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Assessment of Effectiveness of Teaching and Learning of Environmental Concepts in Some Selected Secondary Schools in Osun State, Nigeria

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Abstract

The study assessed the instructional materials being used in the teaching of environmental concepts and determined the extent of knowledge of senior secondary school students on environmental concepts in the secondary schools Physics curriculum in Osun State. Descriptive survey research design was adopted. The population comprised Senior Secondary School Two (SSSII) science students and teachers of Physics in public secondary schools in Osun State. The sample for the study comprised 360 senior secondary school two (SS2) science students and 18 Physics teachers. The sampling was carried out using multistage sampling procedure. Two Local Government Areas (LGAs) were selected from each of the three Senatorial districts in the State while three schools were selected from each Local Government using simple random sampling technique. A Physics teacher was selected from each of the selected schools using purposive sampling technique while 20 students were selected from each school using simple random sampling technique. Two research instruments were used to collect data namely: Environmental Concepts Implementation Instructional Resources Checklist (ECIIRC) and Environmental Concepts Achievement Test (ECAT). Data collected were analyzed using tables, frequency distribution and percentages. Findings on adequacy of usage of instructional aids recommended for the teaching of environmental concepts in the curriculum showed that 61.11% of the teachers fell in the "low level" category while 33.33% and 5.65% fell in the "moderate level" and "high level" categories respectively. The result on the extent of knowledge of environmental concepts possessed by students was reported as follows; 48 (13.33%) of the students had low score, 248 (68.89%) had moderate score and 64 (17.78%) had high score. The study recommends that Environmental Education should be incorporated into Physics teachers education program in order to enhance effective teaching of environmental concepts on the parts of the teachers and facilitate learners' understanding towards environmental concepts.

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Keywords: Assessment, environment, environmental concepts, school, physics and curriculum.

1. Introduction

In the quest for survival, man is rapidly exposing the planet earth to changes which could affect food, energy, politics and ecology security - all being components of sustainable development (Wole, 2009). There is therefore a pressing need to sensitize citizens both at local and global levels, to sustainability issues through environmental education. According to Gideon (2017), the bedrock and the basis towards higher knowledge is education. In other words, the means through which individuals get mental, physical, and moral training which is responsible for full attainment of their missions, purpose in life and equipping for unexpected challenges in their environment could be education. Orji, Maekae and Job **(**2013**)** stressed that countries grow relative to their success in education.

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This makes education to be a variable that determines the growth of a nation, the life wire of its industries, and also the basis for moral reinforcement and revitalization of its people. Environmental Education is a learning procedure that raises people's knowledge and consciousness about the environment and its related challenges, and fosters attitude, motivations and commitments to make knowledgeable decisions and take responsible action (Stohr, 2013).

In 1992, the Nigerian Educational Research and Development Council (NERDC) designed the Environmental Education Curriculum for primary schools which comprised ecological foundation, human environment/development, environmental change/impact and sustainable development. Jekayinfa and Yusuf (2008) believed that awareness and integration of Environmental Education into all curriculum at every grade create a more comprehensive treatment of environmental issues. Among such environmental issues are global warming, air, water and soil pollutions, loss of biodiversity, deforestation and desertification, thermal and noise pollution, cloud seeding. resource depletion like Ozone layer which results in human exposition to dangerous radiation that causes skin cancer, to mention a few.

The ultimate objective of environmentally-related concepts in secondary school Physics curriculum is mainly to ensure that the individual learner is acquainted with the environment. The term environment can be considered as our surroundings which includes physical-biological and social-cultural aspects. Under the physical aspect, we have non-living things such as water, air, land etc., plants and animals are found under the biological aspect while the social-cultural aspect has to do with man-made culture, religion, customs etc.

Okonkwo (2015) opined that the impact of instructional resources in teaching and learning of Physics in senior secondary schools cannot be overlooked and that the use of instructional materials in its teaching and learning influences the cognitive, affective and psychomotor achievement of students. In order words achievement of objectives of environmental concepts depends largely on instructional materials recommended in the curriculum such as, manometer, barometer, solar panel, spectrum chart, Lesile cube to mention a few as prescribed in the secondary school Physics curriculum.

