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LABORATORY RESOURCE FACTORS AND FREQUENCY OF PRACTICAL ACTIVITIES AS CORRELATES OF SECONDARY SCHOOL STUDENTS' ACHIEVEMENT AND INTEREST IN PHYSICS IN OYO STATE, NIGERIA

BY

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## ABSTRACT

*The study investigated laboratory resource factors and frequency of practical activities as correlates of Secondary School Students' Academic Achievement and Interest in Physics in Oyo State. This study adopted descriptive survey of correlational type. A sample of seven hundred and sixty (760) Students and nineteen (19) Physics teachers were used for the study. Nineteen Schools were randomly selected from three randomly selected Local Governments Areas in Oyo North – senatorial district. Five research questions were raised to guide this study. The four instruments used for data collection were Physics Laboratory Equipment Checklists (Physic Laboratory Equipment Availability, Adequacy and Utilization Checklists,  $r = 0.76$ ); Frequency of Practical Activities Questionnaire (FPAQ,  $r = 0.73$ ); Physics Students Interest Questionnaire (PSIQ,  $r = 0.81$ ); and Physics Achievement Test (PAT,  $r = 0.88$ ). Data collected from the study were analyzed using frequency counts, simple percentage, mean, standard deviation and Pearson product correlation coefficient with the use of Statistical Package for Social Sciences (SPSS). The results were interpreted at  $p < 0.05$  level of significance. The results revealed that laboratory equipment are available in schools but not adequately provided; it was also revealed that level of utilization of Physics laboratory equipment was low; it was also revealed that there is high relationship between Frequency of Practical Activities and Students' Academic Achievement in Physics; and lastly there exist insignificant relationship between Frequency of Practical Activities and Students Interest in Physics. Based on the findings of this study, it was recommended that government should make adequate provision of laboratory resources for school offering Science subjects and Physics in particular.*

**Key words:** *Laboratory resource factors, Practical activities, Achievement, Interest.*

## INTRODUCTION

The importance of Science cannot be over emphasized as it forms the basis for technological advancement of any nation (Nigeria inclusive).

Knowledge of science and technology is therefore a requirement in all countries and needed by all people globally due to numerous challenges that are facing them. These challenges include emergence of new drug resistant diseases, effects of genetic experimentation and engineering, ecological impact of modern

technology, dangers of nuclear war and explosions and global warming among others (Alsop and Hicks, 2001).

According to Chiappetta, Koballa and Collete, (2002) Science is defined as an enterprise for the application of scientific knowledge (human pursuit of understanding of living and non-living aspects of the universe). Critical analysis of the above definition of science suggests the inquiry nature of science (physics in particular) as it emphasizes the practical nature of science since the subject cannot be meaningfully understood without the students' active participation which necessitates laboratory activities.

Physics being a branch of science is crucial for effective living in the modern age of science and technology. Given its application in industry and many other professions, it is necessary that every student is given an opportunity to acquire some of its concepts, principles and skills (FME/NERDC, 2009). The general objectives of the Physics Curriculum at secondary school level of education as itemized by FME/NERDC, (2009) are:

- To provide basic literacy in Physics for functional living in the society;
- To acquire basic concepts and principles of Physics as a preparation for further studies;
- To acquire essential scientific skills and attitudes as a preparation for technological application of Physics; and
- To stimulate and enhance creativity.

The above stated objectives cannot be achieved without a well-equipped laboratory and the proper utilization of the available laboratory equipment/resources since Physics is a subject that can only be understood by students' through their active participation. Physics curriculum in Nigeria also

emphasizes activity-based learning and child centered learning. This places a great demand on laboratory space, equipment and resourcefulness of the teacher.

Laboratory resources refer to the material assets which need to be acquired, planned, directed and coordinated in order to promote the quality of science teaching and learning in schools. Consequently laboratory resource factors are those things that influence laboratory resources which includes availability of laboratory resources, adequacy of laboratory resources, and level of utilization of laboratory resources among others. Physics laboratory resources/equipment are those instructional materials in the form of scientific equipment and materials found in physics laboratories which are used for laboratory or practical work in physics. Laboratory or practical works in physics are those contacts or interactions of students with scientific equipment and materials which make direct contributions towards understanding or learning of physics concepts. Physics Laboratory equipment is an inevitable tool in effective teaching and learning of physics.

