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Quality of Science Teaching in Public Secondary Schools in Rivers State: The Journey So Far

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The study seeks to explore certain variables necessary for the provision of quality science learning in Rivers State. Two sets of questionnaires tagged; "Questionnaire on Quality Science Teaching in Secondary Schools (QQSTSS) and Science Laboratory Apparatus Observational Checklist (SLAOC) were utilized as the research instruments. Ex-post facto and Survey research design were adopted for the study. The sample size consisted of 68 science teachers randomly selected from three (3) Local Government Areas in Rivers

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State. Using the Pearson Product Moment Correlation Coefficient method for calculating reliability, a reliability index of 0.82. Data were analysed using frequency count, percentage and modified four-point Likert scale statistical analysis. The findings of the study amongst others revealed that teacher-students ratio in some Local Government Areas is not in line with the stipulated National Policy on Education of 1:40; there are insufficient science laboratory apparatus in the secondary schools and the allocation of period for science subject teaching is insufficient. Recommendations were posited based on the findings in Rivers State, Nigeria.

Keywords: Quality; science teaching; science laboratory; teacher – students ratio; urriculum.

1. INTRODUCTION

Effects of science in modern world are overwhelming and undoubtedly an important agent of transformation. These enormous impacts of science are evident in the communication, agriculture, health, aviation and education sectors. Several countries of the world have been transformed from a declining economy through the increased integration and application of both the processes and products of science. Science and Technology Committee 10th report session in 2005, revealed that effective science teaching in schools is essential, both for ensuring a satisfactory degree of scientific literacy in a society at large, and for equipping the next generation of scientists and engineers to progress into higher education and beyond [1]. Therefore, the development of a nation depends on the amount of science acquisition at its disposal.

The National Policy on Science and Technology [2] attested that a country like Japan which has very little natural resources but depends on importation of raw materials from other countries has through efficient application of science and technology, transformed these materials into goods and services and now dominates world market. It is no gain saying that interest in science learning is increasing in all countries of the world. On this note, The U.S. Bureau of Labor Statistics in 2005 had predicted a 22% growth in jobs for fields related to science, technology, engineering, and mathematics (STEM) between 2004 and 2014 [3].

Obomanu reiterates that each country is striving towards producing more and better trained crops of scientists and technologists because science has assumed the foundation of national development [4]. The knowledge of science is obtained through careful observation, experimentation, and subsequent analysis of natural occurrences. It is rooted in cause and effect relationship which offers a special perspective that demystifies and debunks myths and superstitious beliefs [5]. The study of science aids students in the acquisition of high cognitive, affective and psychomotor dispositions which are relevant to the immense contributions and proffering of solutions to natural challenges in practical terms. Duschl, Schweingruber and Shouse in their work, “Taking Science to Schools” highlighted four important parameters that encompass knowledge and reasoning skills that science students should possess to be considered proficient in science learning [6]. These parameters are to:

(i) know, use and interpret scientific explanations
(ii) generate and evaluate scientific evidence and explanations
(iii) understand the nature and development of scientific knowledge
(iv) participate productively in scientific practices and discourse

The above parameters represent the tenets for quality science learning, ensuring progressive assessment of science learning and proffer proficiencies in scientific development. In Nigeria, immense efforts have been sunk into the promotion of science teaching and learning. However, students' performance in science subjects still presents a major concern for functional science education. Several studies have identified certain variables for the dismal performance in science subjects [7,8]. The science curriculum according to Ahiakwo is perceived as a planned learning experiences presented to the learner under the auspices of the school [9].

The science curriculum plays a vital role in establishing quality science learning. It is therefore expected that the science curriculum of a nation provides the needed scientific manpower not undermining the fact that it reflects the needs, values, interests and aspirations of the society. The learning experiences associated with the science curriculum should project proactive learning experiences that are deliberately planned and developed, focused and cumulative in content and approach. It proposes that the science curriculum in its totality is the rudiment and the path to functional and quality science learning. The science teacher, an implementer of the science curriculum is also an important agent in fostering quality science learning in the classroom. However, Onwioduokit identified that one of the problems of quality science teaching and learning in secondary schools is lack of commitment and discipline of science teachers leading to lack of resourcefulness [7]. Based on this laissez – fare attitude which has fostered the use of "recipe – style" teaching approach for science concepts predominantly regimenting the interactive scientific learning process to the teacher centered paradigm.