Kay and Knack (2008) pointed out that instructional resources arouse the learners craving to learn, and assist the learning process by making assimilation and memorization of materials stress-free. Also they help to hold responsiveness of the learner, make learning accessible to a wider audience, control the pace of learning, promote better understanding of Physics concepts, and help to overcome difficulties in presenting Physics lesson. Asubiojo and Aladejana (2013), in their study ascertained that there is a significant difference in the level of usage of instructional materials between non-professional and professional Physics teachers in Ekiti State secondary schools. Eshiet (2001) and Bassey (2002), noticed that there are insufficient instructional resources for the teaching and learning of Physics in public secondary schools in Akwa Ibom state in particular and Nigeria in general. Amodu and Adewole (2014) conducted a survey across secondary schools comprising private and public randomly selected in Ile-Ife, Nigeria and reported that majority of the schools were quite inadequately equipped with instructional aids for teaching of Physics.

This study is geared towards the assessment of the secondary school Physics curriculum implementation towards environmental education. Specific objectives are to; (a) assess the instructional materials being used in the teaching of environmental concepts in senior secondary school Physics curriculum in Osun State; and (b) determine the extent of knowledge of senior secondary school students about environmental concepts in the secondary schools Physics curriculum in Osun State.

2. Methodology

The study adopted the descriptive survey research design. The population of the study comprised Senior Secondary Two (SS2) science students and teachers of Physics in public secondary schools in Osun State. Sample for the study consisted of 360 senior secondary school two (SS2) science students and 18 Physics teachers. The sampling was carried out using multistage sampling procedure. Two Local Government Areas (LGAs) were selected from each senatorial district using simple random sampling technique. Three schools were selected from each Local Government, using purposive sampling technique (the most senior Physics teacher was selected), one Physics teacher was selected and using simple random sampling technique 20 students were selected from each school.

Two research instruments were used to collect data namely: Environmental Concepts Implementation Instructional Resources Checklist (ECIIRC) to assess the instructional resources available in the teaching of environmental

concepts in Physics; and Environmental Concepts Achievement Test (ECAT). The ECAT is a test on environmental concepts related topics covering SSS1 and SSS2 which contains a 20-items multiple-choice test which was used to determine the extent of knowledge of environmental concepts possessed by the students in the secondary school Physics curriculum. The instruments were subjected to both face and content validity by two curriculum specialists in the Department of Science and Technology Education of Obafemi Awolowo University, Ile-Ife, Nigeria. The curriculum experts read through the contents and corrections were made which were effected.

Pilot study was carried out using sample that is representative to those that were used but are outside the main study. The ECIIRC which contains recommended instructional resources for the teaching of environmental concepts in the Physics curriculum was used to elicit information from ten secondary schools selected outside the study area through observation schedule. The reliability of the instrument was determined to be 0.74 using Cronbach Alpha. The instrument on Environmental Concepts Achievement Test ECAT which initially contained 30 items multiple-choice test was administered to 30 students out of which 20 items were selected after each item of the instrument was subjected to difficulty level at (0.25 - 0.75) and discriminating level (0.2 - 0.6). Value determined for the reliability of the instrument was 0.72 using Pearson Product Moment Correlation Coefficient for the test-retest set of data collected from the students. Data collected were analyzed using descriptive statistics of frequency counts, simple percentages and Bar chart..

3. Results

Research Question 1: How adequate are the usage of instructional materials by Physics in the teaching of environmental concepts in senior secondary schools Physics?

The recovery analysis results, presented in Table 1, confirm the reliability of the analytical procedures employed in this study. Key performance parameters—sensitivity, recovery, precision, and accuracy—were evaluated. The percentage recoveries ranged from 84.68 ± 2.78% for p,p'-DDD to 99.63 ± 4.39% for Endrin, and were within the European Union's acceptable recovery range of 70–110%.

