



## **Peers and Students' Assessments of Biology Teacher Effectiveness in Secondary Schools in Adamawa State**

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### **ABSTRACT**

This study investigated the peers and students' assessments of Biology teacher effectiveness in secondary schools in Adamawa state. The design of the study was survey research. One research question and one null hypothesis tested at 0.05 level of significance guided the study. The sample of the study was 56 schools, 112 biology teachers and 54 SS II biology students selected from the five educational zones in the state. The teachers used for the assessment of biology teachers were selected by purposive sampling technique due to long teaching experience, while other subjects were selected by lucky dip sampling method. The instrument for data collection was questionnaire constructed by the researcher on four point scale which was face validated. The reliability coefficient was determined with Cronbach alpha method and an internal reliability coefficient of 0.78 was obtained. Mean, standard deviation and z-test statistic were used to analyze data. Findings of the study revealed that there is no significant difference between the mean responses of peers and students' assessments of biology teacher effectiveness. It was recommended among others that peers and students' assessment be encouraged in order to diversify biology teacher assessment in the field to enhance effectiveness of the teachers.

**Keywords:** Peers and students, Assessment, Biology teacher effectiveness.

### **INTRODUCTION**

In biology classrooms, assessment of a teacher has many different dimensions. The major assessment processes carried out on a teacher, biology teacher inclusive are: assessment by oneself, colleague and students (Imhanlahimi & Aguele, 2006).

Assessment by oneself known as self evaluation is when a teacher assesses himself or herself to determine whether the objectives of a lesson were achieved. Assessment by colleagues is normally referred to as peer assessment, peer evaluation/peer review (Fernandez & Jenny, 2007), while students evaluation of a teacher is assessment made on the teacher by students to determine the effectiveness (competency) of a teacher (Balogun, 1983) and in this case a biology teacher.

Biology as a school subject and a science of life (Ramalingam, 2000) is full of technical terms and topics, some of which may not be easy for students to understand unless an effective biology teacher explains the term clearly. When the explanation of the technical terms are correctly done, communication barrier in teaching – learning process reduces in the classroom (Lee, 2000; Ugwuadu & Obi, 2009). The main objective of assessing a biology teacher is to collect feedback for improvement of teaching and learning (Balogun, 1983) from the assessor because literature revealed that performance of students in West African Senior School Certificate Examination (WASSCE) and Senior School Certificate Examination (SSCE) are persistently poor (WAEC & NECO Chief Examiners' Report, 2013, 2014, 2015 & 2016).

The technical terms and concepts are those areas of biology teaching that can be used to rate the effectiveness of a practicing biology teacher. This paper is focusing on the assessment of a biology teacher by peers and students while according to Imhanlahimi and Aguele (2007) is more objective than

assessment by oneself which may be biased. There are so many academic activities which a professional biology teacher can be assessed by his colleagues. Some of the activities are teaching effectiveness as in this paper, research paper writing or publications, performance of students in examinations in his subjects, performance at seminars, workshops and conferences, teachers' talk pattern or discussion and contributions at committees (Cox, 1990; Ugwuadu, 2007). When the result of the assessment proves positive, it means that the biology teacher is effective.

Positive assessment of a biology teacher by his colleague in the same field of specialization gives the teacher high prestige and recognition in the system (Umeano, 1999). According to Umeano (1999) also, the verbal skills depend not so much on the grammar and syntax of language rather on the way the things (ideas) are said or presented. The implication is that what is important is not just talking but a critical examination of issues.

In their own contribution, Krat and Kratcoski (2004) opined that the discourse and interactions that occur in classrooms form a communicative context for learning. The professional background and commitment of the science teacher determines to some extent the quality of performance of students in examinations (Imhanlahimi & Aguele, 2007).

Student assessment of a biology teacher is learner/student evaluation of the teacher which is also wide. Some of the areas students may assess his biology teacher may include: presentation of a lesson delivery, preparation of lesson, communication effectiveness, teacher-student interaction, problem solving skill of the teacher, student involvement in a lesson, accuracy of answers, classroom management, methodology of teaching, use of instructional materials, good mastery of subject matter (Lee, 2000; Onwuachu & Nwakonobi, 2009).

Ndukwe (1999) cited by Oshodi (2001) suggested the following yardsticks for assessing teacher effectiveness which applies to a biology teacher:

- Performance of students in examination both internal and external.
- Observation and rating by the supervisor during teaching.
- Rating by fellow teacher (peer evaluation).

