Factors Affecting the Effective Implementation of Senior Secondary Education Chemistry Curriculum in Kogi State, Nigeria

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Abstract- The study examined the factors affecting effective implementation of the senior secondary education chemistry curriculum in Kogi State, Nigeria. The sample of the study consisted of seventy-six (76) chemistry teachers from Senior Secondary Schools in Kogi State, Nigeria.

19- items questionnaire on the factors affecting effective implementation of chemistry curriculum was used as instrument for data collection. Frequency, Mean, standard deviation and Ranking statistical tools were used to analyze the research questions, while hypothesis was tested with t-test at 0.05 alpha level. Results show that inadequate funding, poor motivation of teachers, lack of adequate time to cover the curriculum, inadequate laboratory and voluminous nature of chemistry curriculum were among the factors considered to have negative effect on effective implementation of chemistry curriculum. The study also revealed that school location has no significant influence on the mean response of the chemistry teachers on the factors affecting implementation of the chemistry curriculum. The necessary recommendations were made as solutions to the indentified problems affecting effective implementation of chemistry curriculum.

Index Terms- Affecting, Chemistry, Curriculum, effective implementation, factors, secondary education.

I. INTRODUCTION

In developing country like Nigeria, the importance of chemistry cannot be over emphasised. According to Igbonugo (2015), chemistry helps to ensure continuous availability of students in expected number who take important profession such as medicine, pharmacy, dentistry, food science, agriculture, engineering, science education, environmental education, etc. Contributing to this, Ekpo (2006) citing Cole (1995) said the developing nation should have the prospect for preparing a scientific literate, abounding in sizeable proportion of the society to ensure, that the effectiveness, of introducing modern technology would not diminish. Giginna and Nweze (2014) pointed out that the study of chemistry as science subject has tremendous importance to mankind as the application of its principles has helped in modern inventions. From the foregoing, Nigeria as a developing nation is in dear need of scientifically literate citizenry in chemistry to be able to catapult her to the level of developed nations. Indeed trained chemists are needed to address the aspiration of the country to be among the first 20 economically developed countries in the world by the year 2020.

Curriculum has been defined in various ways. Ugwu (2008) defined curriculum as the experience a school system provides for its students. According to Agusiobo (2003) Curriculum is an organised framework that sets out the content that children are to learn and the process through which children achieve goal which the curriculum sets for them. Therefore curriculum can be seen as all experiences students have under the guidance of the teacher in a school system. The Federal Ministry of Education (2007), basking on the importance of chemistry curriculum, revised the Senior Secondary education chemistry curriculum to reflect in-depth appropriateness and interrelatedness of curricula contents. Also emerging issues which covered value orientation, peace and dialogue, family life, HIV and AIDS education, entrepreneurial skills, etc, were infused into the relevant contents of the new Senior secondary education curriculum so as to pay particular attention to the achievement of the Millennium-Development Goals (MDGs) and critical elements of the National Economic, Empowerment and Development Strategies (NEEDS). The objectives of the revised edition of senior secondary education chemistry curriculum is expected among other things to enable students to

i) develop interest in the subject of chemistry;
ii) acquire basic theoretical and practical knowledge and skills;
iii) develop interest in Science, Technology and mathematics;
iv) acquire basic STM knowledge and skills;
v) develop reasonable level of competence in ICT application that will engender entrepreneurial skills;
vi) apply skills to meet societal needs of creating employment and wealth;
vii) be positioned to take advantage of the numerous career opportunities offered by chemistry;
viii) be adequately prepared for further studies in chemistry.

To achieve these objectives, chemistry teachers have very important roles to play. This is because the chemistry teacher is the bridge between the curriculum and the students. Indeed, chemistry teachers are responsible for the effective implementation of the chemistry curriculum.