Table 1a Assessment of Instructional Materials used in the Teaching of Environmental concepts

N/S	INSTRUCTIONAL RESOURCES	AVAILABILITY			USAGE		
		A f(%)	NA f(%)	Mean	Used f(%)	Not Used	f(%)
1	Clinical thermometers	17(94.4)	1(5.60)	0.94	12(70.50)	5(29.50)	
2	Mini and max thermometers	2(11.1)	16(88.9)	0.11	2(100.0)	0.00	
3	Liquid in glass thermometer	9 (50.0)	9 (50.0)	0.30	7(77.8)	2(22.2)	
4	Ball and ring	11(61.1)	7(38.9)	0.61	10(90.91)	1(9.09)	
5	Wax	9 (50.0)	9 (50.0)	0.50	5(55.56)	4(44.4)	
6	Bunsen burner	17(94.4)	1(5.6)	0.94	15(88.24)	2(11.76)	
7	Alcohol or iodine	18(100)	0.00	1.00	15(83.33)	3(16.67)	
8	Naphthalene	10(61.1)	8(38.9)	0.83	6(60.0)	4(40.0)	
9	Linear expansivity apparatus	9(50.0)	9 (50.0)	0.50	7(77.8)	2(22.2)	
10	Metal rods coated with wax	11(61.1)	7(38.9)	0.61	10(90.91)	1(9.09)	
11	Density bottle	11(61.1)	7(38.9)	0.61	10(90.91)	1(9.09)	
12	Leslie cube	3 (16.7)	15(83.3)	0.17	2(66.67)	1(33.3)	
13	Chart on land and sea breeze	6(33.3)	12(66.7)	0.33	5(83.33)	1(16.67)	
14	Solar panel	4(22.2)	14(77.8)	0.22	3(75.0)	1(25.0)	
15	Round bottom flask / beaker	17(94.4)	1(5.6)	0.94	16(94.12)	1(5.88)	
16	Manometer	7(38.9)	11(61.1)	0.39	6(85.72)	1(14.28)	
17	Capillary tube and Running water	17(94.4)	1(5.6)	0.94	17(100.0)	0.00	
18	Weighing scale	17(94.4)	1(5.6)	0.94	17(100.0)	0.00	
19	Iron fillings	16(88.9)	2(11.1)	0.89	16(100.0)	0.00	

20	Metal container	16(88.9)	2(11.1)	0.89	15(93.75)	1(6.25)
21	Cork to cover flask / Clamp	18(100)	0.00	1.00	18(100.0)	0.00
22	Bicycle dynamo	3 (16.7)	15(83.3)	0.17	2(66.67)	1(33.33)
23	Cells / batteries	18(100)	0.00	1.00	18(100)	0.00)
24	Coal / Wood	10(55.6)	8(44.4)	0.56	9(90)	1(10)
25	Crude oil	4(22.2)	14(77.8)	0.22	1(25.00)	3(75.00)
26	Barometer	8(44.4)	10(55.6)	0.44	4(50.00)	4(50.00)
27	Chart showing source & method of energy utilization and conversion	6(33.3)	12(66.7)	0.33	5(83.33)	1(16.67)
28	Chart and films on radioactivity	7(38.90)	11(61.10)	0.39	6(85.72)	1(14.28)
29	Expert invited to discuss radioactivity	0.00	18(100)	0.00	0.00	18(100.0)
30	Charts on Dams in Nigeria	5(27.80)	13(72.20)	0.28	4(80.00)	1(20)
31	Chart on Niger-SAT I	1(5.6)	17(94.4)	0.06	0.00	1(10.00)
32	Literature on Niger-SAT I	0.00	18(100)	0.00	0.00	18(100.0)
33	Newspaper cuttings	2(11.1)	16(88.9)	0.11	0.00	2(100.0)
34	Information Pamphlet on Nig.SAT I	1(5.6)	17(94.4)	0.06	1(100)	0.00
35	Chart on NICOM-SAT I	2(11.1)	16(88.9)	0.11	1(50.00)	1(50.00)
36	Literature on NICOM-SAT I	0.00	18(100)	0.00	0.00	18(100.0)
37	Information Pamphlet on NICOM-SAT I	1(5.6)	17(94.4)	0.06	1(100.0)	0.00
38	Oscilloscope	6(33.3)	12(66.7)	0.33	2(33.34)	4(66.66)
39	Spectrum Chart	5(27.8)	13(72.2)	0.28	4(80.00)	1(20.00)
40	Electric Torch	13(72.2)	5(27.8)	0.72	13(100.0)	0.00