The importance of an adequately equipped physics laboratory is fundamental given the inquiry – oriented learning approach that characterized physics as a school subject. It is only when concrete learning objects are available for students to interact with among themselves that meaningful learning can occur. In the absence of relevant instructional facilities, learners at best resort to rote learning. Bandele (2003) noted that the importance of physical facilities cannot be relegated. Facilities like modern laboratories, libraries and classrooms are to be put in place in all our schools. Studies conducted by Ayodele (2000) and Vandiver (2011) showed that a positive relationship exists between availability of facilities and student academic performances. In a study conducted by Ibrahim (2013),

he found out that there exist significant relationship between availability of laboratory equipment and students' performance in practical activities in science subject. The study by Alimi, Eniola and Alabi, (2012) revealed a significant difference in facilities available between public and private schools in Ondo State. It however revealed no significant relationship in academic performance of students in the two types of secondary schools.

Availability of laboratory facilities contributes to good academic performance of students. Therefore, it is highly essential and important that all secondary schools have well equipped laboratories in order to ensure that science is realistically taught and understood by the students. In the view of Adeyemo (2012), adequate provision of laboratory facilities plays a significant role in boosting students' achievement in physics, and that physics is more learnt and understood by doing. Physics laboratory equipment must not only be adequately provided in schools, but must be optimally utilized for effective teaching of physics by physics teachers and for meaningful learning of physics by the students. Unfortunately, this does not seem to be the case judging from several research reports [Ajetumobi and Bashorun, (2000); Oladare, Abiodun and Bajulaiye, (2006)], which indicated that man and material resources for effective teaching and learning of science subjects are grossly inadequate in most secondary schools in Nigeria. The findings of Olatunbosun (2008), shows that laboratory adequacy affect the performance of students. This is true as students tend to understand and recall what they see more than what they hear.

When resources are available and skillfully utilized, they influence learning and making it more meaningful. Resources in education are very vital because they aid teaching and learning (Alimi, Eniola and Alabi, 2012). The indispensability of resource materials for teaching physics cannot be overemphasized.

Empirical studies have established that students achieve greater learning as evidenced in acquisition of cognitive and psychomotor skills when resource materials are used for instructional purpose (Ifeakor, 2005). Onah and Ugwu (2010) found out that effective utilization of laboratory equipment have high significant effects on performance of students in physics at secondary school level. Similarly, Bello (2012), also found out that there is significant relationship between effective utilization of Physics Laboratory Equipment and the academic achievement of students. The findings of Achimugu (1998) shows that many schools that are rich in equipment are experiencing non-utilization and underutilization of the equipment and Stephen (2011), also reported that there is a low frequency of use of the available resource materials in the teaching and learning of physics.

Interest is one of the most effective steps in the realization of any activity. It is a gearing factor in the pursuance of every activity. Abubakar (2013) cited Ibrahim (2010) as saying that interest of an individual serves as the sailing boat of one's roles in the whole life span. This is because it is the interest that makes the person aspires, decides, established and developed in terms of choice thereby attaining to the peak of maturity in learning. Consequently, students function better and are more productive as well as derive personal satisfaction when they engage in such subject of their interest.

Being a science subject, effectiveness of teaching physics should be judged by the kind of practical activities that teachers and students were engaged (Oyoo, 2004). Hermit, (2007) was of the view that, if a child is interested in the subject matter, he will learn more. Therefor students' interest is very germane to the choice of subject of study and it must not be overlooked in schools during the course of instruction.

Amadalo, Ocholla, and Memba, (2012) was of the view that practical work increases students' motivation and interest for learning physics. Onah and Ugwu, (2010) found out that school location and interest of students had no significant effects on performance in physics.