In Nigeria, the National Policy on Education stipulates a teacher – students' ratio of 1:40 [10]. This will ensure effectiveness in actual management of teaching and learning process and content delivery of science in secondary schools. Brewer, Gamoran, Ehrenberg and Willms noted that teacher-pupil ratio is a global measure of the human resources brought to bear, both directly and indirectly on children learning [11]. Majanga, Nasongo and Sylvia in a study to determine the effect of class size on classroom interaction during mathematics discourse in public schools in Nakuru municipality in Kenya revealed that teacher-pupil classroom interaction activities in the lower classes were not exploited to the full because teachers used traditional lecture method of teaching [12]. This is as a result of the imbalance in the number of teacher-students ratio.

Quality science learning should encourage active engagement of students' ideas and evidence utilizing participatory approach that link students' baseline knowledge of science concepts and the actual classroom presentation. This bridge will showcase meaningful understanding, development of scientific intellectual curiosity and active participation utilizing both "brains – on and hands – on" effects in the science classroom. It is evident that meaningful study of science lies on practical activities. This practical activities place a forum for proper demonstration of theoretical knowledge gained in the science classroom. However, the scientific value of practical work in most secondary schools is questionable. This trend has diffused into the science teaching and learning process such that most secondary schools' science practicals are usually performed close to the certificate examinations such as West African Examination Council (WAEC), National Examination Council (NECO) and General Certificate Examination (GCE). Onwioduokit explained that the improper integration of classroom science concepts (theories) and practicals has propelled irregular dichotomy in science learning and deficiencies in scientific practical skills [7]. Some authors have identified that improper grasp of science subject matter, lack of laboratory facilities and teaching resources have deterred the quality of science [13,14]. In view of the above, the study seeks to explore the quality of science teaching in Rivers State, Nigeria.

1.1 Objectives of the Study

The main objective of this study is to investigate the factors affecting quality science learning in senior secondary schools in Rivers State, Nigeria. Sequel to this, the specific objectives are to:

(i) determine science teacher – students' ratio.
(ii) investigate the adequacy of laboratory equipment in senior secondary schools.
(iii) examine the components of the curriculum vis-à-vis quality science learning in secondary schools.

1.2 Research Questions

In an attempt to analyse the quality of science learning in secondary schools in Rivers state, the following research questions were raised;

(i) What is the science teacher – student ratio in Rivers State?
(ii) Are there available and functional apparatus in the science laboratories in Rivers State secondary schools?
(iii) What are the science curriculum components that affect quality science learning in secondary schools in Rivers State?

2. METHODOLOGY

The research methodology employed for this study is ex post facto and survey research designs. The research designs were employed to obtain both qualitative and quantitative data for the study. The population comprises of all public science secondary schools and science teachers in Rivers state. Convenience sampling technique was employed to determine the sample size. The selection of the science teachers was achieved based on years of experience. This is to ensure adequate knowledge of the curriculum components, therefore teachers with at least five (5) years experience were grouped and sample size consisted of 68 science teachers selected from three (3) Local Government Areas in Rivers State: Port Harcourt (28), Obio –Akpor (24) and Ikwerre (16).

2.1 Research Instrument

Two sets of data collecting instruments captioned "Questionnaire on Quality Science Teaching in Secondary Schools (QQSTSS) and Science Laboratory Apparatus Observational Checklist (SLAOC) were employed for the study. The QQSLSS consists of two sections A and B. Section A includes personal data of respondents while section B basically focuses on item statement presented to elicit information from the respondents on the curriculum components as it affects quality science teaching and learning in secondary schools in Rivers State. SLAOC is an observational checklist consisting of science laboratory apparatus that are expected to be in the various science laboratories. The research instruments were validated by three experts in science education, specifically biology, chemistry and physics educators.

The questionnaires were subjected to a pilot study using the test – retest method. The purpose of the pilot study was to establish the reliability of the instruments. The Pearson Product Moment Correlation Co-efficient method was used to calculate the reliability of the instrument which was obtained as 0.82. The instruments were personally administered by the researchers hence 100% retrieval was attained.

