arrived at considering the lower and the upper boundaries for 4 levels of decision making of all the 4 responses in the instruments. Inferential statistics of analysis of variance (ANOVA) was used to test the Hypotheses at a 0.05 level of significance.

### **3.10. Method of Data Analysis**

Data collected was analyzed using descriptive statistics in answering study questions 1, 2 and 3. Inferential statistics of Analysis of Variance (ANOVA) statistics was used to test the hypothesis at 0.05 level of significance.

## **4. Results and Discussions**

The data collected for the purpose of this study were analyzed based on the research questions using mean and standard deviation.

#### 4.1. Question One

To what extent does teachers' qualifications influence the implementation of the secondary school Biology Curriculum in Taraba State?

To answer this research question, responses to item 1 (teachers qualification in Biology) of section A on the questionnaire were analyzed. The result of the analysis is presented in Table 1.

**Table 1. Response of the Respondents on whether Teachers Qualifications Influence the Implementation of the Biology Curriculum of Secondary Schools in Taraba State**

	Teachers Qualification	N	%
1	First degree in Biology	66	42.31
2	First degree in Biology Education	76	48.72
3	Master degree in Biology	14	8.97

Table 1 reveals that, 66 (42.31%) of the total respondents had their First degree in Biology, 76 (48.72%) had their First degree in Biology education, while 14 (8.97%) had their Masters in Biology. The higher numbers of qualified teachers involved in the curriculum implementation make it effective and efficient. This, indicates that, there is a positive influence of teachers' qualifications on the implementation of the Secondary Schools Biology Curriculum in Taraba State.

#### 4.2. Null Hypothesis One

There is no significant influence of the Aims and Objectives of the National Curriculum on the implementation of the Biology Curriculum of Secondary Schools in Taraba State.

The independent variable in this hypothesis is the Aims and Objectives of the National Curriculum (Low, Moderate and high); while the dependent variable is the implementation of Biology Curriculum in secondary schools. To test this hypothesis, the implementation of the Biology Curriculum in secondary schools from the Aims and Objectives of the National Curriculum Low, Moderate and High were compared using One-Way Analysis of Variance (ANOVA). The result of the analysis is presented in Table 2.

**Table 2. Summary Data and One-way ANOVA of the Influence of Aims and Objectives of the National Curriculum on Implementation of Biology Curriculum in Secondary Schools (N=1110)**

Aims and Objectives of the National Curriculum	N	$\bar{x}$	SD		
Low – 1	337	35.17	3.06		
Moderate– 2	438	36.55	3.19		
High – 3	335	36.41	2.87		
Total	1110	36.13	3.12		
Source of variance	SS	Df	Ms	F	Sig of F
Between group	207.57	2	103.79	2.89	.000
Within group	5493.09	1107	35.90		
Total	5700.66	1109			

\* Significant at 0.05 level, p-value =0.00, df= 2, 1107.

The result in Table 2 revealed that the calculated F-value of 2.89 is higher than the p-value of 0.00 at a 0.05 level of significance with 2 and 1107 degrees of freedom. With this result the null hypothesis was rejected. This result therefore implied that, Aims and Objectives of the National Curriculum have a significant influence on the implementation of the Biology Curriculum in secondary schools. Since the Aims and Objectives of the National Curriculum had a significant influence on the implementation of the Biology Curriculum in secondary schools, a post hoc analysis was employed using Fishers' Least Significant Difference (LSD) multiple comparison analysis. The result of the analysis is presented in Table 3.

**Table 3. Fishers' Least Significant Difference (LSD) Multiple Comparison Analysis of the Influence of Aims and Objectives of the National Curriculum on Implementation of Biology Curriculum in Secondary Schools****LSD**

(I) Aims and Objectives of the National Curriculum	(J) Aims and Objectives of the National Curriculum	Mean Difference (I-J)	Std. Error	Sig.
Low	Moderate	-1.37(*)	0.31	0.00
	High	-1.24(*)	0.34	0.00
Moderate	Low	1.37(*)	0.31	0.00
	High	0.13	0.31	0.66
High	Low	1.24(*)	0.34	0.00
	Moderate	-0.13	0.31	0.66

\* The mean difference is significant at the 0.05 level.