Oke (1999) cited by Oshodi (2001) suggested the following areas for assessing teachers' effectiveness:

- Good knowledge of subject matter
- Enthusiasm
- Clarity of presentation and communication
- Individual rapport
- Examination or grading
- Experience (learning)
- Assignment
- Coping with workload
- Teaching method
- Students perception of learning/teaching
- Environment (antecedent condition)
- Teaching aids.

Imhanlahimi & Aguele (2007) found out that three groups; students, teachers and researchers assessed biology teacher effectiveness in the use of questions and practical activities during instructions with total mean scores of 52, 68 and 50 respectively. The researchers sharply agreed in the assessment of biology teachers' effectiveness by students and researchers.

According to Fernandez (2007), experts indicate that although students are the most appropriate judge of day-to-day teacher behaviours and attitude in the classroom, they are not the most appropriate judge of the accuracy of course content and the use of acceptable teaching strategies in the discipline and the like. Peers are the most appropriate source of information on course content and methodology. Ajewole (1991) and Ugwuadu & Joda (2015) found out that biology teachers use much of lecture method in teaching biology. Isa (2007) and Akuma (2005) found out that there are a lot of lacking facilities in biology

laboratory and libraries are ill-equipped, teaching is mostly uninteresting due to the use of lecture method which is less activity oriented in the lesson. Okoye (2006) found out that most students displayed general negative attitudes to the study of biology such that some copy notes of other subjects during biology classes due to unfriendly and strict classroom interaction of biology teachers. The problem of this study is: what would be the outcome of peers and students' assessments of biology teachers' effectiveness in secondary schools in Adamawa State?

**Purpose of the Study**

The purpose of the study is to investigate the peers and students' assessments of biology teacher effectiveness in secondary schools in Adamawa State.

The specific purpose of the study is to:

1. Determine the peers and students' assessments of biology teacher effectiveness in secondary schools in Adamawa State.

**Research Question**

The following research question was raised to guide the study;

1. What are the mean responses of peers and students' assessments of biology teacher effectiveness in secondary schools in Adamawa State?

**Hypothesis**

The following null hypothesis was formulated and tested at 0.05 level of significance to guide the study;  
 $H_{01}$ : There is no significant difference between the mean responses of peers and students' assessments of biology teacher effectiveness in secondary schools in Adamawa State

**METHODOLOGY**

This study adopted a survey research design. The research design involves collection and analysis of data from a few people considered to be a representative of the population. Specifically, the opinion survey was used in which questionnaire was used to collect data (Nworgu, 2006).

The area of the study was five educational zones of Adamawa State which comprised Ganye, Gombi, Mubi, Numan and Yola. The population of the study was 280 schools, 562 biology teachers and 10,483 senior secondary two (SS II) biology students in the zones as shown in Table 1.

**Table 1: Population of Schools, Biology Teachers and Biology Students by Education Zone**

S/N	Education Zones	Population of Schools	Population of Biology Teachers	Population of SS II Biology Students
1	Ganye	56	114	2,000
2	Gombi	54	108	1,928
3	Mubi	58	116	2,300
4	Numan	52	104	1,806
5	Yola	60	120	2,800
	Total	280	562	10,483

Source: Adamawa State Post Primary Schools Management Board, Statistics Division (2016)

**Table 2: Sample and Sampling Technique**

S/N	Education Zones	Sample of Schools	Sample of Biology Teachers	Sample of SS II Biology Students
1	Ganye	12	22	10
2	Gombi	10	22	9
3	Mubi	12	24	12
4	Numan	10	20	9
5	Yola	12	24	14
	Total	56	112	54

Purposive sampling technique was used to select teachers from two education zones for the study because the zones met the research purpose. The zones were Mubi and Yola education zones. The zones were selected because they have the highest number of schools (Table 1) with most experienced teachers with more than 10 years of biology teaching experience. These experienced biology teachers were used to peer assess the 64 biology teachers in other three education zones of Ganye, Gombi and Numan (Table 2). From Table 2, Nwana (2005) 20% of the schools were sampled because the total population is in few hundreds, 10% of the biology teachers were sampled because they have total population in many hundreds. However, for SS II biology students 5% was selected because they fall in many thousands. All the teachers in the three zones were selected by lucky dip sampling technique school by school.

From Table 2, forty eight biology teachers from Mubi and Yola zones assessed 64 biology teachers from Ganye, Gombi and Numan zones. A sample of 54 biology students from all the zones assessed the 64 biology teachers assessed by the 48 teachers. One hundred and two questionnaires were produced and used to assess 64 biology teacher effectiveness.