2.2 Methods of Data Analysis

This section is concerned with how data was analysed according to the research question set for the study. Research question one (1) was analysed using frequency count represented by a bar chart while research questions two (2) was analysed using percentage statistical analysis with options as follows; Available and Functional (AF); Available and Not Functional (ANF); and Not Available (NA) while four point Likert scale mean rating statistics of; Strongly Agreed (SA) = 4points; Agreed (A) = 3points; Strongly Disagreed (SD) = 2points; and Disagree (D) = 1point was employed to analyze research question three. The mean criterion value for decision taking was 2.50. This was obtained by the average of the summation of the Likert scale point. Therefore, any calculated mean greater than or equal to 2.50 ($x \geq 2.50$) is significant. While calculated mean less than 2.50 ($x < 2.50$) is not significant.

3. RESULTS AND FINDINGS

Research Question 1: What is the science teacher – student ratio?

The Table 1 below shows the analysis of the data from the 23 local government areas on teacher/student. This is depicted graphically in Fig. 1.

Table 1. Analysis of science teacher-student ratio in Rivers State

LGA	No of science teachers				No of	No of	No of science	Teacher/student
	Bio	Chem.	Maths	Phy	sch	teachers	students	ratio
Abolga	8	6	7	2	11	23	1519	1:66
Alga east	10	8	6	4	11	28	2028	1:72
Alga west	13	9	9	6	13	37	1867	1:50
Akulga	1	3	4	2	5	10	266	1:26
Anolga	8	4	5	3	10	20	1349	1:67
Asalga	9	4	6	4	10	23	505	1:22
Bonny	2	-	2	-	4	4	607	1:152
Delga	3	3	6	2	9	14	436	1:31
Elga	14	9	8	2	17	33	2369	1:72
Elelga	10	12	7	3	5	32	1078	1:33
Emolga	17	15	11	6	20	49	2210	1:45
Golga	15	10	15	10	12	50	2012	1:40
Kelga	15	17	13	7	12	52	2092	1:40
Khalga	25	18	22	13	22	78	3893	1:50
Obalga	75	44	52	31	13	202	5007	1:25
Obolga	-	1	2	1	2	4	167	1:48
Walga	8	4	4	4	5	20	616	1:30
Omulga	-	2	1	2	3	5	653	1:130
Onelga	13	11	13	7	18	44	3684	1:84
Onolga	1	-	1	1	3	3	186	1:61
Oyigbo	8	6	7	3	4	24	794	1:33
Phalga	47	33	33	11	12	124	6305	1:51
Talga	9	10	8	5	10	32	1358	1:42
Total	311	229	242	129	231	911	41001	1:45

Source: Rivers state post primary schools board

The chart above indicates that out of the 23 Local Government Areas in Rivers State, 9 Local Government conform to the National Policy on Education [10] which stipulates teacher-student ratio of 1: 40. International Education Statistics in 2008 stated that the pupil/teacher ratio is an indicator of education quality, in crowded classrooms with a high number of pupils per teacher the quality of education suffers [15].

In line with the above, Onwioduokit expressed that with such crowded arrangement, the teaching and learning process cannot be effective [7]. When such occurs especially in science content delivery, several aspects of scientific skills, attitudes and knowledge will elude the learner. Thus, reducing the aspiration of achieving quality science learning.

