Principals' Assessment of Teachers' Effectiveness in Teaching Chemistry at the Senior Secondary Schools in the Federal Capital Territory, Abuja, Nigeria

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Abstract- The study investigated the principals' assessment of chemistry teachers' effectiveness in teaching chemistry in Federal Capital Territory (FCT); Abuja. The sample consisted of sixty-six (66) principals of senior secondary schools purposely selected from six (6) Local Government area councils. A 21 – item on principals' assessment of chemistry teachers' effectiveness questionnaire (PACTEQ, r= 0.82) was developed for data collection. Frequencies, percentages, mean and standard deviation were used to analyse the research questions, while t – test was used to analyse the hypothesis at 0.05 alpha level. The results show that chemistry teachers do not use variety of teaching methods, relevant instructional materials and appropriate evaluation techniques in teaching chemistry. There were no improvisation of the needed instructional materials and majority of the teachers had negative attitudes toward their work. It was also found that there is significant difference in the mean scores of private and public principals on their assessment of the chemistry teachers' effectiveness in teaching chemistry in favour of private secondary schools. Recommendations were made; to include that secondary school principals should on regular basis, organise in – house training programmes on the use of teaching methods, instructional materials, evaluation techniques, etc for their teachers.

Index Terms- Assessment, Chemistry, Principal, Teachers' effectiveness, Teaching.

I. INTRODUCTION

Chemistry is a branch of science subject that deals with the studies of structures, composition, properties and the uses of matter. It is central to the three (Biology, chemistry and physics) of the most popular science subjects, to a point that students reading Biology or Physics education at high institutions normally take chemistry as a minor subject. Speaking on the importance of chemistry, Akinsola and Igwe (2002) observed that chemistry is involved in industrial set-up such as fertilizer, petroleum and cement as well as the execution of other profession like engineering, Agriculture, criminology and medicine. Adewunmi (2003) defined effectiveness as the extent to which a set goals or objectives of a school goal is accomplished and observed that the quality of teaching and learning should take precedence over other factors of school effectiveness. Contributing to this, Oshodi (2007) defined teachers' effectiveness as the ability of the teacher to produce desired results in the course of his/her duties. Okpala (2006) observed that to be effective, the teacher has to be many things; a source of information and a guide, an organiser of opportunity for learning, someone who can structure a suitable environment for learning and a consultant. Nwachukwu (2009) observed that teacher's way of thinking and belief guides his/her behaviour and decisions inside the classroom. What this means is that the quality of a teacher determines the effectiveness of the teacher in the classroom situation. Therefore, effective teaching of chemistry requires competent and qualified chemistry teacher that has good exposure and experience to foster learning in chemistry.

Assessment is the systematic collection of data to monitor the success of a program or help people with the problem. Oshodi (2007) pointed out twelve items for assessing teachers' effectiveness. The items are good knowledge of presentation, communication, individual rapport, examination grading, experience, assignment, coping with workload, teaching methods, students' perception of learning/teaching environment and instructional materials. In his own contribution, Achimugu (2016) pointed out eight items for assessing teachers' effectiveness, namely knowledge of subject matter, use of teaching methods, use of instructional materials, assignments to students, communication skills, attitude to work, involvement of students in practical activities and evaluation techniques. There are four major ways of assessing teachers' effectiveness, namely students' assessment, teachers' assessment, principal (Headteacher) assessment and inspectors (ministries and educational parastatal)'s assessment. The focus of this paper is on principals' assessment of their chemistry teachers' effectiveness. The principal occupies the administrative and managerial position of the senior secondary school and so no one else influences the whole school operation more than the principal (Adalalegbe 1971) . According to him, the principal is an administrative head, a manager, a supervisor and instructional leader. Contributing to the central role of the principal on school administration, Aluwole (2014), argued that since the principal is the school overall manager who is accountable to the teaching and learning process in the school, a research on teachers' effectiveness from the perception of the school principal becomes relevant and germane. From the above, the principals' assessment of their chemistry teachers is a very useful tool in secondary school administration. It is through the assessment that principals learn to what extent the objectives of chemistry education are being achieved. The feedback will enable the principals to device measures to improve chemistry teachers'

