



Challenges Affecting the Effective Teaching and Learning of Secondary School Basic Science and Technology in Nasarawa State, Nigeria

¹Prof. Joel. O. Eriba & ²Samuel, Ruth Iwanger

¹Department of Curriculum & Teaching, Faculty of Education, Benue State University, Markudi, Nigeria

²Department of Science, Technology and Mathematics Education, Faculty of Education, Nasarawa State University, Keffi, Nigeria
ruthsa124@gmail.com

ABSTRACT

This study examined the challenges affecting the effective teaching and learning of Basic Science and Technology in Nasarawa State's junior secondary schools. A survey research design was adopted for the study, a sample of 36 Basic Science and Technology teachers, twenty from urban and 16 from rural areas from eighteen junior secondary schools were selected for the study using stratified random sampling procedure. Two research questions guided the study and one null hypothesis was tested at 0.05 alpha level of significance. Challenges Affecting the Effective Teaching and Learning of Basic Science and Technology Questionnaire (CAETALOBSTATQ) was the instrument for data collection. The reliability of the instrument was determined using Cronbach alpha and the reliability coefficient obtained was 0.81. Frequency, mean, standard deviation and ranking statistical tools were used to answer the research questions, while the hypothesis was tested using t-test statistics. Results showed that poor motivation of BST teachers, inadequate funding, lack of adequate time to cover the BST curriculum content, inadequate infrastructural facilities, equipments, laboratories/workshops amongst others were the challenges hindering the effective teaching and learning of Basic Science and Technology. The study also revealed that school location has no significant influence on the mean response of the BST teachers on the factors affecting the effective teaching and learning of Basic Science and Technology. Recommendations were made to proffer solutions to the identified problems.

Keywords: Basic Science and Technology, Effective Teaching and Learning, Challenges and Secondary School.

INTRODUCTION

The 21st century is characterized by advancement in Science and Technology. For Nigeria to realize accelerated development in the 21st century, she needs qualitative science and technology education in our schools especially at the junior secondary school level which is invariably the foundation for advanced science and technology education (Omorogbe & Ewansiha, 2013). In developing countries like Nigeria, the importance of Basic Science and Technology education cannot be overemphasized. This is because it helps to ensure continuous availability of students in expected numbers who take science and technology related advanced careers (Samuel, 2017). From the foregoing, Nigeria as a developing nation is in dire need of scientifically and technologically literate citizens to be able to catapult her to the level of developed nations and to address the aspiration of the country to be among the first 20 economically developed countries in the world by the year 2020 (Achimugu, 2016).

Basic Science and Technology formerly known as Integrated Science and Introductory Technology as subject areas were developed by the Nigerian Educational Research and Development Council (NERDC)

following a directive it received from the National Council on Education (NCE) in 2015 to restructure and realign the existing primary and Junior Secondary school curriculum to meet the targets of the nine-year basic education. The overall objectives of the basic education curriculum were to enable students develop interest in science and technology, acquire basic knowledge and skills in science and technology, apply their scientific and technological knowledge and skills to meet societal needs, take advantage of the numerous career opportunities offered by science and technology and become prepared for further studies in science and technology (NERDC, 2007).

Evidence in literature shows that the ineffective teaching and learning of Basic Science and Technology is traceable to some factors such as unqualified Basic Science and Technology teachers, inadequate Basic Science and Technology teachers, class size, voluminous curriculum content, poor preparation of science textbooks, inadequate equipments/materials for science and technology teaching, poor motivation of teachers, use of inappropriate teaching methods, lack of practical activities amongst others (Ajaja, 2009; Onwukwe, 2010; Osokoya, 2013; Omorogbe & Ewansiha, 2013; Opara & Etukudo, 2014; Oni, 2014; Achimugu, 2016 and Samuel, 2017).

Despite the importance of Basic Science and Technology in the country's quest for technological advancement, there has been ineffectiveness in the teaching and learning of the subjects which in turn is strongly affecting the attainment of the country's laudable objectives and goals to developing a scientific and technologically literate citizenry. There is therefore need to find out the factors that are hindering the effectiveness of teaching and learning Basic Science and Technology, hence the focus of the study.