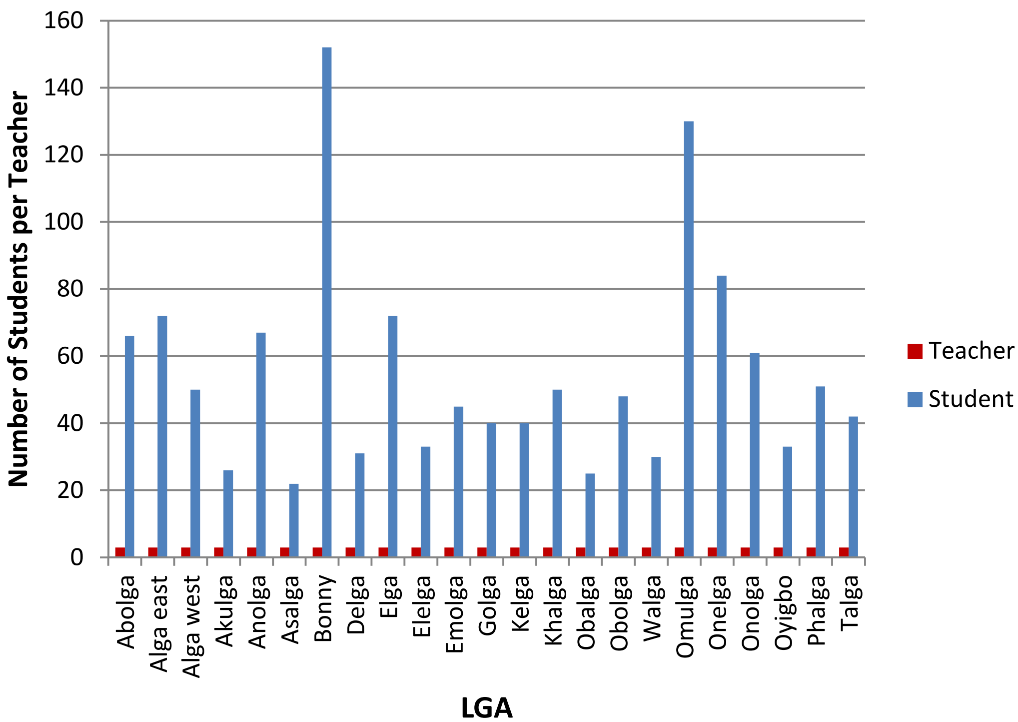

Fig. 1. Bar chart analysis of science teacher - students ratio in Rivers State (23 L.G.A)

Research Question 2: Are there available and functional laboratory apparatus in the science laboratories in the schools?

The analysis of data obtained from the biology laboratory of the sampled schools in the L.G.As was presented in Table 2. The total mean percentages for Available and functional (AF); Available and Not Functional (ANF) and Not Available (NA) for the three sampled schools are AF = 16.2%, ANF = 2.2% and NA = 81.6% respectively, while the analysed data in Table 3 revealed that for the chemistry laboratory, AF = 16.1%, ANF = 2.0% and NA = 81.9%. Finally, Table 4 showed the data analysis for physics laboratory. It was revealed that AF = 16.6%, ANF = 2.1% and NA = 81.3%.

Table 2. Science apparatus in the biology laboratory in secondary schools in the sampled local government areas

Apparatus	Min. Qty Required	L.G.A (1)			L.G.A (2)			L.G.A (3)		
		AF	ANF	NA	AF	ANF	NA	AF	ANF	NA
Microscope	40	2(5.0)	1(2.5)	37 (92.5)	1(2.5)	-	39(97.5)	1(2.5)	-	39(97.5)
Magnifiers hand lens	40	4(10)	-	36(90)	3(7.5)	-	37(92.5)	5(12.5)	-	35(87.5)
Dissecting kits	40	-	-	40(100)	1(2.5)	-	39(97.5)	-	-	40(100)
Retort clamp	40	15(37.5)	8(20)	17(42.5)	22(55)	4(10)	14(35)	11(27.5)	2(5.0)	27(67.5)
Test tube	40	22(55)	6(15)	12(30)	13(32.5)	2(5.0)	25(62.5)	12(30)	-	28(70)
Thermometers	40	-	-	40(100)	6(15)	-	34(85)	1(2.5)	-	39(97.5)
PH meter	5	-	-	5(100)	-	-	5(100)	-	-	5(100)
Water distiller	1	-	-	1(100)	-	-	1(100)	-	-	1(100)
Specimen bottles	40	17(42.5)	-	23(57.5)	13(32.5)	-	27(67.5)	9(22.5)	-	31(77.5)
Beakers (different types)	40	11(27.5)	2(5.0)	27(67.5)	16(40)	-	24(60)	12(30)	5(12.5)	23(57.5)
Dropping pipettes	40	8(20)	-	32(80)	12(30)	1(2.5)	27(67.5)	16(40)	3(7.5)	21(52.5)
Filter funnel	40	5(12.)	-	35(87.5)	8(20)	-	32(80)	4(10)	-	36(90)
Burettes	40	6 (15)	4(10)	30(75)	3(7.5)	-	37(92.5)	-	-	40(100)
Centrifuge	5	-	-	5(100)	-	-	5(100)	-	-	5(100)
Animal cage	10	4(40)	1(10)	5(50)	-	-	10(100)	1(10)	-	9(90)
Instructional charts	10	-	-	10(100)	1(10)	-	9(90)	2(20)	-	8(80)
prototype skeleton	1	-	-	1(100)	-	-	1(100)	1(100)	-	-
Total		15.6%	3.7%	80.7%	15.0%	1.3%	83.7%	18.1%	1.5%	80.4%