effectiveness. This means that the overall expectation of the principals' involvement in assessing their chemistry teachers is to get them committed to solving the problems of the teacher for effective classroom delivery at the school level. The principals would also serve as an agent in providing the necessary feedback to the higher authorities, who in turn would contribute meaningfully to effective teaching of chemistry and ensure that improvement could be made. Therefore, an assessment of chemistry teachers' effectiveness at the secondary school by the principal is a right step in the right direction.

II. Statement of Problem

The problem is that many chemistry teachers do not put enough effort into the activities of teaching and learning so as to get the best out of the teaching profession (Achimugu 2016). This is affecting their effectiveness in teaching chemistry. Therefore there is the need to assess the chemistry teachers' effectiveness. This paper looks at the extent of chemistry teachers' effectiveness and how their principals assess their effectiveness.

III. Purpose of the Study

The purpose of the study is the assessment of chemistry teachers' effectiveness in teaching chemistry by their own principals in FCT. Specifically, the study sought to:

1. find out the effectiveness of the teachers in terms of their knowledge of the subject matter, use of teaching methods, use of instructional materials, attitudes to work and students and evaluation techniques
2. find out the rating of private and public schools' principals on the effectiveness of their chemistry teachers in teaching chemistry.

IV. Research Questions

The study was guided by two research questions:

1. How effective are chemistry teachers in their teaching in terms of knowledge of subject matter, use of teaching methods, application of instructional materials, attitudes toward work/students and evaluation techniques?
2. What are the mean and standard deviation scores of private and public school principals on their assessment of chemistry teachers' effectiveness in teaching chemistry?

V. Hypothesis

To guide this study, one null hypothesis was formulated and tested at 0.05 level of significant

Ho: There is no significance difference in the mean response of private and public school principals on their assessment of chemistry teachers' effectiveness in teaching chemistry.

VI. Methods

The research adopted survey design, which investigated the factors responsible for chemistry teachers' effectiveness. The Area of the study is Senior Secondary Schools in FCT, Abuja, Nigeria. The target population comprised all senior secondary school principals in public and private secondary schools in Federal Capital Territory, Abuja. The sample of this study is made up of 66 senior secondary school principals (34 private and 32 public) from 66 senior secondary schools in FCT. The selection of the 66 secondary school principals was through purposive random sampling technique. Eleven secondary schools were purposively selected from each of the area councils of FCT. Thus a total of 66 senior secondary school principals participated in the study

The research instrument used for the study was questionnaire made of two sections. The first section addressed the following areas: Name of school of the respondents, the gender, types of school and years of experience. The second section contained 21 items on four points response likert - scale of strongly agree (SA), Agree (A), strongly disagree (SD), and Disagree (D). The instrument was face validated by four experts: two specialists in chemistry education and two specialists in measurement and evaluation. They were given the initial draft of the instrument to check the adequacy of the items and weighting of the response, formed the basis of modification of the items. The instrument yielded a cronbach alpha reliability of 0.82 upon administering it to 20 principals who were not part of the sample. This was considered reliably enough to be used for the study.

The instrument was given to the subjects at their various schools with the assistance of the head of department (HOD) of science of the participating schools and collected from them on the same day. A total of sixty-six (66) questionnaires were collected back from the subjects and used for data analysis. The data collected were analysed using frequencies, percentages, means and standard deviation to answer research questions and t – test was used to analysis the hypothesis at 0.05 level significance. The percentage was determined by pooling together strongly agreed and agreed which were regarded as agreed while strongly disagreed and disagreed were pooled together and were regarded as disagreed.