According to Seweje (2000), laboratories have been found to be scientist workshops where practical activities are conducted to enhance meaningful learning. Using adequate and suitable laboratory equipment to teach Physics in secondary schools will help to improve the academic achievement and interest of learners. Therefore, this study is a complementary work to the previous studies; that focuses on the laboratory resources factors and frequency of practical activities as correlates of secondary school students' academic achievement and interest in physics.

## STATEMENT OF THE PROBLEM

The frequent occurrence of poor academic achievement of secondary school students in physics in public examinations has been a source of concern to stakeholders in education sectors over the years. Several factors have been reported to be responsible for the poor academic achievement recorded in physics some of which includes; non- availability of laboratory equipment, non - utilization of the available equipment, low level of practical activities and poor students interest towards the subject. The role of laboratory related factors as it influences academic achievement of physics students' has been the focus of the major researches with exception of the role that laboratory resource factors and frequency of practical activities play on students' academic achievement and interest in physics. It is therefore, against this background, that this study seeks to investigate laboratory resource factors and frequency of practical activities as

correlates of secondary school students' academic achievement and interest in physics.

## RESEARCH QUESTIONS

The following research questions were put forward to guide the study:

1. To what extent is Physics Laboratory Equipment available for the teaching and learning of Physics?
2. How adequate are the available Physics Laboratory Equipment in the teaching and learning of Physics?
3. To what extent are the available Physics Laboratory Equipment utilized in the teaching and learning of Physics?
4. What is the relationship between frequency of practical activities and students' academic achievement in Physics?
5. What is the relationship between frequency of practical activities and students' interest in Physics?

## METHODOLOGY

### Research Design

This research adopted descriptive survey of correlational type because it is concerned with determining or measuring the degree of relationship between two or more variables for the purpose of making predictions about relationships. A correlational survey study includes all research projects in which an attempt is made to discover or clarify relationship between variables through the use of statistical method. This survey enables a researcher to ascertain the extent to which variations in one variable are associated with variables in another.

The justification for adopting the correlational design for this study therefore is that, it permits one to measure a great number of variables and their interrelationship simultaneously. In this study the variables of interest are: availability of laboratory equipment, adequacy of laboratory equipment, utilization of laboratory equipment, and frequency of practical activities as independent variables while students' academic achievement and interest in physics are dependent variables.

### Population

The population of the study is made up of all Physics teachers numbering 115 and all senior secondary schools students' offering Physics in Oyo North Senatorial District numbering 45,501 while the target population is all SSS2 students offering physics and their total is 14,550 students (Tescom Zonal Office, Shaki).

### Sample and Sampling Techniques

The sample for the study consisted of all the Physics teacher(s) of each school and Senior Secondary School 2 (SSS2) Physics students in all the selected schools. Nineteen schools were randomly selected from three Local Governments Areas in that region to form the sample for this study. Nineteen (19) Physics Teachers participated in this study while forty (40) SSS2 physics students were randomly selected in each school to participate in the study. This amounts to seven hundred and sixty (760) students that participated in the study.

### Instrument for Data Collection

Four instruments were used for data collection which includes: The Checklist on Physics Apparatus i.e. Physics Laboratory Equipment Availability, Adequacy and Utilization Checklist (PLEAAUC). This was validated by

experts in the Department of Teacher Education of University of Ibadan, with reliability of 0.76. The second instrument was Frequency of Practical Activities Questionnaire (FPAQ). This was designed by the researchers and has a reliability of 0.73 using Cronbach alpha coefficients of reliability. The third instrument was Physics Achievement Test (PAT). This consisted of twenty five structured questions on physics topics. The reliability of this instrument was determined using Kuder Richardson formulae (Kr 20) and a reliability of 0.88 was obtained. The fourth instrument was Physics Students Interest Questionnaire (PSIQ). This was adapted from the work of Adeniji (2015). Its reliability was estimated to be 0.81

### Procedure for Data Collection

The instruments designed for the study were administered to the respondents by the researchers. The respondents were assured of the confidentiality of their response; as such they were implored to be honest in providing answer to each question of the questionnaire, since the information being supplied was for research purpose only. The instruments were administered to the respondents the same day and after one hour, it were retrieved back for analysis.