*Total percentage (%) mean: AF = 16.2%, ANF = 2.2% and NA = 81.6% , Source: Research Data (2013), *Percentages in parentheses*

Table 3. Science apparatus in the chemistry laboratory in secondary schools in the sampled local government areas

Apparatus	Min. Qty Required	L.G.A (1)			L.G.A (2)			L.G.A (3)		
		AF	ANF	NA	AF	ANF	NA	AF	ANF	NA
Barometer tube	10	-	-	10(100)	-	-	10(100)	1(10)	-	9(90)
Thermometers	40	-	-	40(100)	6(15)	-	34(85)	1(2.5)	-	39(97.5)
Bunsen burners	10	2(20)	1(10)	7(70)	1(10)	-	9(90)	4(40)	-	6(60)
Pipette	40	8(20)	2(5)	30(75)	12(30)	1(2.5)	27(67.5)	5(12.5)	2(5)	33(82.5)
Test tube	40	22(55)	6(15)	12(30)	13(32.5)	2(5.0)	25(62.5)	12(30)	-	28(70)
Flask(round bottom)	40	14(35)	3(7.5)	23(57.5)	9(22.5)	-	31(77.5)	6(15)	1(2.5)	33(82.5)
Flask(flat bottom)	40	10(25)	1(2.5)	29(72.5)	4(10)	-	36(90)	-	-	40(100)
Oven	1	-	-	1(100)	-	-	1(100)	-	-	1(100)
Weighing bottles	20	-	-	20(100)	6(30)	-	14(70)	-	-	20(100)
Reagent bottles	40	16(40)	2(5)	22(55)	11(27.5)	4(10)	25(62.5)	9(22.5)	2(5)	29(72.5)
Chemical cupboard	5	2(40)	-	3(60)	1(20)	-	4(80)	1(20)	-	4(80)
Measuring cylinder	40	5 (17.5)	1(2.5)	34(80)	11(27.5)	3(7.5)	26(65)	9(22.5)	2(5)	29(72.5)
Instructional charts	10	-	-	10(100)	1(10)	-	9(90)	2(20)	-	8(80)
Kipps apparatus	2	-	-	2(100)	-	-	2(100)	-	-	2(100)
Balances	10	1(10)	-	9(90)	2(20)	-	8(80)	1(10)	-	9(90)
Total		17.5%	3.2%	79.3%	17%	1.7%	81.3%	13.7%	1.2%	85.1%

*Total percentage (%) mean: AF = 16.1%, ANF = 2.0% and NA = 81.9%, Source: Research Data (2013), *Percentages in parentheses*

Table 4. Science apparatus in the physics laboratory in secondary schools in the sampled local government areas

Apparatus	Min. Qty Required	L.G.A (1)			L.G.A (2)			L.G.A (3)		
		AF	ANF	NA	AF	ANF	NA	AF	ANF	NA
Bimetallic strip	10	-	-	10(100)	-	-	10(100)	-	-	10(100)
Pendulum bob	40	16(40)	-	24(60)	11(27.5)	-	29(72.5)	8(20)	-	32(80)
Ammeter	40	2(5)	1(2.5)	37(92.5)	6(15)	-	34(85)	11(27.5)	-	29(72.5)
Calorimeter	20	-	-	20(100)	1(5)	-	19(95)	1(5)	-	19(95)
Force board	40	18(45)	2(5)	20(50)	14(35)	4(40)	22(55)	10(25)	1(2.5)	29(72.5)
Galvanometer	40	4(10)	-	36(90)	6(15)	-	34(85)	7(17.5)	-	33(82.5)
Convex lens	40	8(20)	-	32(80)	16(40)	3(7.5)	21(52.5)	16(40)	6(15)	18(45)
Concave lens	40	11(27.5)	2(5)	27(67.5)	14(35)	-	26(65)	12(30)	3(7.5)	25(62.5)
Stop clock	40	6(15)	-	34(85)	14(35)	-	26(65)	9(22.5)	-	31(77.5)
Rheostat	20	-	3(15)	17(85)	1(5)	-	19(95)	3(15)	1(5)	16(80)
Ray box	20	2(10)	-	18(90)	-	-	20(100)	--	-	20(1000
Potentiometer	40	7(22.5)	2(5)	29(72.5)	4(10)	-	36(90)	5(12.5)	2(5)	33(82.5)
Magnetic compass	10	-	-	10(100)	-	-	10(100)	-	-	10(100)
Rectangular prism	40	21(52.5)	-	19(47.5)	14(35)	-	26(65)	17(42.5)	-	23(57.5)
Vernier calipers	20	2(10)	-	18(90)	-	-	20(100)	-	-	20(100)
Micrometer screw gauge	20	1(5)	-	19(95)	-	-	-	2(10)	-	18(90)
Meter rule	40	13(32.5)	-	27(67.5)	7(17.5)	-	33(82.5)	17(42.5)	-	23(57.5)
Resistance box	20	-	-	20(100)	2(10)	-	18(90)	1(5)	-	19(95)
Total		16.4%	1.8%	81.8%	15.8%	2.6%	81.6%	17.5%	1.9%	80.6%