VII. Results

The response of the principals in the items on the questionnaire administered to them for assessing their chemistry teachers is shown in Table 1

Table 1: **Response of principals to the assessment of their chemistry teachers.**

S/No	*ITEMS*	*S.A*	*A*	*SA + A*	*%(SA + A)*	*D*	*S.D*	*D + S. D*	*%(D + S.D)*
Knowledge of the subject matter									
1	The teacher has a good knowledge of chemistry as a subject.	17	30	47	71	14	5	19	29
2	The teacher is always well prepared to teach.	12	22	34	52	25	7	32	49
3	The teacher is confidence in teaching.	22	20	42	64	18	6	24	36
4	The teacher always make use of his/her lesson plans in teaching	12	13	25	38	19	22	41	62
Use of Teaching Methods									
5	The teacher uses a variety of methods to teach.	6	10	16	24	17	33	50	76
6	The teacher employs appropriate teaching methods.	7	11	18	27	11	27	48	73
7	The teacher encourages the students to participate actively in chemistry lessons.	10	12	22	33	21	23	44	67
8	The teacher always gives assignment/home works.	31	19	50	76	10	6	16	24
9	The teacher gives holiday's assignment and projects at the end of the term.	4	13	17	26	21	28	49	74
10	The teacher makes corrections and gives back to the students all the assignments given to them.	19	13	32	48	20	14	34	52
Uses of Teaching Materials									
11	The teacher makes use of instructional materials during his/her lessons.	6	19	25	38	26	15	41	62
12	The teacher's use of instructional materials makes the lesson clearer.	10	18	28	42	27	11	38	58
13	The teacher improvises instructional materials when the already made ones are not available.	6	14	20	30	19	27	46	70
Attitudes to work and to the students.									
14	The teacher attends his/her lesson always.	10	19	29	44	19	18	37	56
15	The teacher is punctual to school.	12	27	29	41	11	28	39	59
16	The teacher has a good sense of humour and loves the students.	30	13	43	65	15	8	23	35
17	The teacher is kind and gentle manly.	21	14	35	53	8	23	31	47
Use of Evaluation Techniques.									
18	The teacher begins his/her lesson by assessing the previous lesson.	15	17	32	48	19	15	34	52
19	The teacher assesses the students during and at the end of the lesson.	14	8	22	33	30	14	44	67
20	The teacher sets his examination questions with appropriate timing.	41	11	52	79	09	05	14	21
21	The teacher marks, enters and keeps accurate records of the students' grade.	36	12	48	73	11	07	18	27

Table 1 shows the frequencies of the subjects' responses and their percentages. The views of the sampled principals are positive for eight (8) items: 1, 2, 3, 8, 16, 17 20 and 21; and negative for the rest of the items. A close look at the percentage on table 1 reveals that many of the principals responded in affirmative that teachers have good knowledge of chemistry (71%), teacher is confidence in teaching a topic (64%) and teacher is well prepared to teach (52%); while the principals had negative response on teachers' use of lesson notes to teach (38%). On items that relate to the teaching methods, the principals expressed high percentage of disagreement with all the three items. The percentages of the principals who agreed are less than 34% for the three statements. On items that deals with assignment to students, the principals agreed with item 8, that is the teacher always give class assignments and home work (78%) but disagreed with the two other items on holidays assignments/project (26%); and mark, correct and give students back their scripts (48%). The principals' responses show that disagreement was high for the statement on the proper use of instructional materials with percentage disagreement less than 43% for the three items. On items which deal with the teachers' attitudes, the principals (41% , 44%) disagreed with their attitude to works but they (65% and 53%) agreed with their teachers' rapports with the students. The percentage response on statements concerning evaluation of students showed that the

principals disagreed with statements 18 (48%) and 19 (33%), but agreed with items 20 (79%) and 21 (73%).

Table 2: Means and standard deviation scores of private and public school principals on their chemistry teachers' effectiveness in teaching chemistry.

