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An Investigation into the Teaching of Physics in some Selected Senior Secondary Schools in Yewa South and Ipokia Local Government Area of Ogun State, Nigeria

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Abstract

The performance of physics students in Senior Secondary Schools has for years, been one of the nagging issues of our country educational system, thus undermining the performance of students in physics at external examination. Therefore, the study ascertained the methods used in the effective teaching of physics. The quantitative research was a survey consisting of a questionnaire that was completed by physics teachers and their respective students in senior secondary schools. The data were retrieved and analyzed using descriptive statistics. The study conceals the fact that the methods of teaching physics in senior secondary schools have an effect in the academic performance of students. It suggests that trained Physics teachers should be employed, more so; teachers should acquaint themselves with the best methods for teaching physics effectively.

Keywords: *Investigation, Teaching, Physics, Secondary schools*

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Background to the Study

According to Dewey (1916) Education is the process of facilitating learning; acquisition of knowledge, skills, values, beliefs and habits. Educational methods include storytelling, discussion, teaching, training and directed research. Teaching should encompass both instruction in procedures, a process to guiding students to the information they will need, and challenging them to engage in thinking about concepts they construct in their minds. All of these processes are needed in order to teach students to become fully functional thinkers. When teaching some common thinking operations which are special textual idiosyncrasies that each subject teacher should help students think about, for example tables in the science text (Practical work i.e. Physics practical) and relating illustrations and text in the history books (Robinson 1975).

As pointed out by Sam (2012), importance of physics cannot be over emphasized as it forms the basis for technological advancement of any nation. Physics plays a vital role in the development of any society, the teaching of physics in secondary school is intended to produce young scientists who would be able to design the technological devices that would make day to day activities easier and living more comfortable. Physics, which is found to be the bedrock of scientific and technological development worldwide in both developing and developed countries alike, it has some features which are generally acceptable besides, an array of performance, objective was also stated for each topic in physics. Ivowi (1993) emphasized some factors on the Senior Secondary School (SSS) Physics Curriculum content-

1. Understanding the concept: That is, ability to explain concepts and principles of physics topics
2. Functionality: That is, the use of functional equipment in order to expose students to the various processes and to enable them acquire relevant skills
3. Application: ability to apply concept learnt, skills acquired to relevant field.

Science that deals with the structure of matter and the interaction between the functional constituents of the observable universe while Physics is concerned with all aspects of nature on both the macroscopic and submicroscopic levels (Brown 2006). Science and technology are key drivers to any nation development because technological and scientific revolutions undergo economic advances improvements in health systems, education and infrastructure (Lee-Rayzor) technology as an instrument for accelerating development should receive special attention in national planning in the developing countries.

In their works, Betts, Zau and Rice (2003) explained that the minimum educational attainment of a physics teacher should be Bachelor's degree in Education, (B.Ed). In a related work, Askihia (2010) noted that teacher's qualification influences students' academic performance of the students. He observed also that teachers with B.Sc. though have the content knowledge but produced students with low mean scores.

The importance of secondary education in educational system cannot be over-emphasized. Apart from serving as the link between primary and tertiary education, it provides opportunity for a student to acquired additional knowledge, skills and traits beyond the primary level. A major factor that necessitates the acquisition of secondary education in Nigeria is that the education being provided at the primary level is proving to be insufficient

for a child to acquire permanent literary, communication and numeracy skills expected from him/her at the end of the training (Chinelo 2011, Ige 2011).

According to Murnane and Philips (1981), teachers experience on student learning in senior secondary school (SSS) have found a positive relationship between teachers' effectiveness and their year of experience, but the relationship observed is not always a significant or an entirely linear one. The evidence available suggested that while inexperience teachers are less effective than more senior teachers, the benefits of experience level off after a few years (Rivkii and Kain 2000).Davis (1997) suggests that the design and selection of teaching method must take into account not only the nature of subject matter but also how students learn. Teaching of Physics at SSS involves lectures with little student interaction, end-of-chapter problem solving and cookbook labs. Jan (2000).

The study investigates both teaching and learning of Physics in some selected Senior Secondary School in Yewa south and Ipokia Local Government Areas of Ogun state, Nigeria using the following research questions:

1. What is the pattern of interaction in physics classroom?
2. What instructional methods are used for teaching physics in SSS Two?
3. What is the extent of coverage of content of physics syllabus in SSS Two?