Despite the importance of chemistry in the country's quest for technological development and roles of chemistry teachers on its implementation, there has been ineffective implementation of Senior Secondary chemistry Curriculum (Ajeyalemi 1983, Nwosu 1993, Ezeliora 2003, Igbonugo 2013)

Evidence in literature shows that the low level of implementation of science curriculum is traceable to some factors such as unqualified chemistry teachers, inadequate chemistry teachers, shallow knowledge of chemistry teachers; lack of laboratory, class size, voluminous curriculum content, poor preparation of science textbooks, inadequate equipment/materials for science teaching, poor motivation of teachers, use of inappropriate teaching methods, lack of laboratory, lack of in-service training, lack of practical activity (Uzoechi 2006, Ugwu 2008, Ayodele 2009, Ejidike and Oyelana, 2015). Against this background, one would want to empirically document whether literature cited above on secondary school science implementation are still tenable in Kogi State and in particular the influence of school location, on the factors affecting the effective implementation of chemistry curriculum. The curiosity to include, the study of the school location is based on the fact that in Nigeria, the urban/rural dichotomy is very well pronounced in terms of the provision of social amenities in favour of the urban areas.

II. Problem of the Study

Despite the importance of chemistry in the Nigeria's quest for technological development, there seems to be problems in the implementation of the laudable objectives of the senior secondary education chemistry curriculum in Nigeria. How to sensitise chemistry teachers on the need to effectively implement the senior secondary school chemistry curriculum and make government seriously involved in providing necessary environment for curriculum implementation remain daunting. It is against this background that the researcher deemed it necessary to carry out a study on the factors affecting effective implementation of senior secondary education chemistry curriculum in Nigeria.

III. Purpose of the Study

The study is aimed at finding the factors affecting the effective implementation of chemistry curriculum in Senior Secondary Schools in Kogi State. Nigeria.

Specifically, the study aimed at:

1. Finding out the factors affecting the effective implementation of chemistry curriculum in Senior Secondary School in Kogi state, Nigeria.
2. Establishing the roles of school location, on the factors affecting the effective implementation of chemistry curriculum in Senior Secondary Schools in Kogi state, Nigeria.

IV. Research Questions

1. What are the factors affecting effective implementation of chemistry curriculum in Senior Secondary Schools in Kogi state, Nigeria?

2. To what extent do school location influence chemistry teachers' mean scores on factors affecting effective implementation of senior secondary education chemistry curriculum?

Hypothesis

To guide this study, one null hypothesis was tested at 0.05 level of significance

Ho: There is no significant difference in the mean scores of the urban and rural chemistry teachers on factors affecting effective implementation of chemistry curriculum.

Method

This was survey research carried out in Kogi State of Nigeria. The population of this study is all chemistry teachers in Kogi state, Nigeria. They were four hundred and forty-eight (448) chemistry teachers in the two hundred and sixty-two (262) public senior secondary schools in the state. The sample of this study was made of seventy-six (76) chemistry teachers (41 urban and 35 rural) from 40 public senior secondary schools. The selection of the 40 senior secondary schools was through stratified random sampling technique as the secondary schools in the state were stratified into two groups (urban and rural) based on their geographical location. Within each location, 20 senior secondary schools were selected, totalling forty (40) senior secondary schools, using balloting method of simple random sampling technique. All the chemistry teachers in the 40 senior secondary schools constituted the sample and they were seventy-six (76).

The instrument for data collection was 19–items questionnaire titled factors affecting the effective implementation of chemistry curriculum (FAEICC) developed by the researcher. The questionnaire was a 4 – point rating scale of strongly Agree (SA) = 4; Agree (A) = 3, Disagree (DA) = 2 and Strongly Disagree (SD) =1. The instrument was given to two specialists in measurement and evaluation and two specialists in science education for face validity. Their corrections were effected before the final questionnaire was constructed. To establish the reliability of the instrument, 20 copies of the instrument were administered to chemistry teachers who were not part of the sample. Their responses were subjected to a reliability analysis using cronbach alpha which gave a coefficient of 0.84. The value was considered high enough and reliable for this study.

The instrument was given to the subjects and collected from them on the same day. A total of seventy-six (76) questionnaires were collected back from the subjects and used for data analysis. The data collected were analysed using frequency, means, standard deviation and ranking statistical tools to answer research questions and t-test to analyse the hypothesis. The criterion mean value is 2.50 and items with mean values of 2.50 and above were regarded as significant while those with mean value of less than 2.50 were not significant. The hypothesis was tested at 0.05 level significance.

V. RESULTS

Table 1: Frequency, means, standard deviation and Ranking of the factors affecting effective implementation of chemistry curriculum.