#### **Instrument for Data Collection**

A 20-items questionnaire titled Teacher – Student Assessment Questionnaire (TSAQ) constructed by the researcher and used for the study. The questionnaire was constructed on four point scale of: Very good (4), Good (3), Fair (2) and Poor (1) used for assessing the biology teachers’ effectiveness by the teachers and students used for the study. The questionnaire was constructed from the following 10 areas of teaching practice drawn and adapted from teaching practice assessment content of the School of Technology and Science Education (STSE), Modibbo Adama University of Technology, Yola (2017) and that of Oke (1999) as cited by Oshodi (2001). The 10 teaching areas included; lesson preparation, lesson presentation, mastery of subject matter, use of teaching aids, methodology, making learners ready to learn/introduction of a lesson, questioning, time allocation, pupils’ activities and evaluation of lesson.

#### **Validation of the Instrument**

The TSAQ was given to two experts in curriculum and instruction from Department of Science Education, Modibbo Adama University of Technology, Yola for face validation. The validators were asked to assess the instrument in areas of clarity of expression, relevance to the objectives, suitability of items and areas of coverage of the items. After validation, all the 20 items were selected by the validators as good items, so none of the items was discarded.

#### **Reliability of the Instrument**

The reliability of the instrument was determined with Cronbach alpha method which gave coefficient of internal consistency reliability of 0.78. The researcher administered the questionnaire on 20 biology teachers for pilot study. Data collected were used to calculate the reliability coefficient using the Cronbach alpha method. The instruments were administered on the 20 biology teachers in five schools outside the ones used for the study but the schools were of equal statuses.

#### **Procedure for Data Collection**

One hundred and two TSAQ were used for the study. The arrangement for data collection was such that 48 biology teachers from Mubi and Yola assessed 64 biology teachers’ effectiveness from Ganye (22), Gombi (22) and Numan (20) (Table 2). For student assessors, 20, 19, 23, 18 and 28 students from Ganye,

Gombi, Mubi, Numan and Yola respectively assessed the effectiveness of the same 64 biology teachers assessed by the 48 teachers (Table 2). A time-table was prepared to make the work easy with the help of five research assistants and the exercise was completed in seven days time by both the assessing teachers and students. Each assessor be it teacher or student ticked the appropriate response on the questionnaire on the four point scale as observations of teaching were going on.

Data were analyzed using mean and standard deviation to answer the research question while z-statistic was used to test the hypothesis. The cut-off point used as decision rule for answering the research questions was mean score of 2.50 (lower limit of 3 on the scale). If the mean was 2.50 and above, it was regarded as satisfactory performance and if less than 2.50, it was a low performance.

For hypothesis testing, if z-calculated was higher than the table value, the hypothesis was rejected and if less than the table value, the hypothesis was accepted. Z-statistic was used because the sample size was above 30 for comparing the differences between two independent means (Nworgu, 2006).

## **RESULTS**

The following results emanated from the study:

*Research Question 1: What are the mean responses of peers and students' assessments of biology teacher effectiveness in secondary schools in Adamawa state?*

**Table 3: Mean and Standard Deviation of Peers and Students' Assessments of Biology Teacher Effectiveness in Secondary Schools in Adamawa State**

S/No	Items	Peer Assessors N = 48 Teachers $\bar{X}$	Students' Assessors N = 54 Students $\bar{X}$	Peer Assessors SD	Student Assessors SD	Remarks
1	Teaching showed that teacher prepared his lesson	2.80	2.76	1.40	1.36	SP
2	Teacher taught with lesson plan	2.67	2.51	1.20	1.15	SP
3	Presentation of lesson was clear	2.46	2.36	1.02	1.14	PP
4	Instructional materials were available and suitable for the lesson	1.70	1.50	1.01	1.12	PP
5	There was misuse of teaching aids	2.58	2.54	1.31	1.12	SP
6	Biology teacher is competent	2.65	2.58	1.22	1.18	SP
7	Teacher explained very well	2.66	2.62	1.31	1.20	SP
8	Teacher has good knowledge of subject matter	2.70	2.68	1.30	1.14	SP
9	Teacher was dishing out facts without engaging students	2.28	2.30	1.10	1.01	PP
10	Activity-oriented method was used in the lesson	2.38	2.24	1.02	1.01	PP
11	Teacher aroused students' interest before teaching	2.36	2.25	1.02	1.03	PP
12	Teacher praised correct answers	2.38	2.24	1.04	1.03	PP
13	Teachers' communication was clear	2.52	2.56	1.30	1.21	SP
14	Classroom management was good	2.07	2.11	1.02	1.01	PP
15	Classroom was noisy during the lesson	2.27	2.14	1.04	1.03	PP
16	Questions were asked as the lesson progressed	2.28	2.10	1.02	1.01	PP
17	There was evaluation of lesson	2.89	2.79	1.42	1.36	SP
18	Teacher was well organized during lesson	2.68	2.60	1.22	1.30	SP
19	Teacher was strict during teaching	2.68	2.59	1.40	1.39	SP
20	Correction of assignments was done after teaching	2.39	2.29	1.14	1.10	PP
	Total G $\bar{X}$	2.48	2.39	1.18	1.15	

Key: SP = Satisfactory Performance, PP = poor Performance

Breakdown: Satisfactory Performance = 10 items

Poor Performance = 10 items

**Hypothesis Testing**

H<sub>01</sub>: There is no significant difference between the mean responses of peers and students’ assessments of biology teacher effectiveness in secondary schools in Adamawa State.