Keys; A = Available, NA = Not Available, U = Used, NU = Not Used and X = Mean

The result in the table revealed that alcohol and iodine cork to cover flask or clamp, cells and batteries are 100% available; clinical thermometer, bunsen burner, round bottom flask/beaker, capillary tube and running water and weighing scale had percentage availability of 94.4%, non-availability percentage is 5.6%; iron fillings, metal container had percentage availability of 88.9%, while the non-availability is 11.1%; electric torch had percentage availability of 72.2%, while the non-availability percentage is 27.8%; ball and ring, metal rods coated with wax, density bottle had percentage availability of 61.1%, while the non-availability percentage is 38.9%; naphthalene, coal and wool had percentage availability of 61.1%, while the non-availability percentage is 38.9%; liquid in glass wax, linear expansivity apparatus, thermometer had percentage availability of 50% while the non-availability percentage is 50%; barometer had percentage availability of 44.4% while non-availability percentage is 55.6%; manometer, charts and films on radioactivity had percentage availability of 38.9% while the non-availability percentage is 61.1%; charts on land and sea breeze, chart showing source and method of energy utilization and conversion, oscilloscope had percentage availability of 33.3%, while the non-availability percentage is 66.7%; charts on dams in Nigeria, spectrum chart had percentage availability of 27.8%, while the non-availability percentage is 72.2%; solar panel, crude oil had percentage availability of 22.2%, while the non-availability percentage is77.8%; Leslie cube, bicycle dynamo had percentage availability of 16.7%, while the non-availability percentage is 83.3%; minimum and maximum thermometers, newspaper cuttings, chart on Niger SAT 1 had percentage availability of 11.1%, while the non-availability percentage is 88.9%; chart on Niger SAT 1, information pamphlet on Niger SAT 1 had percentage availability of 5.6%, while the non-availability percentage is 94.4%; expert invited to discuss radioactivity, literature on Niger SAT 1, literature on NICOM SAT 1 were not availability.

Table 1b: Summary table on the Availability of Instructional Materials used in the Teaching of Environmental Concepts

Environmental Concepts Instructional Materials	Availability of Environmental Concepts Instructional Materials	Frequency (f)	Percentage (%)
Low	0 – 13	2	11.11
Moderate	14 – 26	13	72.22
High	27 – 40	3	16.67

Keys; Low = 0 – 13, Moderate = 14 – 26 and High = 27 - 40

Table 1b presents the process involved in determining the cumulative scores of availability of instructional materials used in the teaching of environmental concepts, values range of 0 – 13 were termed low, 14-26 was termed moderate and 27 – 40 was termed high. The results obtained showed that 2(11.11%) of schools had low availability of instructional aids, 13(72.2%) of schools` availability of instructional materials was found to be moderate while 3(16.67%) of schools had high availability of instructional aids. Findings from table 2b revealed that availability of instructional materials used in the teaching of environmental concepts was found to be moderate.

Table 1c: Summary table on Usage of Instructional Materials in the Teaching of Environmental Concepts

Description	Usage of Environmental Concepts Instructional Materials	Frequency (f)	Percentage (%)
Low	0 - 13	11	61.11
Moderate	14 - 26	6	33.33
High	27 - 40	1	5.6

Keys; Low = 0 – 13, Moderate = 14 – 26 and High = 27 – 40

Table 1c showed how the cumulative value of usage of instructional materials for the teaching of environmental concepts were determined. Values range of 0 – 13 were termed low, 14 -26 was termed moderate and 27 – 40 was termed high. The results obtained revealed that there was a low level of usage of instructional aids among the teachers with 11(61.11%), moderate level of usage instructional materials in the teaching of environmental concept was found to be 6(33.33%) while only one teacher out of 18 teachers had high level of usage of instructional aids in the teaching of environmental concept. Therefore, Results showed that level of usage of instructional materials in the teaching of environmental concept by teachers was found to be low.

Research Question 2; What is the extent of knowledge of senior secondary schools' students on environmental concepts in the secondary schools Physics curriculum in Osun State?