Purpose of the Study

The aim of this study was to investigate factors that are affecting the effective teaching and learning of Basic Science and Technology in junior secondary schools in Nasarawa State. Specifically, the study's objectives are to;

1. Find out the challenges affecting the effective teaching and learning of Basic Science and Technology in Nasarawa State's Junior Secondary Schools.
2. Establish the role of school location on the challenges affecting the effective teaching and learning of Basic Science and Technology in Nasarawa State's Junior Secondary Schools.

Research Questions

1. What are the challenges affecting the effective teaching and learning of Basic Science and Technology in Nasarawa State's Junior Secondary Schools?
2. To what extent does school location influence Basic Science and Technology teachers' mean response on challenges affecting the effective teaching and learning of Basic Science and technology in Nasarawa State's Junior Secondary Schools?

Hypothesis

One null hypothesis was tested at 0.05 level significance.

H₀₁: There is no significant difference in the mean response of the urban and rural Basic Science and technology teachers on challenges affecting the effective teaching and learning of Basic science and Technology in Nasarawa State's Junior Secondary Schools.

METHODOLOGY

The study adopted survey research design. Stratified random sampling procedure was employed to select 36 Basic Science and Technology teachers from 18 public junior secondary schools (9 urban and 9 rural). The schools were stratified using geographical location (urban and rural), from which the sample for the study was drawn. The instrument for data collection was a 15-item questionnaire titled Challenges Affecting the Effective Teaching and Learning of Basic Science and Technology Questionnaire (CAETALOB SATQ) developed by the researcher. The questionnaire was a 4-point rating scale of Strongly Agree (SA) = 4; Agreed (A) = 3, Disagree (DA) = 2 and Strongly Disagree (SD) = 1. The instrument was validated by 3 experts from Measurement and Evaluation and Science and Technology education. To establish the reliability of the instrument, 20 copies of the instrument were administered to Basic Science and Technology teachers who were not part of the sample. Their responses were subjected

to a reliability analysis using Cronbach alpha which gave a reliability coefficient of 0.81. The value was considered high enough and reliable for this study. The data collected were analyzed using frequency, means, standard deviation and ranking statistical tools to answer the research questions. t-test statistic was used to test the hypothesis at 0.05 level of significance. The criterion mean value was 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.

RESULTS

Research Question One

What are the challenges affecting the effective teaching and learning of Basic Science and Technology in Nasarawa State's Junior Secondary Schools?

Table 1. Frequency, Means, Standard Deviation and Ranking of the Challenges Affecting the Effective Teaching and Learning of Basic Science and Technology

S/N	ITEM STATEMENTS	SA	A	SD	D	X	SD	RANK	REMARK
1	Inadequate funding	18	10	2	6	3.24	0.69	2	Agree
2	Inadequate BST teachers	20	8	3	5	3.03	0.96	8	Agree
3	Inadequate infrastructure facilities	22	10	2	2	2.20	1.14	12	Agree
4	Inadequate professional development of BST teachers	18	8	3	7	2.87	1.19	9	Agree
5	Poor motivation of BST teachers	22	8	2	4	3.33	0.70	1	Agree
6	Poor utilization of available instructional materials	15	8	8	5	2.57	1.05	14	Agree
7	Poor management of BST laboratories & workshops	20	12	2	2	2.84	1.08	10	Agree
8	Ineffective use of innovative instructional strategies	22	7	3	4	2.71	1.02	13	Agree
9	Lack of qualified laboratory assistants	21	8	3	5	2.53	1.05	15	Agree
10	Lack of current BST textbooks	15	8	5	8	3.08	0.90	7	Agree
11	Lack of effective supervision & monitoring of BST teachers	22	7	2	5	3.12	0.96	6	Agree
12	Lack of well equipped BST laboratories & workshops	23	8	3	2	2.82	1.04	11	Agree
13	Insufficient time to cover BST curriculum	20	7	5	4	3.22	0.63	3	Agree
14	Large class size	24	5	4	3	3.13	0.99	4	Agree
15	Voluminous nature of BST curriculum content	23	6	5	2	3.13	0.99	4	Agree

Table 1 shows that the mean ratings of the item's statements were all above the mean value of 2.50. This means that the respondents (Basic Science and Technology teachers) agreed with the statements on the questionnaire as major challenges affecting the effective teaching and learning of Basic Science and Technology. The most frequently occurring challenge that affects the effective teaching and learning of Basic Science and Technology was poor motivation of BST teachers followed by inadequate funding while lack of qualified Laboratory Assistants was the least factor.