S/N	*ITEM STATEMENTS*	*SA*	*A*	*SD*	*D*	*MEAN*	*Standard Deviation*	*Rank*	*REMARK*
1	Inadequate funding.	50	16	2	8	3.42	0.96	1	Agreed
2	Inadequate chemistry teachers.	44	20	3	9	3.30	1.00	3	Agreed
3	Inadequate infrastructural facilities.	30	18	11	17	2.80	1.18	13	Agreed
4	Inadequate professional development of teachers.	29	20	8	19	2.78	1.20	14	Agreed
5	Poor motivation of chemistry teachers.	45	21	4	6	3.38	0.90	2	Agreed
6	Poor utilization of the available instructional materials.	25	18	8	25	2.57	1.25	16	Agreed
7	Poor management of chemistry laboratory.	32	15	12	16	2.84	1.18	10	Agreed
8	Poor training of chemistry teachers	24	22	14	16	2.71	1.12	15	Agreed
9	Ineffective use of innovative teaching methods.	21	18	17	20	2.53	1.15	18	Agreed
10	Lack of qualified laboratory assistants.	36	22	6	12	3.08	1.09	9	Agreed
11	Lack of current chemistry text books.	34	26	7	09	3.12	1.00	8	Agreed
12	Lack of effective supervision and monitoring of chemistry teachers.	29	21	11	15	2.84	1.14	10	Agreed
13	Lack of well equipped chemistry laboratory	40	25	04	07	3.29	0.93	4	Agreed
14	Lack of adequate time to cover chemistry curriculum.	38	28	02	08	3.26	0.94	5	Agreed
15	Large class size.	36	24	6	10	3.13	1.03	6	Agreed
16	Voluminous nature of chemistry curriculum content.	34	27	6	10	3.13	1.00	6	Agreed
17	High rate of transfer of chemistry teachers	21	11	20	23	2.38	1.19	19	Disagreed
18	Overwhelming number of activities demanded by the curriculum.	30	20	08	18	2.82	1.19	12	Agreed
19	The pressure of external certificate examination.	22	18	17	19	2.57	1.15	16	Agreed

From table 1 above, the mean rating of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, , 18 and 19 were all above the mean of 2.50. This means that the respondents (chemistry teachers) agreed with the statements on the questionnaire, as the factors affecting the effective implementation of chemistry curriculum. However items 17 has mean rating below the cut-off mean of 2.50. This means that chemistry teachers disagreed with the statement as a factor affecting the effective implementation of chemistry curriculum. Another interesting result of the finding of this study is that the most frequently occurring factor that affects the effective implementation of chemistry curriculum is inadequate funding, followed by poor motivation of chemistry teachers while the high rate of transfer of the chemistry teachers was the least factor.

Table 2: **Overall mean and standard deviation scores of urban and rural chemistry teachers on factors that affect the effective implementation of chemistry curriculum.**

School Location	*Number of subjects*	*Mean*	*Standard Deviation*
Urban	41	2.98	1.05
Rural	35	2.90	1.11

From table 2, the comparism of urban and rural chemistry teachers mean response scores on the factors that affect effective implementation of chemistry curriculum, reveal that urban teachers have slightly high mean (2.98) than their rural counterparts who have a mean of 2.90. This implies that school location to some extent has some influence on the chemistry teachers' response on factors that affect effective implementation of chemistry curriculum in favour of teachers teaching in urban areas. But whether this difference is significant or not would be discussed in table 3.

Table 3: T – test analysis on the mean responses of urban and rural teachers on factors that affect effective implementation of chemistry curriculum.

GROUP	*N*	$\bar{X}$	*SD*	*df*	*T – Cal*	*T – table*
Urban Chemistry Teachers	41	2.98	1.05			
Rural Chemistry Teachers	35	2.90	1.11	74	0.32	1.98

Among the respondents there are forty-one (41) urban and thirty –five (35) rural chemistry teachers. The responses of each of the group were recorded and the mean and the standard deviation of each of the group were calculated. From the table, the calculated value of t at 0.05 level of significance with 74 degree of freedom is 0.32. This value is less than the table value of 1.98. Thus the null hypothesis is accepted. Therefore, there is no significant difference between urban and rural chemistry teachers on factors affecting effective implementation of chemistry curriculum. The observed difference in opinions of urban and rural chemistry teachers in table 2 is not significant and therefore, it is by chance.