### Method of Data Analysis

Data collected were analyzed using descriptive statistics of frequency counts, simple percentage, mean and standard deviation, since the nature of the study demand percentage count to determine the level of availability, adequacy and utilization of physics laboratory resources and the level of relationship between the variables was measured using Pearson-product moment correlation coefficients ( $r$ ).

## RESULTS

The results of the findings are presented as follows

**Table 1:** Shows the Availability, Adequacy and Level of Utilization of Physics Laboratory Equipment

S/N	Availability		Adequacy		Utilization	
	Available	Not Available	Adequate	Not Adequate	Used	Not Used
Frequency count	1,046	569	560	1055	878	737
Percentage (%)	64.77	35.23	34.67	65.33	54.37	45.63
<b>Total</b>	<b>1615</b>		<b>1615</b>		<b>1615</b>	

**Research Question 1:** To what extent is Physics Laboratory Equipment available for the teaching and learning of physics?

The table 1 above shows the availability of Physics Laboratory Equipment in percentage. From the table, the frequencies of the available equipment were recorded to be 1,046 which amount to 64.77%. Likewise the frequencies of 569 which amount to 35.23% were recorded for non-availability of physics laboratory equipment. Looking at this result, a likely question that comes to one's mind is that are these equipment available in right proportion? The next research question will provide answer to this.

**Research Question 2:** How adequate are the Physics Laboratory Equipment in the teaching and learning of Physics?

The table 1 above shows the level of adequacy of the physics laboratory equipment. Going by the table values 1055(65.33%) of the equipment in the physics laboratory in the sampled schools are not adequately

provided while 560(34.33%) equipment seems to be adequate. Out of the nineteen schools visited only six of the schools have separate laboratory for physics practical while the remaining thirteen schools have single purpose laboratory i.e. they all use one single laboratory for all science subjects.

**Research Question 3:** To what extent are the available Physics Laboratory Equipment utilized in the teaching and learning of Physics?

The table 1 above shows the level of utilization of the available physics laboratory equipment in percentage. On the whole the physics laboratory equipment was used on the average level in accordance with the information obtained on the table as shown above. The overall level of utilized equipment is 878(54.37%) while the overall level of not utilized equipment is 737(45.63%).

**Research Question 4:** What is the relationship between frequency of practical activities and students' academic achievement in Physics?

**Table 2:** Relationship between Frequency of Practical activities and Students' Academic Achievement in Physics

Variable	N	Mean	SD	R	P	Remark
Frequency of practical	19	20.84	6.47	.767	.032	Sig.
Physics Achievement	760	36.71	18.46			

P < 0.05 level of significant

Table 2 presents relationship between frequency of practical activities and students' academic achievement in Physics. The table revealed that frequency of practical activities have high positive relationship with students' academic achievement in physics ( $r = 0.767$ ;  $p < 0.05$ ). The result implies that the more frequent practical

activities the better the students' academic achievement in physics.

**Research Question 5:** What is the relationship between frequency of practical activities and students' interest Physics?

**Table 3:** Relationship between Frequency of Practical activities and Students Interest in Physics

Variable	N	Mean	S. D	R	P	Remark
Frequency of practical	19	20.84	6.47	.621	.083	Not Sig.
Students' Interest	760	61.74	14.37			

$P < 0.05$  level of significant

The table 3 above presents the relationship between frequency of practical activities and students interest in Physics. The table indicated that frequency of practical activities have high positive relationship with students' interest in physics ( $r = 0.621$ ;  $p > 0.05$ ) but not statistically significant. This implies that the frequency of practical activities not withstanding might not influence students' interest in physics, considering other variables like availability and adequacy of laboratory equipment.

## DISCUSSION OF FINDINGS

**Research Question 1:** To what extent is Physics Laboratory Equipment available for the teaching?

The result on the availability of Physics laboratory equipment in schools revealed that physics laboratory equipment are available in secondary schools in Oyo State as presented in percentage in the table 1 above. Based on the weighted average percentage, it could be observed that 1046(64.77%) of the equipment are available and 569(35.23%) of the equipment were not available. This finding supported Adesola (2005) who found out that the level of available resources is indeed a plus to the teachers and goes to show the level of ingenuity and commitment of the teachers toward

effective delivery of lesson. This result goes in contrary to that of Ibrahim (2013) who found out that most of practical equipment are not available in secondary schools.