Literature Review

Survey from schools by Ajayi (2007) revealed that inadequate teaching materials and laboratory equipment, poor teaching method and poor science curricula among others were factors affecting the teaching of Physics. According to Anago (1990) students' poor performance in physics globally is basically due to lack of involving the students in teaching and learning activities, lack of materials and qualified personnel as well as insufficiency of laboratories materials also inability to cover the syllabus and course content. The impact of teachers in the performance of students is germane.

While advocating activities oriented method for teaching physics, Nwagbo (2001) explained that ignorance of teachers and neglect of activity oriented methods by teachers grossly contribute to student's low performance in physics. According to him, it is one thing is to be grounded in conceptual understanding of a subject another is to be well acquitted with the best method to pass the concept across to learners for proper comprehension. In this regard, professional teachers are desirable.

Though Okorodudu (2011) and (Adeyemi 2012)noticed that inadequacy of teachers is noticeable mostly in the core subjects such as English language, mathematics, French and sciences and that the inability of teachers to show commitment to teaching in schools is attributed to indiscipline in school, Sunday (2010) believed that if there is genuine and helpful interaction between the teacher and students, the student will be able to express their minds on what they find difficult in physics topics to their teacher and thereby reduce the difficulties encountered.

Another issue in this line is inappropriate teaching method used by physics teaches which is capable of causing low performance of student, (Owolabi and Oginni 2013).Jegede and

Adebayo (2013) suggested that physics teachers should use appropriate teaching methods that are relevant to their students. According to them, no method is the best, the teacher needs to study their students and identify the best teaching method for them. Teacher needs to encourage the students by making physics interesting and captivating to them. This idea was supported by Darling (2000).

Methodology

The research design for this study is descriptive survey design. This design was considered most appropriate since questionnaire was the main instrument used for data collection from the segment of the population of interest. Survey is more economical since many subjects can be studied at the same time (Mitchell and Jolley 2004). Also, finding from the study can be generalized for the entire population.The instrument used is questionnaire. The questions were designed for both teachers and students and it was structured according to how both the teacher and student perform in physics class. The sample selection was limited to twenty (20) senior secondary school and twenty (20) teachers in each schools. In each schools, students were randomly selected. This brings the total of two hundred student and twenty physics teachers that were selected from all the schools.

Permission was sought from the Head of department by collecting official letter to all schools where the questionnaire would be administered. The data was collected through the personal administration of questionnaire by the researcher himself to Physics students of different secondary schools and physics teachers comprising of both public secondary schools and private secondary schools. The main instrument used for data collection for the study is questionnaire. Two forms of both open and closed ended questionnaire (teacher's questionnaire and student's questionnaire) were developed and used for data collection. The teacher questionnaire consists of teacher's qualification, years of teaching experience, method of teaching, pattern of interaction and topic covered. Similarly, the students' questionnaire consists of gender of the student, student's age, and appropriate teaching method, subject covered most by teachers, pattern of interaction and topic covered.

Results and Discussion

Research Question 1: What is the Pattern of Interaction in Physics Classroom?

Pattern of Interaction	**Teachers (%)**	**Students (%)**
Students have a say in the teaching learning process	65.0	70.0
Only the teacher teaches while the students learn	35.0	30.0
Total	**100.0**	**100.0**

Table 1: Showing the pattern of teaching Observed

On the pattern of interaction in physics classroom as suggested by both teachers and students' participants. 65% and 70% of teachers and students respectively agreed on students should have a say in the teaching and learning process while 35% and 30% of both agreed that only the teacher teaches while the students learn. The table reveals that there is equal opinion from both end and the majority agreed on students having a say in the teaching and learning process. This is in congruence with Jegede and Adebayo (2013) who are of the opinion that

physics teachers should use appropriate teaching methods that are relevant to their student. They said no method is the best, the teacher need to study their student and identify the best teaching method for them. Teacher needs to encourage the students by making physics interesting and captivating to them. Their relationship with the students everywhere should not scared them away but rather draws their interest towards the study of physics. It is also in-line with Sunday (2010), who alluded that there should be interaction between the teacher of physics and the student. In this case, it is believed that it is genuine and helpful interaction between the teacher and students, the student will be able to expose their minds and what and when, they find difficult in physics topics to their teacher and thereby reduce the difficulties encountered.

Research Question 2: What instructional methods are used for teaching physics in SSS Two?