VI. Discussion

The result of data analysis shows that the chemistry teachers used in this study agreed with all the factors affecting the effective implementation of chemistry curriculum except the factor that deals with high rate of transfer of chemistry teachers. The finding presented on table 1 as it affects inadequate funding, lack of adequate time to cover the curriculum; large class size and lack of infrastructural facilities are supportive of previous studies of Ayodele (2009) especially his finding that paucity of funds supplied to schools by government is the major causes of the problems in the implementation of science curriculum and this corroborates with the present findings. Also the findings of this study concerning over loaded curriculum, lack of well equipped laboratory; lack of qualified teachers, inadequate science teachers, poor utilization of available science teaching materials and large class size are in agreement with the findings of Uzoechi (2006) who noted that above factors greatly affect effective implementation of science curriculum.

The work also agreed with the finding Ajeyalemi (1983) who pointed out that lack of qualified chemistry teachers, lack of equipment and inappropriate teaching methods affect effective learning of chemistry. The work is also in agreement with Ekpo (2006) who also pointed out that in the absence of necessary equipment for experimentation in the verification of chemistry principles and deployment of the right methodology, the learning of chemistry borders on memorisation. Ezeliora (2003) agreed with the findings of this study when he pointed out that lack of textbooks, inadequate chemistry teacher, class size and lack of science laboratory affects effective implementation of chemistry curriculum.

However the findings of this study revealed that chemistry teachers disagreed that high rate transfer of chemistry teachers, affects effective implementation of chemistry curriculum. The present view of chemistry teachers may be as result of the inclusion of private secondary schools teachers as part of the subjects of the study as private school teachers hardly go on transfer.

The finding of the study also showed that there is no significant difference between urban and rural chemistry teachers on the factors affecting effective implementation of chemistry curriculum. This implies that urban and rural teachers responded in a similar way to the questionnaire items. This also means that the urban – rural dichotomy has no influence on chemistry teachers' opinion on factors affecting effective implementation of chemistry curriculum.

VII. Conclusion and Recommendations

Conclusion

This paper has been able to bring to fore the factors that affect effective implementation of senior secondary education curriculum. The factors identified include: inadequate funding, poor motivation of teachers, lack of adequate time to cover chemistry curriculum, inadequate chemistry teachers, lack of equipped chemistry laboratory; voluminous nature of chemistry curriculum content, large class size, overwhelming number of activities demanded by the curriculum, inadequate professional development, poor management of laboratory, lack of effective supervision/monitoring, poor utilization of available science teaching materials, poor preparation of chemistry teachers, inadequate infrastructures, the pressure of external certificate examination and poor use of innovative teaching method. Pertinent recommendations are made below and the researcher calls on all the stakeholders in chemistry education to ensure strict implementation of the recommendations and other suggested solutions in order to meet the objectives of Senior Secondary education Chemistry Curriculum and improve on the academic performance of the chemistry students.

VIII. Recommendations

In the light of the above, the paper recommends

1. Chemistry education should be well funded. Government should ensure that 26% of her annual budget is allocated to education as recommended by UNESCO
2. There should be improved conditions of service for teachers especially chemistry teachers at the secondary school level. The teachers should be paid regularly as at when due. They should also be paid science allowance.
3. There should be more recruitment of qualified chemistry teachers so as to make them available in our secondary schools. The teacher/students ratio of 1:40

recommended for secondary schools by the National policy on education of Nigeria should be maintained.

4. There should adequate provision of infrastructural facilities such as classrooms, laboratories, libraries, textbooks, chalks, knockers, chairs, writing materials, tables, etc.
5. Adequate laboratory equipment and other related teaching aids should be promptly provided to chemistry teachers to effectively carry out their jobs and chemistry teachers should involve themselves in this teaching.
6. Chemistry teachers should be sponsored to in-service training programmes which should include attendance to conferences, seminars and workshops to improve their professional development.
7. There should be regular supervision, monitoring and evaluation of chemistry teachers.
8. Efforts should be made by the curriculum planners to reduce the volume of chemistry curriculum without losing the essential underlying principles of chemistry. Equally school administrator should ensure that more time is provided in the time-table for teaching chemistry at least one double period and two single periods in a week.
9. Government should employ more laboratory personnel who among others, should assure, that chemistry laboratory is well maintained and managed.
10. Chemistry teachers should employ appropriate teaching methods, utilize available teaching materials and avoid the rush to cover the syllabus for the purpose of passing external examination only.

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