PERFORMANCE IMPROVEMENT NEEDS OF TEACHERS FOR EFFECTIVE TEACHING OF BASIC SCIENCE IN JUNIOR SECONDARY SCHOOLS IN EBONYI STATE

Okoro, Hyceinth Akpah[1], Egwu, Ethina Ukamaka[2],

1. Department of Integrated Science,
Ebonyi State College of Education,
Ikwo- Nigeria
2. Department of Science Education,
Ebonyi State Secondary Education Board,
Abakaliki- Nigeria

Abstract

This study was carried out to determine performance improvement needs of teacher for effective teaching of basic science in junior secondary schools in Ebonyi state. Five research questions were developed and answered in line with the purpose of the study. A structured questionnaire was developed from the related literature reviewed for the study. The questionnaire was face-validated by three experts, and tested for reliability using Cronbach Alpha and test -retest techniques which yielded a coefficient of 0.81. Copies of the questionnaire were administered on 442 respondents with the help of three search assistants. There was a hundred percent return rate after 3 weeks. The data was analysed using weighted mean and improvement needed index (INI) to answer the research questions. The findings of the study were as follows: (i) 11 out of 15 competency items were needed in instruction and instructional facilities (ii) 6 out of 8 competency items were needed in "you and your environment", (iii) 4 out of 5 items were needed in "living and non living things" component of basic science (iv) 3 out of 5 competency items were needed by the teachers in science and development" component while 5 out of 7 competency items were needed in "you and energy" component to enable the teachers perform effectively in teaching the subject. Based on the findings of the study, it was recommended among others, that the Ebonyi State government should package the findings into workshop, training, manual for training and retraining teachers of basic science to achieve effective performance in teaching the students.

Keywords: Performance, Improvement Needs, Effective Teaching, Basic Science, Junior Secondary Schools

Introduction

In Nigeria, basic science (formerly called Integrated Science) is taught to students at the upper basic level of education for the acquisition of foundational knowledge, skills, attitude and interest in science. According to Odu and Haruna (2014), it is a level of science which provides unique training of students in observation, reasoning and experiment in entry-level science to enable the student develop logical minds at the junior secondary school level.

Junior Secondary Schools, according to Onu and Ugwuoke (2011) are institutions where children between 12-14 years receive foundational education as preparatory for senior secondary education. According to the authors, students are taught basic prevocational and academic subjects like introductory physics, chemistry, biology, earth science, astronomy, among others. Information from the National Curriculum for Junior Secondary School (NERDC, 2007), explained that basic science is arranged from year one to year three around the following major themes: (i) You and your environment (ii) living and non-living things (iii) science and development and (iv) you and energy to ensure effective teaching.

Effective teaching, in the view of Olaintan (2017) means giving the right training to teachers to enable them learn with interest and understanding so that the desired objectives of the lesson will be achieved. To make students in Junior Secondary School acquire the desired knowledge, skills and attitude, teachers must therefore be effective in the performance of their professional responsibilities.

Performance is the ability to carry out an activity based on effectiveness. In the submission of Redmond (2017), performance is the manner in which a person does a job which is judged by demonstration of effectiveness. In this study, performance connotes the extent a teacher plans, implements, and evaluates students' achievements in basic science. The level of students' performance in basic science in internal and external examinations is an indication of teacher performance or effectiveness. Therefore, in order for teachers of basic science in junior secondary schools to perform effectively in their service delivery, they need improvement.

Improvement is an indication of better performance based on a set standard or previous achievement. Galesburg (2007) stated that improvement is actively undertaken to enhance the performance of an individual so that the expected objectives can be achieved. In this study, improvement is the ability of basic science teachers to achieve greater success in teaching the subject in identified deficient areas through teacher planned retraining programme in Junior Secondary School in Ebonyi State.

Based on the importance of basic science education, the Federal Government of Nigeria (FME, 2004) emphasized the study of the subject in the junior secondary school level. Presently, it appears that the efforts of teachers have not been felt. This is because the Basic Education Certificate Examination (BECE) result have relatively been poor with respect to Basic Science in Ebonyi State.

In the area of study, the researcher observed that lack of infrastructural facilities and lackadaisical attitude of teachers militate against students' performance in BECE. In addition, teachers' ineffectiveness has been alleged to be a major setback to students' performance in

the subject in the past few years. This observation agrees with the submission of Wasagu in Wushishi and Kubo (2011) who identified some factors that pose challenges to teachers' performance in the teaching profession as poorly equipped laboratories, poor communication skills and poor attitude to work, among others. Consequently, some of the affected students felt frustrated and dropped out of school. Some of them resorted to unethical means of livelihood such as stealing, cyber crimes and sex work and so on. If teachers' limitations in teaching basic science at the JSS level can be identified and improved upon, their level of performance in teaching the subject could be improved.