Teaching methods	**Teachers (%)**	**Students (%)**
Lecture	10.0	5.5
Discussion	15.0	17.0
Interactive and Demonstration	60.0	64.5
Lecture and Discussion	15.0	13.0
Total	**100.0**	**100.0**

Table 2: On instructional methods Appropriate for SS2 Physics

On the method of teaching as agreed upon by both teachers and students' participants, 10% and 5.5% of teachers and students respectively agreed on Lecture method respectively; 15% and 17% of teachers and students respectively agreed on Discussion method respectively; 60% and 64.5% of teachers and students respectively agreed on interactive and demonstration method and 15% and 13% of both teachers and students agreed on Lecture and Discussion method. This shows that there is similar opinion from both teachers and students. Hence Interactive and demonstration method takes the lead which agrees with Redish and Stemberg (1999) who are of the view that most acceptable method of teaching Physics which changes student's position from passive to an active one is the Interactive and Demonstration method.

Research Question 3: What is the extent of Coverage of content of Physics syllabus in SSS Two?

Table 3a: First Term Subject Coverage level$x$=mean; δ=standard deviation, WC: (well covered) AC: (averagely covered) and NC: (not covered)

S/N	Subject	Teachers					Students					Remarks
		WC	AC	NC	$\bar{x}$	δ	WC	AC	NC	$\bar{x}$	δ	
1.	Concept of Position, Distance and Displacement in relation to X - Y plane.	20	0	0	3.00	.00	175	15	10	2.83	.49	Positive
2.	Scalar and Vector quantities	20	0	0	3.00	.00	164	31	5	2.79	.46	Positive
3.	Derivation of Equation of linear motion	20	0	0	3.00	.00	136	56	8	2.64	.56	Positive
4.	Projectile and its Application	20	0	0	3.00	.00	121	67	12	2.55	.61	Positive
5.	Newton's laws of motion	19	1	0	2.95	.22	115	68	17	2.49	.65	Positive
6.	Equilibrium of forces	15	5	0	2.75	.44	91	87	22	2.35	.67	Positive
7.	Equilibrium of forces	17	3	0	2.85	.37	81	92	27	2.27	.69	Positive
8.	Simple Harmonic Motion (SHM)	14	6	0	2.70	.47	89	87	24	2.33	.68	Positive
9.	Concept of Position, Distance and Displacement in relation to X - Y plane.	6	13	1	2.25	.55	88	62	50	2.19	.81	Positive

Table 3b: Second Term Subject Coverage level x = mean; δ=standard deviation, WC: (well covered) AC: (averagely covered) and NC: (not covered)

S/N	Subject	Teachers					Students					Remarks
		WC	AC	NC	$\bar{x}$	δ	WC	AC	NC	$\bar{x}$	δ	
1.	Heat Energy	16	4	0	2.80	.41	137	35	28	2.55	.73	Positive
2.	Specific Heat Capacity	18	1	1	2.85	.49	112	75	13	2.50	.62	Positive
3.	Heat Capacity and specific Heat capacity	16	4	0	2.80	.41	50	128	22	2.14	.59	Positive
4.	Evaporation, Boiling and melting points	13	7	0	2.65	.49	82	89	29	2.27	.70	Positive
5.	Latent Heat	10	10	0	2.50	.51	108	59	33	2.38	.75	Positive
6.	Vapour Pressure	18	2	0	2.90	.31	122	69	9	2.57	.58	Positive
7.	Gas laws	20	0	0	3.00	.00	148	37	15	2.67	.61	Positive
8.	Production and propagation of wave	17	3	0	3.00	.00	105	66	29	2.38	.73	Positive
9.	Properties of Waves	17	3	0	2.85	.37	109	69	22	2.44	.68	Positive
10.	Light Waves	10	10	0	2.50	.51	86	90	24	2.31	.68	Positive
11.	Refraction of light	5	15	0	2.25	.44	76	90	34	2.21	.71	Averagely covered

Table 3c: Third Term Subject Coverage level x = mean; δ=standard deviation, WC: (well covered) AC: (averagely covered) and NC: (not covered)

S/N	Subject	Teachers					Students					Remarks
		WC	AC	NC	$\bar{x}$	δ	WC	AC	NC	$\bar{x}$	δ	
1.	Glass Prism	18	2	0	2.90	.31	90	56	54	2.18	.83	Positive
2.	Lenses	17	3	0	2.85	.37	119	61	20	2.45	.67	Positive
3.	Optical Instruments	18	2	0	2.90	.31	74	110	16	2.29	.61	Positive
4.	Optical Instruments	15	5	0	2.75	.44	68	120	12	2.28	.57	Positive
5.	Dispersion of white light	9	11	0	2.45	.51	76	81	43	2.17	.76	Positive
6.	Sound wave	3	14	3	2.00	.56	34	100	66	1.84	.69	Averagely covered
7.	Resonance	0	18	2	1.90	.31	23	54	123	1.50	.70	Not covered

The extents of physics content coverage in Physics First Term Academics session of the SS2 students. This opinion above was all receive positive response from both teachers and students' respondents. Therefore, we can deduce from the present's table that the content of physics content was well covered by the teachers and students in the selected schools in first term.