*Total percentage (%) mean: AF = 16.6%, ANF = 2.1% and NA = 81.3%, Source: Research Data (2013), *Percentages in parentheses*

Laboratory activities are possible if there are sufficient apparatus. This is because laboratory activities avail students the opportunity to think logically, ask reasonable questions, seek appropriate answers and solve problems [16]. The findings above are in line with the views of Nbina who stated that until equipment and laboratories (in whatever functional forms) are adequately available in schools, science teaching and learning may continue to be defective [17]. Conclusively, it is important to state that insufficient laboratory materials for the teaching and learning of science constitute a major cause of student under achievement.

Research Question 3: What are the science curriculum components that affect quality science learning in secondary schools?

Table 5 presents the analysed responses of the 68 science teachers. The item statements 1, 5, 8 and 9 were accepted with mean of 3.48, 2.85, 2.85 and 3.92 respectively; while item statements 2, 3, 4, 6, 7, and 10 were rejected with mean of 2.21, 2.18, 2.19, 2.13, 2.22, and 2.15 respectively. The findings showed that the respondents accepted that the senior secondary school curriculum is an important tool required for the provision of quality science learning. However, it was disagreed that the present science curriculum will enhances the development of scientific process skills. Onwioduokit identified the scientific process skills to include cognitive, manipulative, computational and communicative skills [7]. These skills are essential in the realization of scientific enquiry which is fundamental for quality science learning.

Table 5. Analysis of science teachers' responses on science curriculum components and quality science learning

s/no	Item statement	SA	A	D	SD	Total	Mean	Decision
1	The science curriculum provides the foundation for quality science learning.	36	29	3	-	68	3.48	Significant
2	The present curriculum will enhance the development of scientific process skills.	9	14	27	18	68	2.21	Not significant
3	The present science curriculum will develop problem solving abilities among learners.	11	13	21	23	68	2.18	Not significant
4	The present science curriculum will ensure active student's participation in science class.	12	14	17	25	68	2.19	Not significant
5	The present science curriculum contents are not related to the learner's everyday experience.	19	28	13	8	68	2.85	Significant
6	The present science curriculum provides the needed scientific knowledge appropriate in the attainment of quality science learning.	6	16	27	19	68	2.13	Not significant
7	The present science curriculum are structurally arranged to ensure learners effective understanding of concepts.	12	13	21	22	68	2.22	Not significant
8	The present science curriculum contents are over loaded and not comprehensively completed.	20	27	12	9	68	2.85	Significant

Table 5 continued………………

9	The allocation of period for science subjects is insufficient for their completion.	33	24	9	2	68	3.92	Significant
10	The instructional methodology as stipulated by the present science curriculum is appropriate in ensuring quality science learning.	13	9	21	25	68	2.15	Not significant

Source: Research Data 2013

Ahiakwo stated that, problem solving is to identify the gap between a problem and a solution using information (knowledge) and reasoning [9]. The science curriculum contents should be designed so as to present to the learner the ability to possess reflective scientific thinking, detect contradictions, relate empirical concepts and utilize mathematical analysis in solving scientific problems. This situation will encourage active participation of students during the learning of science concepts. The findings also revealed that the science curriculum is overloaded and the allocation of periods to the teaching of science subjects is not sufficient to cover the entire curriculum.

Finally, it was shown that the science curriculum contents are not related to the learners' everyday view about science. Nbina stated that students have all experience science learning outside the classroom and can form and express their own views of science [17]. It is important to state that the science curriculum should be designed such that there is a bridge between students' background knowledge and what is to be taught. Eintein in Nbina puts it that the whole of science is nothing more than a refinement of everyday thinking [17].