Research Question Two

To what extent does school location influence Basic Science and Technology teachers' mean response on challenges affecting the effective teaching and learning of Basic Science and technology in Nasarawa State's Junior Secondary Schools?

Table 2. Mean and Standard Deviation of Response Obtained by Respondents (BST Teachers) in Urban and Rural areas on Challenges Affecting the Effective Teaching and Learning of Basic Science and Technology

School location	Number of respondents	X	SD
Urban	20	2.88	1.05
Rural	16	2.85	1.09
Total	36		

Table 2 revealed that urban teachers have slightly high mean (2.88) than their rural counterparts who have a mean of 2.85. This implies that school location to some extent has some influence on the Basic Science and technology in favour of teachers teaching in urban areas.

Hypothesis

There is no significant difference in the mean scores of the urban and rural Basic Science and technology teachers on factors affecting the effective teaching and learning of Basic science and Technology in Nasarawa State's Junior Secondary Schools.

Table 3. Result of t-test Analysis on the Mean Responses of Urban and Rural Teachers on Challenges that Affect Effective Teaching and Learning Basic Science and Technology

Group	N	X	SD	df	t-cal	t-crit.
Urban BST teachers	20	2.88	1.05			
Rural BST teachers	16	2.85	1.09	2	0.32	2.92

Among the respondents there are nine (9) urban and nine (9) rural Basic Science and Technology teachers. The responses of each of the group were recorded and the mean and the standard deviation of each group were calculated. From Table 3, the calculated t-value at 0.05 level of significance with 2 degrees of freedom is 0.32. This value is less than the table value of 2.92. Thus the null hypothesis was not rejected. This means that, there is no significant difference between urban and rural teachers on challenges affecting the effective teaching and learning of Basic Science and Technology. The observed difference in opinions of urban and rural Basic Science and Technology teachers in Table 2 is not significant and therefore, it is by chance

DISCUSSION

The findings from the study show that poor motivation of Basic Science and Technology teachers, insufficient funding of Basic Science and Technology education, lack of adequate time to cover the curriculum; large class size, lack of infrastructural facilities, inadequate teachers, lack of qualified teachers, ineffective utilization of innovation instructional strategies among others are the challenges which affect the effective teaching and learning of Basic Science and Technology. The finding agrees with the findings of Ajaja (2009), Onwukwe (2010), Osokoya (2013) Omorogbe and Ewansiha (2013), Opara and Etukudo (2014) and Samuel (2017) that ineffective method of instruction, dearth of qualified teachers, overloaded curriculum among others are the challenges affecting the ineffective teaching and learning of Basic Science and Technology.

The finding of the study also showed that there is no significant difference between urban and rural Basic Science and Technology teachers on the challenges affecting the effective teaching and learning of Basic Science and Technology. 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 Basic Science and Technology's opinion on factors affecting effective teaching and learning of Basic Science and Technology, this finding is in agreement with Achimugu (2016) whose findings revealed that, school location has no effect on the teaching of Basic Science and Technology.

CONCLUSION

This study has been able to bring to lime light the challenges that are affecting effective teaching and learning of Basic Science and Technology. The factors identified include: poor motivation of teachers, inadequate funding, lack of adequate time to cover BST curriculum content, large class size, inadequate infrastructural facilities, poor use of innovative instructional strategies, poor utilization of available science and technology teaching materials, inadequate supervision amongst others.

RECOMMENDATIONS

The following recommendations were suggested;

1. Basic Science and Technology education should be well funded by the government as recommended by UNESCO.
2. There should be improved service conditions for Basic Science and Technology teachers.
3. There should be more recruitment of qualified Basic Science and Technology teachers.
4. The teacher/student ratio of 1:40 as recommended for secondary schools which is contained in the National Policy on Education of Nigeria should be maintained.
5. There should be adequate provision of infrastructural facilities, materials/equipments for BST teachers to effectively carryout their jobs.
6. There should be regular supervision, monitoring and evaluation of BST teachers.
7. Basic Science and Technology teachers should endeavor to employ appropriate teaching methods, utilize available teaching materials and avoid the rush to cover the syllabus for the purpose of examination only.

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