On the extents of physics content coverage in Physics Second Term Academics session of the SS2 students. This opinion above didn't receive positive response from both teachers and students' respondents. Therefore, we can really deduce or generalize statement for both teachers and students. From the present's table content of physics content were averagely covered by the teachers and students in the selected schools in first term by item 11 (refraction of lights); item 1-10 on the table shows that the students opined that the content of physics are averagely covered while the teacher opined that it was well covered expect for item 5 (latent heat) which was opined averagely covered by the teachers.

The level of coverage for the physics content in third term, the teachers opined from item 1-5 that the content is well covered while the students opined that the content was averagely covered. There was equal opined by both teaches and students on item 6 and 7 (sound wave and resonance) that it was averagely covered. Hence it is in-line with Darling Hammond (2000) who opined that physics content in his research that indicates greater student gains in learning are associated with better-prepared teacher. The content covers a wide range of activities such as Experiments, Demonstrations and Scientific inquiry skills designed to bring out the resourcefulness and ingenuity of the physics student.

This points out to the fact that Physics contents were not well covered which is in congruence with Darling (2000) who said that physics content in his research that indicates greater student gains in learning are associated with better-prepared teacher. The content covers a wide range of activities such as Experiments, Demonstrations and Scientific inquiry skills designed to bring out the resourcefulness and ingenuity of the physics student.

Conclusion and **Recommendations**

In view of the analysis of result, findings and conclusion on the study, the following recommendations were made:

1. Teacher should by as much as possible to make use of resources available around them i.e. Laboratory equipment, textbook etc. to make the students understand what they are been taught. They should take individual difference into consideration, use the best appropriate method and always have patient to teach the students to understand.
2. Students that do not have interest in science courses should not be forced to study physics because they are the ones that perform woefully. The teacher should encourage the students by organizing different quiz competition within and outside the school.
3. The heads of departments and teachers should take into consideration the contents in a particular topic and the treatment duration of physics topics when time on the school timetable to senior secondary school two for easy coverage of the syllabus. So therefore, this research work is recommended to those offering science subjects most especially physics in senior secondary school or higher school of learning.

4. Practicing physics teachers should undergo in service training such as seminars, post graduate diploma course in education to effectively discharge duties. More also Government should encourage the professional teachers in physics through incentive and science allowances.
5. Government in collaboration with the ministry of Education should intensify their effort at educating physics teachers in senior secondary schools attending conferences, workshops and seminars so that they can have access to current information (PERE) physics education research finding that will enhance the teaching and learning of physics

References

Adeyemi, T. O. (2012). School variable and internal efficiency of Secondary School in Ondo State *Nigeria Journal of Education. Secondary. Res 2(3): 203-204)*

Ajayi, P.O (2007). Evaluation of the implementation of Senior Secondary School Physics curriculum in South West Nigeria (Unpublished Ph.D thesis 617) University of Ado-Ekiti Nigeria. *International Journal of Innovative Science, Engineering and Technology.2(6)*

Anago, M. (1990). Basic science laboratory with practical suggestion and procedure Lagos hinder, 50 -53. *International Journal of Innovative Science, Engineering and Technology Vol.2(6) 2015*

Asikhia O. A. (2010) Students and teachers' perceptions of the cause of poor Academic Performance in Ogun State Secondary School (Nigeria). *European Journal of Social Science 13, 2 (2010).*

Bahgl, V. (2012). *Physics in Environment Engineering I.lnislovak Hyzika I.I.* Environment lnzineirzive I. University textbook. Tuzuoen

Becky, I.D., Vesternin, T., Gregory, W.C, Alexander, W. Rivers, & Marisa, Z. R. (2011*). Derivation of genetic interaction networks from quantitative phenotype data ©2011.* American Physical Society.

Belts, J. Z. & Rice, L. (2003). Determinants of student achievement. *A Journal of Nigeria Council of Educational Psychologists. 2(1) 86 - 92*

Birk, H. A. (2011). The effect of teaching method on students' economics of education. *Journal of College Science Teaching. 23(5) pp 286 - 290*

Central Bank of Nigeria (2010). *Statistical Bulletin*. Abuja, Nigeria Federal Government press.