Table 4: Principal Component Analysis of the studied OCPs in sera of breast cancer subject

Extent of Knowledge	Frequency (f)	Percentage (%)
Very High	64	17.77
High	64	17.77
Average	81	22.50
Low	71	19.72
Very Low	80	22.22

"Keys; very low = 0 – 39, Low = 40 – 49, Average = 59 – 59, High = 60 – 69 and Very high = 70 – 100 and Very high = 70 – 100

The table above revealed that 80(22.22%) of the students had very low score, 71(19.72%) had low score, 81(22.50%) had an average score, 64(17.78%) had a high score, while 64(17.77%) had a very high score. The result showed that 232(64.44%) had a score ranging from very low to average while 128(35.56%) had above average. Hence, it can be deduced that the knowledge of Environmental Concepts possessed by students is low"

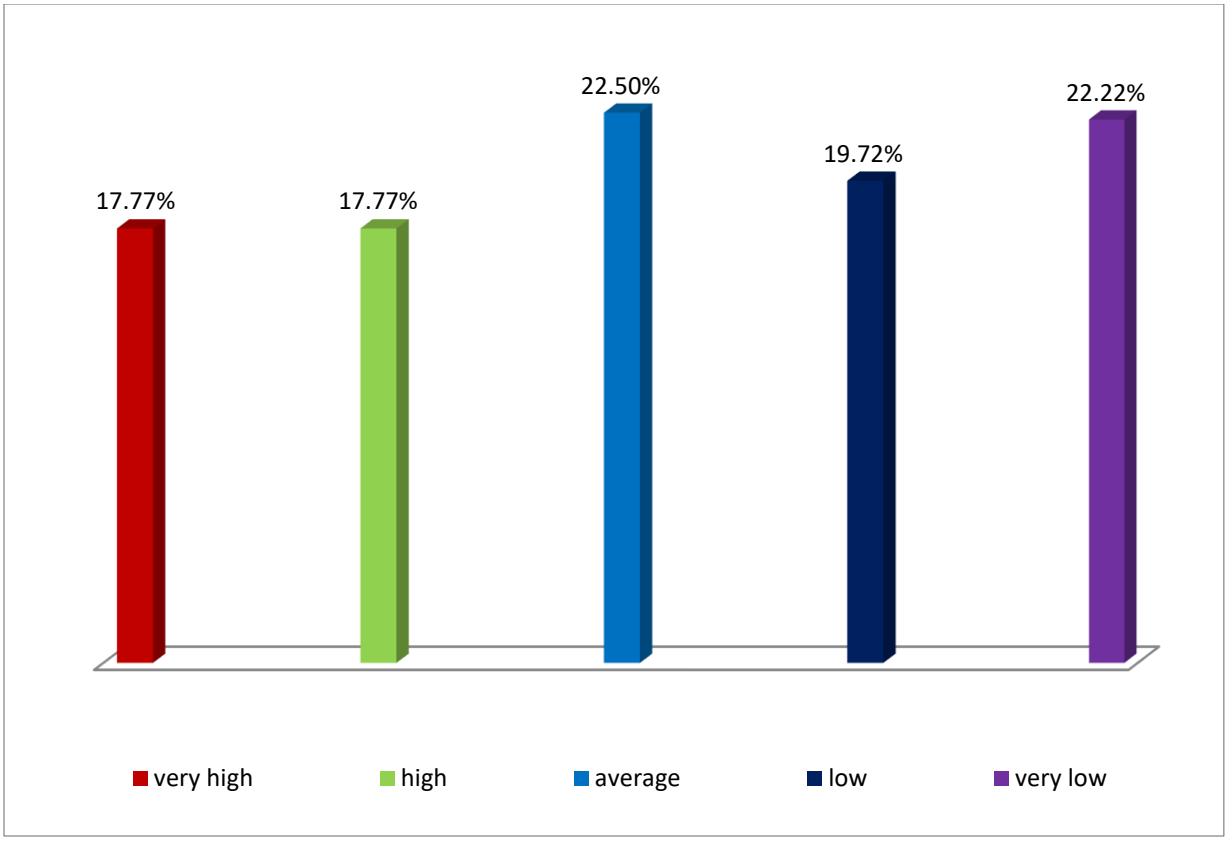


Figure 1: Bar chart showing the extent of knowledge of Respondents on Environmental Concepts in the Secondary Physics Curriculum
Source: Field survey report, 2021
Keys; very low = 0 – 39, Low = 40 – 49, A = 59 – 59, High = 60 – 69 and Very high = 70 – 100