**Research Question 2:** How adequate are the Physics Laboratory Equipment in the teaching and learning of Physics?

The result on the level of adequacy of the physics laboratory equipment revealed that the physics laboratory equipment though present in the schools, were not adequately provided. Going by the table values, 1055(65.33%) of the equipment in the physics laboratory in the visited schools are not adequately provided while 560(34.67%) seems adequate. This result is supported the findings of Ajetumobi and Bashorun (2000) and Oladare, Abiodun and Bajulaiye (2006) which indicated that man and material resources for effective teaching and learning of science subjects are grossly inadequate in most secondary schools in Nigeria.

It is worthy of note that, out of the nineteen schools visited, only six of the schools have separate laboratory for physics practical while the remaining thirteen schools have single purpose laboratory. That is,

they all use one single laboratory for all science subjects. In the same vein, the adequacy level of the available laboratory equipment was evaluated using the West Africa Examination Council (WAEC) standard for a class of fifty students. Hence simple proportion was used to compute the adequacy of the available equipment in each of the school surveyed with respect to the number of physics students in each class.

**Research Question 3:** To what extents are the available Physics Laboratory Equipment utilized in the teaching and learning of Physics?

The results on the level of utilization of the available physics laboratory equipment revealed that the level of utilization of the available equipment is slightly above average as shown in percentage. On the whole the physics laboratory equipment was utilized on the average level in accordance with the information obtained in the table 1 as shown above. The overall level of utilized equipment is 878(54.37%) while the overall level of not utilized equipment is 737(45.63%). The result implies that the more the level of utilization of physics laboratory equipment the better the students' academic achievement in physics. This contradicts the finding of Achimugu (1998) who discovered that many schools that are rich in equipment are experiencing non-utilization and underutilization of the equipment and that of Stephen (2011), who reported that there is a low frequency of use of the available resource materials in the teaching and learning of physics.

**Research Question 4:** What is the relationship between frequency of practical activities and Students' Academic Achievement in Physics?

The result on the relationship between frequency of practical and students' academic achievement in physics revealed that frequency of practical activities have high positive relationship with

students' academic achievement in physics ( $r = 0.767$ ;  $p < 0.05$ ). The result implies that the more frequent practical activities the better the students' academic achievement in physics. This result supported Ibrahim (2013), who discovered that there exist significant relationship between the frequency of laboratory activities and students' performance in science subjects. This is also similar to that of Amadalo, Ocholla and Memba, (2012), which identified practical work as an influencing agent in the process of learning physics.

**Research Question 5:** What is the relationship between frequency of practical activities and students' interest in Physics?

The result reveals that there is high positive relationship between frequency of practical activities and students interest in physics ( $r = 0.621$ ;  $p > 0.05$ ) but not statistically significant. This implies that the frequency of practical activities notwithstanding did not influence students' interest in physics, considering other variables like availability and adequacy of the available laboratory equipment. This result goes contrary to that of El-Rabadi (2013) who states that laboratory work positively affects students' scientific attitudes/interest, thought and mental faculties and that of Amadalo, Ocholla, and Memba, (2012) that practical work increases students' motivation and interest for learning physics.

## CONCLUSION

The study revealed that laboratory equipment was available to some extent in the secondary schools. However, they are grossly inadequate in the schools, that is, the quantity which is required to meet the students' population for effective practical activities were not available. From the findings, the study concluded that proper utilization of laboratory equipment will enhance good academic achievement and



interest in physics in Oyo State because from the findings, it was observed that dependent and independent variables have positive relationship with each other. More provision of laboratory equipment, proper utilization of the available laboratory equipment and frequent conduct of practical activities leads to positive relationship on students' academic achievement and interest in Physics.