S/N	ITEMS	PRIVATE		PUBLIC	
		MEAN	S.D.	MEAN	SD
1	The teacher has a good knowledge of chemistry as a subject.	2.89	0.89	2.80	0.90
2	The teacher is always well prepared to teach.	2.60	0.88	2.58	0.89
3	The teacher is confidence in teaching	2.88	0.97	2.84	0.99
4	The teacher always make use of his/her lesson plans in teaching	2.23	1.10	2.22	1.20
5	The teacher uses a variety of methods to teach.	1.83	1.00	2.81	1.30
6	The teacher employs appropriate teaching method.	1.96	1.09	2.94	1.02
7	The teacher encourages the students to participate actively in chemistry lesson.	2.27	0.97	2.14	0.98
8	The teacher always gives assignment/home works.	3.14	1.01	3.12	1.02
9	The teacher gives holidays assignment and projects at the end of the lesson.	1.99	0.92	1.87	0.93
10	The teacher makes connections and gives back to the students all assignment given to them.	2.56	1.12	2.57	1.10
11	The teacher makes use of instructional materials during his/her lesions.	2.24	0.91	2.23	0.92
12	The teacher's use of instructional materials makes the lesson clearer.	2.41	0.93	2.40	0.94
13	The teacher improvises instructional materials when the already made ones are not available.	1.98	0.66	2.97	0.69
14	The teacher attends his/her lesson always.	2.32	1.03	2.30	1.04
15	The teacher is punctual to school	2.29	1.12	2.28	1.10
16	The teacher has a good sense of humour and loves.	2.98	1.09	2.97	0.98
17	The teacher is kind and gentle.	2.50	1.26	2.49	1.20
18	The teacher begins his/her lesson by assessing the previous lesson.	2.48	1.09	2.47	1.11
19	The teacher assesses the students during and at the end of the lesson.	2.33	1.04	2.32	1.06
20	The teacher sets his examination questions with appropriate timing.	3.43	0.97	3.31	0.98
21	The teacher marks, enters and keeps accurate records of the students' grades.	3.17	1.04	3.16	1.00
GRAND MEAN / SD		***2.78***	***0.98***	***2.18***	***1.04***

Table 2 shows that principals from private secondary schools have grand mean scores of 2.78 while principals from public secondary schools had grand mean scores of 2.18. This implies that principals from private secondary schools rated their chemistry teachers higher than their counterparts from public secondary schools. What this means, is that to some extent, chemistry teachers in private secondary schools are more effective in teaching chemistry than their counterparts in public secondary schools. Therefore, school type has some influence on the effectiveness of chemistry teachers in teaching chemistry. But the extent of this influence can be seen clearly in table 3.

Table 3: T – test of the mean responses of public and private schools' principals on their chemistry teachers' effectiveness in teaching chemistry.

Group	*N*	*MEAN*	*SD*	*DF*	*T – cal*	*T – table*
Public School Principals	32	2.18	1.04	69	2.41	1.98
Private School Principals	39	2.78	0.98			

From table 3, t – calculated (2.41) is more than t – critical (1.98) at 0.05 significance as such the null hypothesis was rejected. It shows that school type had significant effect on the assessment of school principals on the chemistry teachers' effectiveness in teaching chemistry.

VIII. Discussion

The result of the data analysis shows that the majority of principals sampled, were of the view that chemistry teachers have good knowledge of subject matter, confidence in teaching and were prepared to teach chemistry. This finding is in agreement with statements of Oshodi (2007), that teachers' preparedness for the lessons could be as a result of their academic qualifications, attitude and experience on the subject matter, and they are expected to spend, the greater part of their time in preparing their lessons. To this end, chemistry teachers are effective in their knowledge of the subject matter except that a good number of them do not use their lesson notes appropriately.

Majority of the principals' assessments were negative on the appropriate use of teaching methods by their chemistry teachers. That is to say that chemistry teachers lack ability to effectively utilize innovative teaching methods to enhance the teaching and learning of chemistry. This finding is in agreement with the findings of many researchers (Nwosu 1996; Akinsola & Igwe 2002, Ibe, Adah & Ihejiamizu 2013 and Igbonugo 2014), who have carried out researches in chemistry education pertaining methods of teaching chemistry and found out that, inappropriate use of teaching methods especially the use of lecture method that borders on memorisation inhibit learning, kills students' interests and discourage them to develop positive attitude for effective learning outcomes. Hence there is the need for chemistry teachers at all level of our education system to ensure that the goals of teaching chemistry are realized by using the appropriate teaching methods in their classrooms interaction with the students.