The purpose of this study therefore, was to determine competencies in instruction and infrastructural facilities, you and your environment, living and non-living things, science and development components of basic science where teachers need improvement for effective teaching.

Research Questions

The following research questions guided the study:

1. What are the competencies in instruction and infrastructural facilities where teachers need improvement for effective teaching of basic science?
2. What are the competencies in "You and your environment" component of basic science where teachers need improvement for effective teaching?
3. What are the competencies in "living and Non-living things" component of basic science where teachers need improvement for effective teachings?
4. What are the competencies in "Science and Development" component of basic science where teachers need improvement for effective teachings?
5. What are the competencies in "You and energy" component of basic science where teachers need improvement for effective teaching?

Methodology:

Five research questions guided the study. Survey research design was adopted. The study was carried out in Ebonyi State, south eastern Nigeria. The choice of the area was informed on poor performance of JSS students in basic science in the three education zones of the state as revealed by BECE results in the past few years. This was an indictment on teachers who are charged with the responsibility of teaching students effectively. The population constituted all the 221 junior secondary schools in Ebonyi state. The sample was 2 Basic Science teachers from each of the 221 JSS of the rank of principal and senior education officers, giving a sample of 442. This was considered relatively small and therefore purposively selected. Four hundred and forty two (442) copies of the questionnaire where administered on the respondents and

were all retrieved completed after two weeks through three research assistants. Data collected were analysed using weighted mean and Improvement Need Index (INI) to answer the research questions and to make decisions on the areas where teachers needed improvements.

The following steps guided the research:

a. The weighted mean of each item under the needed category ($\bar{X}n$) was calculated.
b. The weighted mean of each item under the performance category ($\bar{X}P$) was also calculated
c. The difference between the two means for each item ($\bar{X}n$- $\bar{X}p$) was determined

Decision:

1. Where the difference was zero (0), there was no need for improvement because the level at which the item was needed was equal to the level teachers could perform the item.
2. Where the difference was positive (+) there was need for improvement because the level at which the item was needed was greater than the level at which teachers could perform the item
3. Where the difference was negative (-) there was no need for improvement beucase the level at teachers could perform the item was greater than the level at which the items is needed

Results

The results of the study were obtained from the research questions answered through data collected and analysed

Research Question 1

What are the competencies in instruction and instructional facilities where teachers need improvement for effective teachings?

Table 1: Performance Gap Analysis of the mean raings of the responses of teachers on the competencies in instruction and instructional facilities where teachers need improvement for effective teaching. N= 442

S/n	Items Statement	$\bar{X}n$	$\bar{X}p$	PG ($\bar{X}n$- $\bar{X}p$	Decision
	Cluster A: Planning Competencies				
1.	Determine the need for content planning	3.72	0.20	3.53	IN
2.	Identify the objectives of the topic	3.27	0.30	2.94	IN
3.	Identify instructional facilities at the end of the lesson	3.20	3.51	0.51	NIN
4.	Include activities that will equip students with needed knowledge and skills	3.15	2.10	1.04	IN
5.	Select infrastructural materials and integrate same to content areas	2.98	1.93	1.02	IN
6.	Identify appropriate evaluation techniques for each content area	3.34	2.84	0.43	IN
	Cluster B: Implementation Competencies				
7.	Introduce the lesson	3.61	3.70	-0.11	NIN
8.	Summary/revise the previous lesson	3.87	3.93	-0.01	NIN
9.	Present the lesson	3.86	3.45	0.39	IN
10.	Utilize different instructional strategies and materials at the appropriate time	3.54	2.15	1.45	IN
	Cluster C: Evaluation Competencies				
11.	Determine assessment procedures	3.52	3.48	0.04	IN
12.	Decide how to judge the performance	2.55	1.87	0.65	IN
13.	Utilize a variety of assessment methods	3.33	3.34	0.01	IN
14.	Assign grades to students' performance	3.71	3.11	0.62	IN
15.	Use assessment results to evaluate students' performance	3.79	3.91	-0.05	NIN

Key: $\bar{X}n$= mean of needed items, $\bar{X}p$= mean of performance, PG= Performance Gap; IN = Improvement needed, NIN= No Improvement needed.

Data presented in table one revealed that the performance gap values of 11 out 15 items ranged from 0.01 to 3.53 and were positive. This indicated that the teachers needed improvement in the 11 competency items in instruction for effective teaching of basic science. The table also revealed that 4 of the item had performance gap values of -0.31, -0.11, -0.05 and -0.03 which were negative. This indicated that the teachers did not need improvement in the 4 competency items for effective teaching of basic science in Junior secondary schools.