Chinelo, O.A. (2011).f alling standard in Nigeria Education, traceable to proper skills Acquisition in schools. *Journal of Africa studies and Development 5(pp 1 -9)*

Davis, P. (1997). What teachers need to know about teaching methods? *Reading Research Quarterly 3(4), pp 499 - 545*

Dermott, M.C. (2013). Teaching physics figuring out what method to use in physics. *Journal of Physics Education class 4(5) pp 472 – 491*

Dewey, J. (1916): Democracy and education. *Journal of Engineering Education. 90(1) pp 123 - 130*

De-Snipisheus, S.A. (2000). Some effective teaching method. Journal of Education Research and Technology 6(1), pp 116 119

Dictionary.com (2016). *Unabridged*. Based on the Random House Dictionary © Random House, Inc.

Ehiamatelor, E.I. (2011). *School facilities management in Nigeria*. Current Issues in Management Benin: Uniben press

Farinde, O.E. Ehimetalor, H.E & Dada, S.K. (2000). *Essential Physics for senior secondary schools*. Second Edition August 200. ISBN 978—89-X

FCI Research (2012). Interaction methods of teaching physics of technical Universities. *Journal of Information in Education 13(1) PP51 – 71.*

Federal Ministry of Education (2003). *Education sector status Report.* Abuja: Nigeria Federal Government press.

Gajtanska, M. N., Krisak M.I. (2012). Physics in environmental. *Journal of engineering Education 11(2), pp 121 - 131*

Hager, W.R. (1974). An investigation of verbal behaviour and learning climate in undergraduate engineering classroom. *Journal of Research in Science Teaching. 11(2), 121-131.*

Henry, G., Scolt, R. (2016). *A Greek-English Lexicon at the perseus project*. http://serc.certeton.edu/10415.1780March18,2016

Ige, A.M. (2011): Myths and realities of falling standard of education in Nigeria. The way forward. *Journal of African studies and Development* 5(1), *pp 1 - 9*

Ivowi, O.A. (1993). Effects of instruction resources on the academic achievement. *Journal of Education Research and Technology. 1*(1), *pp 99 - 111*

Jegede, S.A. & Adebajo, J.O. (2013). Enriching physics education in Nigeria towards enhancing a sustainable technology development. *Journal of Education Research* 3(2), *pp 80 – 84*

Laurie, M B. (2006). Models for Value-added modeling of teacher effects. *Journal of Educational and Behavioural statistics.*. 29(1), *pp 67-101*

Lee – Roy, I. (2012). The role of Science and technology in the developing world. *Review of Educational Research, 73(1), pp 88 - 122*

Murmane, R.J. & Philips, B. (1981). Learning by doing, Vintage and selection: Three pieces of the puzzle relating teaching experience and teaching performance. *Economics of Education Review 1 (4), 453 – 465.*

Nwagbo, F.O. (2001). The effect of guided inquiry and lecture method on student's performance global. www.globalacademic.journal.

Obioma, G. (2010). The new 9 years basic, Education curriculum and the newly approved Senior Secondary School Curriculum structure speech Delivered by Executive Secretary Nigerian *Educational Research and Development Council (NERDC). 1(2) pp 5 - 12*

Okafor, L.C. (1993). *Analysis of classroom interaction pattern in Biology in secondary School in Anambra State.* Unpublished Ph.D Thesis, University of Nigeria Nsukka.

Okorodudu, R.I. (2011). Innovation in teaching and learning experience *Educ. Psgchol.5(1) pp2-12.*

Onich et al (2010). Influence of Physics teachers' qualification in the performance of students in external examination. *Research and Analytical project 9(11) PP. 4 - 11*

Owolabi, O.T. & Oginni, O.I. (2013). Assessing the relative effectiveness of three teaching method in the measurement of students' performance in physics. *International Journals of Material, Methods and Technology, 1(4) pp 116-125.*

Redish, E.F. & Steinberg, R.N. (1999). Effect of Physics teaching in Senior Schools. *International Journal of educational Research. 5(2) pp 24 – 30*

Riukin, S.G. & Kain J.F. (2000) Teachers, Schools and academic achievement (working paper 6691, revised) Cambridge MA: National Bureau of Economic Research

Skinner, H.A. (2011). Does problem based learning create a better student A Reflection? Paper presented at the 2nd Asia pacific conference in problem. Based learning. *Education Across Discipline. 4(6) pp 201 – 222*

Sunday, A .A (2010). Analysis of classroom interaction pattern in physics in secondary school. *International Journal of Educational Research and Technology. 1(1) pp 99 -111*