Most of the chemistry teachers assessed gave class assignments and home work but did not mark, correct and give the same to the students. The result of this study also showed that many chemistry teachers do not give holidays assignments/projects. The task of giving assignments/projects to the students should go beyond classroom and take home assignment to include holidays' assignments/projects. Achimugu (2014), maintained that holidays assignment foster creativity as students learn more when they are involved in searching for information.

The result of the data analysis shows that majority of the principals' response was negative for the effective use of instructional materials in teaching and learning chemistry and those chemistry teachers do not improvise instructional materials. Achimugu (1995) has pointed out the importance of instructional materials in enhancing effective teaching and learning chemistry and that instructional material are inadequate in our schools. Ezeudu (2000) have called for improvisation of science instructional materials and chemistry teachers are encouraged to improvise these instructional materials.

The result of data analysis also shows that majority of the principals were negative on their chemistry teachers attitudes toward work but were positive in their attitudes toward the students. This means that the inability of the chemistry teachers to have positive attitude toward their jobs affect their effectiveness in teaching chemistry. This finding is in agreement with the finding of Nwosu (1996) and Onyike (2001) who pointed out that teachers showed negative attitudes to work.

The response of sampled principals also reveals that few chemistry teachers carry out pre-teaching, teaching and post-teaching assessment of the students, while majority of the teachers set their examination questions, mark, enter and correct students' scripts. Achimugu (2016) pointed out that no meaningful academic progress can be made in the teaching and learning of chemistry if the students are not assessed before, during and after the chemistry lessons. The teacher cannot effectively interact with the students in absence of assessment in the course of teaching chemistry.

The finding of the study also shows that there is a significant difference between public and private school principals on the effectiveness of their chemistry teachers. This implies that school types have significant influence on the principals views on the issues raised in the study. Lack of unanimity in the assessment by the principals based on school types may be as result of the fact that most private schools have manageable class size and there is strict supervision and monitoring of chemistry teachers in private schools. Furthermore, chemistry teachers in private schools are aware that, if they do not perform, they can be sacked from their teaching job. As result, they try to live up to expectation. Thus private secondary school principals have more positive response on their chemistry teachers than public secondary school principals. This also means that private secondary school chemistry teachers are more effective than their counterpart in public secondary schools in teaching chemistry.

IX. Conclusion

The effective teaching and learning is the centre around which the principals and chemistry teachers have their focus. It is therefore necessary that principals should ensure that there is effectiveness on the part of the chemistry teachers who interact with the students. The paper looked at principals' assessments of chemistry teachers' effectiveness in teaching chemistry and from the responses of the principals; some deficiencies were discovered on the part of the teachers' effectiveness. Thereafter, appropriate recommendations would be made to address the deficiencies. This paper then, concludes that if various suggestions are taken into consideration, chemistry teachers would be effective and this in turn would enable chemistry students develop positive interest that would enable them perform well in chemistry.

X. Recommendations

In the light of the above, the paper recommends that:

1. Secondary school principals should on regular basis; organise in-house (school based) training programmes on the use of innovative teaching methods, instructional materials and evaluation techniques for their teachers.
2. Secondary school principals in collaboration with government at various levels should ensure adequate provision of funds for running schools as well as enough instructional materials for teaching and learning chemistry.
3. Secondary school principals and head of department of science should ensure that their chemistry teachers give assignments/projects to the students during holidays.
4. Secondary school principals in public schools should ensure manageable class size by not over admitting students as well as ensure strict supervision of classroom teaching and learning in their schools.
5. Chemistry teachers should be encouraged to have positive attitudes to the teaching profession as well as improvise in the absence of standard instructional materials to ensure quality teaching and learning.

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