Research Question 2

What are the competencies in "You and your environment" component of Basic Science where teachers need improvement for effective teaching?

Table 2: Performance Gap Analysis of the mean ratings of the responses of teachers on the competencies in "You and Your environment" where they need improvement for effective teaching N= 442

S/n	Items Statement	$\bar{X}n$	$\bar{X}p$	PG ($\bar{X}n$- $\bar{X}p$	Decision
1.	Warming cold foods before eating them kills germs	3.15	2.77	0.38	IN
2.	Proper use of drugs as prescribed by the physician reduces resistance to pathogens	2.85	2.38	0.47	IN
3.	Drug abuse cases brain tag	2.85	2.77	0.08	IN
4.	Antibiotics causes unpredented health challenges	3.30	2.70	0.60	IN
5.	Substances like zin lead manganese causes water pollution	2.54	2.69	-0.15	NIN
6.	Carbon (IV) oxide help to deplete the ozone layer	2.80	2.20	0.60	IN
7.	Burning of plastic materials and motor tyres destroys the ozone layer	3.46	2.86	0.61	IN
8.	Afforestation helps to improve the atmospheric conditions for hundred habitations	2.56	2.68	-0.14	NIN

***Key**: $\bar{X}p$= Mean of needed items, $\bar{X}p$= means of performance, PG= Performance Gap; IN= improvement needed, NIN = No improvement needed.*

Data presented in table 2 revealed that the performance gap values of 6 out of 8 items ranged from 0.08 to 0.61 which were positive. This is an indication that teachers of basic science need improvement in 6 of the listed. Two (2) of the items had their performance gap values of -0.15 and -0.14 which were negative; indicating that the teachers need improvement in these items for effective teaching

Research Question 3

What are the competencies in "Living and non-living things" component of basic science where teachers need improvement for effective teaching?

Table 3: Performance Gap Analysis of the mean ratings of the responses of teachers on the competencies in "living and non living things" component of basic science where teachers need improvement for effective teaching N=442.

S/n	Items Statement	$\bar{X}n$	$\bar{X}p$	PG ($\bar{X}n$- $\bar{X}p$	Decision
1.	Tendons are tough-like materials found at the end of muscles	3.80	2.50	1.30	IN
2.	Cardiothoracic surgeons specialize on the heart and surrounding areas	3.30	2.70	0.60	IN
3.	Testosterones in a male hormone that controls the development of sperm	3.30	3.00	0.30	IN
4.	Transpiration of substances within the body is a good example of metabolism	2.80	2.20	1.60	IN
5.	Gestation starts from fertilization of sperms and ova and ends in birth	2.70	3.00	-0.30	NIN

Key: *$\bar{X}n$= Mean of needed items, $\bar{X}p$= means of performance, PG= Performance Gap; IN= improvement needed, NIN = No improvement needed.*

Data presented in table 3 revealed that the performance gap values of 4 out of 5 items ranged from 0.30 to 1.30 and were positive. These values indicated that the teachers need improvement in 4 competency items in "Living and non-living things" component of basic science for effective teaching.

The table also revealed that one of the items had performance gap values of -0.30 which was negative indicating that the teachers did not need improvement in that item for effective teaching.

Research Question 4:

What are the competencies in "Science and development" component of basic science where teachers need improvement for effective teaching?

Table 4: Performance Gap Analysis of Mean Ratings of the responses of teachers on the competencies in "Science and Development" Component of basic science where teachers need improvement for effective teaching N=442

S/n	Items Statement	$\bar{X}n$	$\bar{X}p$	PG ($\bar{X}n$- $\bar{X}p$	Decision
1.	ICT component include wireless phones and the internet	3.67	3.00	0.67	IN
2.	Petroleum and natural gas are derived from organic materials	4.00	2.80	1.20	IN
3.	Right application of science results in combating the effects of climate change	2.80	2.20	0.60	IN
4.	Ethical issues in science are legally based	2.70	3.00	-0.30	NIN
5.	E-learning and e-teaching constitute ICT	2.50	3.00	-0.50	NIN

Key: *$\bar{X}n$= Mean of needed items, $\bar{X}p$= means of performance, PG= Performance Gap; IN= improvement needed, NIN = No improvement needed.*

Data in table 4 revealed that the performance gap values for the first 3 items ranged from 0.60 to 1.20 which are positive indicating that teachers need improvement in them for effective teaching. The table also revealed that two of the items (4 and 5) had performance gap values of -0.30 and -0.50 which were negative. This indicated that the no improvement is needed by the teachers in these items.

Research Question 5

What are the competencies in "you and energy" component of basic science where teachers need improvement for effective teaching?