## RECOMMENDATIONS

In view of the findings of this study, the following recommendations were put forward:

1. Federal Government and Ministry of Education in various States of Nigeria should make efforts to provide adequate laboratory equipment for the teaching and learning of science in general and physics in particular.
2. The available Physics laboratory equipment should be judiciously and adequately utilized by Physics teachers during the teaching of physics and the schools authority should create more time on the times table for practical lesson.
3. Teachers should imbibe the spirit of improvisation where the ready-made are not available when needed for effective teaching and learning of physics.

## REFERENCE

- Abubakar, H. S. (2013). Relationship among interest, socio-economic status of parents and subject area selection of students in senior secondary schools in Sokoto metropolis: implication for counselling. *Sokoto International Journal of Counselling Psychology*, Maideen Edition, 146-156.
- Adeniji, E. B. (2015). Study habits, classroom participation and interest as predictors of students' achievement in biology among selected high school students in Ife zone of Osun State. An unpublished M. Ed project work of University of Ibadan, Ibadan.
- Adesola, A. A. (2005). Resource provision and utilization, mathematics ability and learning environment as prediction of learning outcome in Undergraduate practical geography. Unpublished Ph.D Thesis, University of Ibadan, Ibadan.
- Adeyemo, S. A. (2012). The influence of teachers' supply and the provision of laboratory facilities on students' achievement in physics. *European Journal of Educational Studies*, 4(3), 397-409. *Ozean Publication*
- Ajetunmobi, A. W. & Bashorun, O. W. (2000). Resources utilization in agricultural science education. *41st Annual Conference Proceedings, Awka*. 99-102.
- Alimi, O. S., Eniola, G. B., & Alabi, F. O. (2012). School types, facilities and academic performance of students in senior secondary schools in Ondo State, Nigeria. *International Education Studies*. 5(3), 44-48. Retrived on [www.ccsenet.org/ies](http://www.ccsenet.org/ies)
- Alsop, S. & Hicks, K. (2001). *Teaching science: A Handbook for Primary and Secondary School teaching*. Glasgow: Bell & Bain Ltd.
- Amadalo, M. M., Ocholla, A. A., & Memba, E. B. (2012). Effect of practical work in physics on girls' performance, attitude change and skills acquisition in the form two-form three secondary schools' transition in Kenya. *International Journal of Humanities and Social Science*. 2(23), 151-166.
- Ayodele, J. B. (2000). School size, class size and teacher's quality as correlation of internal efficiency

- in primary school in Ondo State, Nigeria. Unpublished PhD Thesis, University of Ibadan, Ibadan.
- Bande, S. O. (2003). The universal basic education in perspective, need for formative evaluation. Nigeria. *Journal of Educational Research and Evaluation*, 1(4), 54-56.
- Bello, T.O. (2012). Effect of availability and utilization of physics laboratory equipment on students' academic achievement in senior secondary school physics. *World Journal of Education*, 2(5), 1-7. Retrieve from URL: <http://dx.doi.org/10.5430/wje.v2n5p1>
- Chiappetta, E. L., Koballa, T., & Collete, A. T. (2002). Science instruction in the middle and secondary schools. Upper Saddle River, NJ: Merrill Prentice Hall.
- El-Rabadi E. S. (2013). The effect of laboratory experiments on the upper basic stage students' achievement in physics. *Journal of Education and Practice*, 4(8), 62-70.
- Federal Ministry of Education, (FME): (2009). *Secondary school physics curriculum*. Lagos: NERDC Press,
- Hermit, A. (2007). The role of motivation in education. *A-Z Education: Motivation*. Retrieved on [http://contributor.yahoo.com/user/408/a\\_hermit.html](http://contributor.yahoo.com/user/408/a_hermit.html).
- Ibrahim D. S. (2013). Investigation into the provision and utilization of laboratory facilities and students' performance in practical biology in Gombe State, Nigeria. Unpublished M.Ed dissertation of Usmanu Danfodiyo University, Sokoto.
- Ifeakor, A. C. (2005). Enhancing professional STM teachers' role in lifelong education: strategies and needs for teacher's performance. *46th Annual Conference Proceeding of STAN*, 129-133.
- Oladare, O. T., Abiodun, O. S., & Bajulaiye, B. A. (2006). The status of resources in secondary school; teaching and learning in Lagos state, Nigeria. *47th STAN Conference Proceedings*, pp. 14-21.
- Olatunbosun, M. (2008). Student teacher and school environment factors as determinant of achievement in senior secondary school Chemistry in Oyo State, Nigeria. *The Journal of International Social Research*, 1(2), 56-60.
- Onah D. U. & Ugwu E. I. (2010). Factors which predict performance in secondary school physics in Ebonyi north educational zone of Ebonyi state, Nigeria. *Advances in Applied Science Research*, 1(3), 255-258. Retrieved from [www.pelagiaresearchlibrary.com](http://www.pelagiaresearchlibrary.com)
- Oyoo, S. O. (2004). Rethinking proficiency in the language of instruction (English) as a factor in the difficulty of school science. *The International Journal of Learning*, 14(4), 231-242.
- Seweje, R. O. (2000). The challenges of science teaching in Nigeria today. *Journal of Education Foundations and Management*, 1(1), 216-217.
- Stephen, U. S. (2011). The status of material resources for effective teaching of physics in secondary schools in Akwa Ibom State of Nigeria. *An International Multidisciplinary Journal, Ethiopia*, 5(4), serial no.21 pp. 242-249.
- Vandiver, B. (2011). The impact of school facilities on the learning environment. Unpublished Doctoral Dissertation, Capella University.