Table 2b Cumulative table on Extent of knowledge of students Towards Environmental Concepts

Extent of Knowledge	Students' scores on Environmental Concepts Instructional Materials	Frequency (f)	Percentage (%)
Low	0 – 33	48	13.33
Moderate	34 – 66	248	68.89
High	67 above	64	17.78

Keys; Low = 0 – 33, Moderate = 34– 66 and High = 67 above

Table 2b revealed that 48(13.33%) of the students had low knowledge in environmental concepts in Physics, 248(68.89%) had moderate knowledge in environmental concepts in Physics while 64(17.78%) had high knowledge in environmental concepts in Physics. This implies that low percentage 64(17.78%) of the students had high knowledge in environmental concepts in Physics

4.0. Discussion

Results of findings on adequacy of the usage of instructional materials by Physics teachers in the teaching of environmental concepts in the senior secondary school revealed that percentage availability of instructional materials as identified by the secondary school Physics curriculum for the teaching of environmental concepts was moderate. While the result also revealed that the percentage on adequacy of the usage of environmental concept instructional aids was low among teachers. Only a teacher adequately utilized instructional material in the teaching of environmental concepts. The result further revealed that availability of instructional materials was moderate yet teachers did not adequately make use of them all. This finding agreed with research work carried out by Okonkwo

(2015) who reported that instructional materials available which can improve the teaching and learning of Physics in schools were not generally available. While the available instructional aids were not adequately used.

Findings on the extent of knowledge of senior secondary school Physics students about environmental concepts in the secondary school Physics curriculum revealed that, low percentage of the students had high score while the highest percentage had moderate score from the Environmental Concept Achievement Test administered to them. However, investigation carried out by Selman and Erkan (2020), titled "Secondary School Students Awareness of Environment" was not in agreement with the result obtained on extent of knowledge possessed by senior secondary school Physics students about environmental concepts. They reported that the level of awareness about concepts of environmental education demonstrated by students was high which counters the result of this study. This could be as a result of the inadequate level of usage of available instructional aids in the teaching of environmental concepts which can facilitate learning on the part of the students as advocated by Oladejo, Olosunde, Ojebisi and Ishola (2011).

Conclusion

The study concluded that instructional resources are not adequate in secondary schools in Osun State. As a result of this, the usage of instructional aids in the teaching of environmental concepts was found to be low among the students. It is therefore evident that inadequate usage of instructional materials had negative influence on students' knowledge towards environmental concepts.

Recommendation

From findings of this study, the following are recommended:

(i) Government should provide adequate instructional materials for the effective teaching and learning of environmental concepts in Physics curriculum in Osun State Secondary Schools

(ii) Government should support professionalism in teaching by organizing in-service training, workshops and seminars for teachers so as to keep them well-informed of latest development in the field of educational technology.

(iii) Government should ensure that teachers are trained and re-trained so as to be relevant concerning the ever-changing environmental condition of our planet as the content knowledge of teachers in the teaching of environmental concepts will go a long way in enhancing and creating adequate knowledge in students as regard pro environmental attitudes and knowledge they need in solving environmental issues as advocated in the 21st century Sustainable Development Goal

References

Adebimpe, A. O., Improvisation of Science Teaching Resource. Science Teachers Association of Nigeria (STAN) 40th Annual Conference Proceeding, 55-60 (2005).

Amodu F.R. & Adewole O. O., Towards Effective Teaching of Physics Through the Use of Relevant Instructional Materials. International journal of multidisciplinary sciences and engineering, 5 (3) (2014).

Asubiojo, R. O., Aladejana, A. L., Utilization of Instructional Materials by Physics Teachers and Students in Ekiti State Secondary Schools, Nigeria. *Journal of Research in Education and Society, 4(3),* 2141 – 6753 (2013).

Aina, J. K., "Importance of Science Education to National Development and Problems Militating Against Its Development." *American Journal of Educational Research, 1,* 225

229. doi: 10.12691/education-1-7-2 (2013).