Table 5: Performance Gap Analysis of Mean Ratings of the Responses of Teachers on the competencies in "You and Energy" component of basic science where teachers need improvement for effective teaching, N=442.

S/n	**Items Statement**	**$\bar{X}n$**	**$\bar{X}p$**	**PG ($\bar{X}n$- $\bar{X}p$**	**Decision**
1.	Sound and motion are forms of energy	3.00	2.70	0.30	IN
2.	Movement of electrical charges	3.50	3.00	0.50	IN
3.	Energy efficiency is the amount of useful energy got from a system	2.80	2.50	0.30	IN
4.	Exercising the body is loss of energy in form of heat	2.87	2.80	0.07	IN
5.	Biomass is not a good example of renewable source of energy	3.01	3.72	-0.71	NIN
6.	Latent is a form of heat that affects potential energy of particles	2.70	3.0	-0.30	NIN
7.	Ratio of output to the applied force is called mechanical advantage	3.85	2.70	1.15	IN

Key: *$\bar{X}n$= Mean of needed items, $\bar{X}p$= means of performance, PG= Performance Gap; IN= improvement needed, NIN = No improvement needed.*

Data in table 5 revealed that the performance gap values of 5 out of 7 items ranged from 0.07 to 1.15 and were positive. The values indicated that the teachers need improvement in the 5 items in "You and your energy" component of basic science for effective teaching. The table also revealed that two of the items (5 and 6) had their performance gap values as -0.71 and -0.30 respectively which were negative. This indicated that no improvement is needed in these items.

Discussion

In table 1; it was revealed that teachers needed improvement in 11 out of 15 competencies. These competencies include determine the need for context, identify the objectives of the topic and 9 others. These findings were in agreement with the views of Agun and Imogie (2010) who identified some basic elements of instructional planning to include selection of content and inclusion of activities that will equip students with relevant knowledge and skills. This findings could be attributed to irregular instruction and supervision by higher education officers in schools to detect teachers deficiencies in lesson planning, implementation and evaluation.

In you and your environment" basic science, it was found out that 6 out of 8 competency areas are needed by the teachers for effective teaching which include: avoid germs, proper drug use according to physician's prescription, among others. These findings are in agreement with the opinion of Semali and Kinchethoe in Nnadozie (2009) who stated that people need to warm their cooked foods that have stayed for a day before eating to avoid contacting germs. It is also in agreement with the views of Westh, Zinn and Rasdahi (2004) who said that drugs must be taken according to doctor's prescription to avoid unprecedented disease or sudden deaths.

In table 3, the study revealed that out of 5 items were needed by the teachers in "Living and non -living things" component of basic science for effective teaching. This included information that tendons are tought-like materials located at the end of muscles and that testosterones is a male hormone that controls spermatogenesis. These findings are in conformity with the submission of Abani (2012) who said that tendons are tough like materials found at the end of muscles, and so on

In table 4, it was revealed that teachers needed improvement in 3 out of 5 competency areas. These competencies. These include the knowledge and understanding that ICT includes mobile phones and the internet and that petroleum and natural gas are derived from organic materials. These findings agree with the opinion of Offorma (2014) who submitted that ICT component include mobile phones, internet, among others. The submissions of the authors adds more credence to this findings.

In table 5, the study revealed that out of the 7 competency items, 5 were needed by the teachers for improved and effective teaching in "You and energy" component of basic science. These competencies include the knowledge that sounds and motion are forms of energy, and that movement of electrical charges is called electrical energy, among others. The findings are in agreement with the views of Jedgede, Oyebanyi and Brown (2011) and Adeyemi, Okoh and Idris (2008) who submitted that sound and motion are forms of energy and that movement of electrical charges is called electrical energy and so on.

Conclusion

Basic Science is a compulsory subject offered by all students in Nigeria based on the provision of the National Policy on Education. Qualified teachers are usually employed to teach the subject in Junior Secondar Schools. Previous performance of students in the study in the area of study. In this study, teachers were implicated for the poor performance of the student in the subject implied ineffectiveness on the part of the teacher.

It is on this premise that the researcher identified the competencies in the component themes of the subject, instructional planning, implementation and infrastructural facilities where teachers needed improvement for effective teaching.

Recommendations

Based on the findings of the study the following recommendations were made:

1. The Ebonyi State government should package the findings in this study where improvement are needed into workshop materials for training teachers of basic science for effective teaching.
2. Ebonyi state government should direct education officers/ teachers in basic science in collaboration with the ministry of education and Universal Basic Education Board (UBEB) to carry out strict monitoring and supervision of teaching of Basic Science in Junior Secondary Schools in the State.

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