**Table 4: z-test Analysis of difference Between the Mean Responses of Peers and Students’ Assessors on Biology Teacher Effectiveness in Secondary Schools in Adamawa State**

Groups	N	Mean	sd	df	z-cal	z-crit	Remarks
Peer Assessors	48	2.48	1.18				
				100	0.390	1.980	NS*
Student Assessors	54	2.39	1.15				

\*NS = Not Significant

Table 4 revealed that there is no significant difference between the responses of peers and students’ assessments of biology teacher effectiveness in secondary schools in Adamawa State; since z-calculated is less than z-critical at 0.05 level of significance. The H<sub>01</sub> is accepted.

**Findings of the Study**

The following findings resulted from the study;

1. There is no significant difference between the responses of peers and students’ assessments of biology teacher effectiveness in secondary schools in Adamawa State.
2. Out of the 20 items on the questionnaire (Table 3) 10 results agreed with both peers and students’ assessment as satisfactory performance (SP) of the biology teachers, while 10 results showed poor performance (PP) of the teachers from both assessors.

**DISCUSSION OF FINDINGS**

The result of this study showed that both the peers and students’ assessments of biology teacher performance in their teaching effectiveness agreed. This result is in agreement with the findings of Imahanlahimi & Aguele (2007) who found out that assessment of biology teachers by students and researchers were more objective than assessment by oneself which may be biased. The researchers and students mean scores were 52 and 50 respectively which is a very slight difference that did not vary much. In the same way, the mean scores of this study which are 2.48 and 2.39 in Table 3 and 4 did not vary much showing consensus of assessment results of the two different assessors in the same problem of study.

From the result of this study, it could be believed that students are appropriate judge of day-to-day teacher behaviours and attitudes in the classroom but not that teachers are incapable of doing so as opined by Fernandez (2007) who cited expert belief in this position. This is because students closely interact among themselves and discuss matters arising in the school also among themselves. Going by the result of this study in Table 3, it is observed that the ratings of 54 students and 48 teachers did not vary much meaning that the perception of students on their biology teacher effectiveness can be generalized among them. By observing the results of catchy items in Table 3 like: serial numbers 1, 3, 6, 7, 8, 9 13 and 15, one would actually know what the teachers can do and what they have been doing in the biology classrooms.

The result also revealed the methodology of teaching of the classroom biology teachers as in items 9 and 10. Item 9 revealed the use of lecture method since the teachers were dishing out facts without engaging students in the lesson. This finding agreed with Ajewole (1991) and Ugwuadu & Joda (2015) who found out that biology teachers used much of lecture method in teaching biology. Item 10 showed that activity-oriented method was poorly done. This could be

as a result of lacking facilities which agreed with the findings of Isa (2007) and Akuma (2005) that there are a lot of lacking facilities in biology laboratories and libraries were ill-equipped. On the whole, 10 items of the results on Table 3 showed satisfactory performance of the biology teachers' effectiveness while 10 items showed poor performance when the results were analyzed.

## CONCLUSION

The results of this study exposed what is in the field in the teaching of biology. The peers and students' assessments showed agreement on the effectiveness of the biology teachers used for the study due to no significant difference of their mean responses. The results have implications for teaching biology because the result is not as high as one would expect.

The 50% successful and 50% poor performance of teacher effectiveness is generally low for poor students' performance in biology examinations to improve as literature revealed. This situation of average effectiveness of biology teachers is a communication to our policy makers to react favourably to improve the condition.

## RECOMMENDATIONS

The following recommendations resulted from the findings of this study;

1. Peers and students' assessment of biology teachers should be encouraged so as to diversify biology teacher assessment in the field.
2. The results in Table 3 should be considered and implemented for overall biology teacher pedagogical skill development because the items cut across the major areas of effective teaching practice.
3. Government should increase the provisions for teacher education in the state and in the country in general so that teachers can improve beyond the findings of this study.
4. Training of teachers, sponsorship at seminars, workshops and conferences should be intensified so that teacher can acquire new trends in the teaching of biology.

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