The result of the analysis in Table 3 showed that Teachers whose the Aims and Objectives of the National Curriculum was low were significantly different in their implementation of the Biology Curriculum in secondary schools from those whose Aims and Objectives of the National Curriculum were either moderate or high. Also Teachers whose the Aims and Objectives of the National Curriculum were moderate were significantly different from those who were high in the implementation of the Biology Curriculum in secondary schools.

**4.3. Null Hypothesis Two**

There is no significant influence of the evaluation techniques used by Biology teachers on the implementation of the Biology Curriculum of Secondary Schools in Taraba State.

The independent variable in this hypothesis is the Evaluation techniques used by Biology teacher (Low, Moderate and High); while the dependent variable is the implementation of the Biology Curriculum in secondary schools. To test this hypothesis, the implementation of Biology Curriculum in secondary schools from the Evaluation techniques used by Biology teachers Low, Moderate and High were compared using One-Way Analysis of Variance (ANOVA). The result of the analysis is presented in Table 4.

**Table 4. Summary Data and One-way ANOVA of the Influence of Evaluation Techniques used by Biology Teacher on Implementation of Biology Curriculum in Secondary Schools (N=1110)**

Evaluation Techniques used by Biology Teacher	N	$\bar{x}$	SD		
Low – 1	351	35.21	3.20		
Moderate– 2	392	36.11	3.07		
High – 3	367	37.07	2.86		
Total	1110	36.13	3.12		
Source of variance	SS	Df	Ms	F	Sig of F
Between group	281.47	2	140.73	3.97	0.00
Within group	5419.19	1107	35.42		
Total	5700.66	1109			

\* Significant at 0.05 level, p-value =0.00, df= 2, 1107.

The result in Table 4 revealed that the calculated F-value of 3.97 is higher than the p-value of 0.00 at 0.05 level of significance with 2 and 1107 degrees of freedom. With this result the null hypothesis was rejected. This result therefore implied that, Evaluation techniques used by the Biology teachers have a significant influence on implementation of Biology Curriculum in secondary schools. Since the Evaluation techniques used by Biology teacher had a significant influence on the implementation of the Biology Curriculum in secondary schools, a post hoc analysis was employed using Fishers' Least Significant Difference (LSD) multiple comparison analysis. The result of the analysis is presented in Table 5.

**Table 5. Fishers' Least Significant Difference (LSD) Multiple Comparison Analysis of the Influence of Evaluation Techniques used by Biology Teacher on Implementation of Biology Curriculum in Secondary Schools****LSD**

(I) Evaluation Techniques used by Biology Teacher	(J) Evaluation Techniques used by Biology Teacher	Mean Difference (I-J)	Std. Error	Sig.
Low	Moderate	-0.90(*)	0.30	0.00
	High	-1.86(*)	0.34	0.00
Moderate	Low	0.90(*)	0.30	0.00
	High	-0.96(*)	0.31	0.00
High	Low	1.86(*)	0.34	0.00
	Moderate	0.96(*)	0.31	0.00

\* The mean difference is significant at the 0.05 level.

The result of the analysis in Table 5 showed that Teachers whose Evaluation techniques used by Biology teacher was low was significantly different in their implementation of the Biology Curriculum in secondary schools from those whose Evaluation techniques used by Biology teachers were either moderate or high. Also Teachers whose Evaluation techniques used by Biology teacher was moderate were significantly different from those who were high in the implementation of the Biology Curriculum in secondary schools.

## 5. Discussion of Findings

This section is devoted to the discussion of the findings of the analysis carried out using the data collected. It involves one research question and two research hypothesis.