Bassey, U., Science and Technology and Mathematics (STM) Education. As a Basis for Sustainable Industrialization. 43rd Annual Conference of Science Teachers Association of Nigeria (STAN). 111-113 (2002).

Beatrice A. A., Felicia, I. U. and Orji E. E., Effect Of Instructional Materials On Teaching And Learning Of Basic Science In Junior Secondary Schools In Cross River State, Nigeria. 14(1) 67-73 Dol http.//dxdor.org/gjedr.v/14:1.9 (2014).

Bowes, L. and Jaffee, S., 'Biology, Genes, And Resilience: Toward A Multidisciplinary Approach', Trauma, Violence and Abuse, 14(3), 18(2) (2013).

Daniel, U., LakhanLal Y., Theophile, M. and Jean., U., The impact of teaching approaches on effective physics learning: an investigation conducted in five Secondary Schools in Rusizi District, Rwanda *Rwandan Journal of Education* 4(2), 18(2) 62 – 68 (2018).

Eniayeju, I. E., Improvisation for Effective Learning of Physics: The Asaba. Education, Technical and Science Education Journal, 1 (1), 92-93 (2005).

Eshiet, I. T., Using Local Resources in Teaching. Journal of the Royal Society of Chemistry. London 25, 718-120 (2001).

Gideon, N., The future of education and skills education 2030 South Africa Journal of Higher Education, 31(2) (2017).

Jegede, S. A.., Awodun, A. O. and Olusola, O. O., Comparative Analysis Of Students' Achievement In Senior School Certificate Examination (SSCE) in Physics between 2007And 2012. International Journal of Engineering Research & Technology, 2(7), 2278 (2013).

Jegede S.A and Adedayo J.O., Enriching Physics Education in Nigeria Towards Enhancing
a Sustainable Technological Development. Greener Journal of Educational Research. (2013).

Jekayinfa, A. A. and Yusuf, A. R., Teachers' Opinions on the incorporation of environmental education in the Nigerian primary school curriculum. Educational Research and Review 3 (11), 334-338 (2008).

Kay, R.H. and knaack, L., An Examination of The Impact of Learning Objects in School. Journal of computer assist learning 24(6), 447-461 (2008).

Matthew, N. O, Tolulope, J. A, Abayomi, A. M and Sharan, M. M., Environmental Physics: An Introduction International Journal of Scientific Advances 2(1) 32-34 (2021).

Samuel, G. S., Students' Academic Performance In Physics, Chemistry And Biology, A Case Study Of Some Selected Secondary Schools In Fagge Local Government Area Of Kano State.Nigeria Unpublished thesis (2017).

Selman, A.S & Erkan, Y., Secondary School Student. Awareness of Environment Geographical Education Concepts Review of International Geographical Education, 10(3), 445-466 (2020).

Stohr, W., "Coloring a Green Generation: The Law and Policy of Nationally-Mandated Environmental Education and Social Value Formation at the Primary and Secondary Academic Levels," The Journal of Law and Education 42(1): 1-110 (2013).

Odeniyi, O.A and Saladin, Q.A., Impact of Instructional Aids On Students'Academic Performance In Physics In Secondary Schools In Federal Capital Territory (FCT) Abuja, Nigeria.. *European scientific Journal* 14(4) 1857-7881 (2018***).***

Okonkwo P., Impact of Instructional materials in teaching and learning of physics in senior secondary schools: a case study of some selected secondary schools in Onitsha educational zone Journal of Research in Education 5(1), 76 (2015).

Oladejo, M. A, Olosunde, G. R, Ojebisi, A. O. and Ishola, O. M., Instrumental Materials And Students Achievement In Physics: Some Policy Implications. *European Journal of Humanities And Social Sciences* 2(1) 114-124 (2011).

Orji, E. O. and Maekes, J. (2013). The Role of Education in National Development : Nigeria
Experience. European Scientific Journal, 9(28).1-4

Usman, K. O. and Adewunmi, A. O., Factors Responsible for Inability of Teachers to Improvise Instructional Materials for the Teaching of Physics. Journal of Science Teachers Association of Nigeria, 42 (1), 52-56 (2006).