4. CONCLUSION

Science and scientific activities are manifested everywhere, in our homes, schools and the entire environment. As such, science learning should be geared towards harnessing the potentials and equipping the learner to proffer substantive solution to all human challenges. In that respect, the pointer should be focused on presenting quality science education to the learner, in which the curriculum plays a vital role. The planning, development and implementation of the science curriculum should therefore take into cognizance the fundamental issues that will ensure quality science learning. To this end, the following recommendations were made.

5. RECOMMENDATIONS

1. Quality science learning is achievable if appropriate teacher – student ratio is ensured in all science classrooms.
2. Effort should be directed towards the provision and equipping of science laboratories with adequate and functional apparatus so as to incorporate both theoretical and practical activities of science concepts.
3. The science curriculum should be reviewed in order to ensure that all contents are related to the learner's interest and background knowledge to ensure conceptual harmony in science learning.
4. Time period allocation for science subjects should be extended so that the entire curriculum would be extensively taught.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Federal Republic of Nigeria. National policy on science and technology. Federal Government Press. Lagos; 2008.
2. Science and Technology committee. Science teaching in schools. 10th Report of session. House of Lords. ; 2005. Accessed 22 April 2014.
Available: www.publications.parliamnet.uk/pa. 2006
3. U. S. Department of Labor. Employment outlook: Occupational employment projection to 2014; 2015. Accessed 20 April 2014.
Available: http://www.bls.gov/opub/mlr/2005/11/art5full.pdf.
4. Obomanu BJ. Learning theories and science teaching in schools. In Obomanu BJ, Okoro CA, editors. Teaching: Issues and Methods. Omoku: Molsyfem United Services Publishers; 1999.
5. Gbamanja SPT. Modern methods in science education. Port Harcourt, Rivers State: Paragraphics publishers; 1991.
6. Duschl RA, Schweingruber HA, Shouse AW. Taking science to schools; learning and teaching science in grade K-8. National Research Council of the National Academies. Washington D.C.; 2007. Accessed 20 April 2014.
Available: http://www.nap.edu/openbook.php?record_id=11625.
7. Onwioduokit FA. The ordeal of science teaching in the contemporary society: A need for paradigm shift for the new generation. A professorial inaugural lecture (series 36th) delivered on January 31st. University of Uyo, Nigeria; 2013.
8. Arokoyu AA, Ugonwa RC. Assessment of resource availability for chemistry instruction in the secondary schools in Rivers State. Journal of Emerging Trends in Educational Research and Policy Studies (JETERAPS). 2012;3(3):346–351.
9. Ahiakwo MJ. Science, science education and scientific literacy. A professorial inaugural lecture (series 17th) delivered on March 1st, 2006. Rivers State University of Science and Technology, Nkpolu-oroworukwo, Port Harcourt.
10. Federal Government of Nigeria. National policy on education. Federal Government Press. Lagos; 2013.
11. Brewer DJ, Gamoran A, Ehrenberg RG, Willms JD. The class size controversy (CHERI working paper No.14). Cornel University, ILR School. Accessed 19 April; 2014. Available: http://digitalcommons.ilr.cornel.edu/workingpapaers/25/.
12. Majanga EK, Nasongo JW, Sylvia VK. The effect of class size on classroom interaction during mathematics discourse in the wake of free primary education: A study of public primary schools in Nakuru municipality. Current Research Journal of Social Sciences. 2011;3(1):44-49.
13. Adolphus T, Aderonmu TSB. Factors affecting the teaching and learning of electromagnetism among secondary school physics students. Nigeria Journal of Vocational Teacher Education. 2008;8(1).
14. Edomwonyi-Otu L, Avaa A. The challenges of effective teaching of chemistry: A case study; 2011. Accessed 28 March 2013.
Available: http:// lejpt.academicdirect.org/A18/001_008.htm.
15. International Education Statistics. Accessed 22 April; 2014.
Available: http://huebler.blogspot.com/2008/11/ptr.hml.

16. Ogunkunle RA, Okorosaye-Orubite AK. A survey of the current state of resources for the teaching of secondary school mathematics in Rivers State. Journal of Technical and Science Education. 2007;16(1&2).
17. Nbina JB. Refocusing the teaching and learning of science in Nigerian schools in the 21st Century. In Egbule P, Tabotndip JE, Aboho DA, editors. Refocusing Education in Nigeria in the 21st Century. Onitsha: West & Solomon publishing company; 2011.

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