### 5.1. Teachers' Qualification and Implementation of Biology curriculum in secondary schools

The result of the first question revealed that there is a positive influence of teachers' qualifications on the implementation of the Biology curriculum in secondary schools. The finding of this research question is contrary to the view of Ityokaa and Adejoh (2014) who indicated that teachers' qualification and their years of experience does not have any effect on how to determine their level of curriculum implementation and evaluate students' learning outcome but there was a significant difference in teachers' gender, and their competency in evaluating sciences learning outcome. Ishiekwen and Benjamin (2014) agreed with the Ityokyaa and Adejoh that a Teacher's professional qualifications, and area of study do not significantly influence the implementation of environmental education curriculum. On the contrary Anthony, Isaac, Patrick, Shani, Emmanuel, and Abu (2017), in their study conducted on professional qualification of teachers in teaching and learning Social Studies concepts in Senior High Schools in Ghana, affirmed that Social Studies is an integrated discipline which is full of concepts required a qualified teacher to handle it. This therefore shows that professional qualifications influence the implementation of secondary school Biology.

### Aims and Objectives of the National Curriculum for Secondary School Biology

The result of the first hypothesis revealed that there is a significant influence in the Aims and Objectives of the National Curriculum for Secondary School Biology. AbdulRahaman (2017) revealed among other things: that the course content and the objectives were adequate; there were inadequate instructional materials and training services for the staff. The objectives of the Biology Curriculum have been achieved to a moderate extent. Contents of the Biology Curriculum are very relevant in achieving the objectives of the Biology Curriculum. Demonstration, discussion, lecture and team teaching methods were often while laboratory methods, project methods, excursion/field trips and discovery methods are seldom. Essay writing, multiple choice alternative, true or false, completion of blanks and assignment assessment methods are very often used while Oral Questioning and Laboratory Work are seldom used in the implementation of the Biology Curriculum.

### Evaluation techniques used by Biology Teacher in assessing secondary school students

The result of the study indicates that teachers use the recommended evaluation techniques in assessing their students to a high extent. The result of the second hypothesis showed that there are evaluation techniques used by Biology teacher in assessing secondary school students in Taraba State. The finding of this hypothesis is in line with the study of Selda, Başturk and Hakan (2012) who noted that most Biology teacher candidates adopted the multiple choice test type in exams for determining the students' success and performance. It is understood that they mostly use the question-and-answer teaching

method in determining the students' preliminary knowledge at the beginning of the lessons and determining how much they learned at the end of the lessons. It is seen that when giving a project paper, they determine a criterion conformed to students' levels and demands and when giving a verbal grade, they mostly consider the students' performance in the classroom and their attendance to the lesson.

Amakiri and Ukwuije (2016) also revealed that: Assessment for Learning strategies effectively improved the Biology achievement of students; Biology academic achievement of students was enhanced by the following AFL strategies: use of questioning, comment only marking and self/peer assessment but the most effective is comment only marking; AFL has a significant effect on biology academic achievement of students. Based on the results of the study, the following recommendation among others was made by the researchers: a critical review of classroom assessment methods is advocated, especially in the aspect of comments made by teachers concerning the learning outcome of students. For the evaluation technique to be effective, teachers of the Biology should give assignments that are of high quality. Tests that elicit more understanding of the subject matter and basing students' final evaluation on the sufficiency of appropriate assignments and tests could be emphasized to achieve optimum goal in Biology teaching and learning.

## 5.2. Conclusion

Based on the results and findings of the study, the following conclusions were reached. Qualification of teachers positively influence the implementation of Biology curriculum in secondary schools in Taraba State., Aims and objectives of the National Curriculum significantly influence the implementation of Biology curriculum in secondary schools in Taraba State, and Evaluation techniques used by Biology teacher significantly influence the implementation of Biology curriculum in secondary schools in Taraba State.

## 5.3. Recommendations

Based on the findings of the study, the following recommendations were made: an adequate number of trained Biology teachers for the implementation of the Biology curriculum should be employed by the government and cooperate organizations; teachers should ensure that aims and objectives of the Biology Curriculum monitored periodically to assess the extent to which the objectives are being achieved; and the ministry of education monitoring unit should ensure that Biology teachers use the recommended

evaluation techniques in assessing their students in Taraba State.

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