## APPENDIX

S/N	Equipment	Availability				Adequacy				Level of Utilization			
		AV.		NAV.		Adequate		Not Ad.		U		NU	
		f.c.	%	f.c.	%	f.c.	%	f.c.	%	f.c.	%	f.c.	%
1.	Spring Balances	19	100	00	0.0	05	26.3	14	73.7	18	5.3	01	5.3
2.	Trolleys	04	21.1	15	78.9	02	10.5	17	89.5	02	10.5	17	89.5
3.	Beakers	19	100	00	0.00	16	84.2	03	15.8	17	89.5	02	10.5
4.	Pendulum bobs	19	100	00	0.00	12	63.2	07	36.8	18	94.7	01	5.3
5.	Stop watches	19	100	00	0.00	06	31.6	13	68.4	18	94.7	01	5.3
6.	Meter rules	19	100	00	0.00	17	89.5	02	10.5	18	94.7	01	5.3
7.	Pulleys	13	68.4	06	31.6	10	52.6	09	47.4	11	57.9	08	42.1
8.	Drawing boards	16	84.2	03	15.8	12	63.2	07	36.8	16	84.2	03	15.8
9.	Hydrometers	05	26.3	14	73.7	04	21.1	15	78.9	04	21.1	15	78.9
10.	U-tube manometer	04	21.1	15	78.9	04	21.1	15	78.9	03	15.8	16	84.2
11.	Spiral springs	18	94.7	01	5.3	05	26.3	14	73.7	16	84.2	03	15.8
12.	Pair of Vernier calipers	16	84.2	03	15.8	12	63.2	07	36.8	15	78.9	04	21.1
13.	Micrometer screw gauges	14	73.7	05	26.3	02	10.5	17	89.5	13	68.4	06	31.6
14.	Inclined planes	11	57.9	08	42.1	11	57.9	08	42.1	09	47.4	10	52.6
15.	Lift pumps	01	5.3	18	94.7	01	5.3	18	94.7	02	10.5	17	89.5
16.	Force pumps	04	21.1	15	78.9	01	5.3	18	94.7	03	15.8	16	15.8
17.	Tripod stands	15	78.9	04	21.1	06	31.6	13	68.4	11	57.9	08	42.1
18.	Wire gauze	17	89.5	02	10.5	04	21.1	15	78.9	13	68.4	06	31.6
19.	Bunsen	15	78.9	04	21.1	02	10.5	17	89.5	11	57.9	08	42.1

S/N	Equipment	Availability				Adequacy				Level of Utilization			
		AV.		NAV.		Adequate		Not Ad.		U		NU	
		f.c.	%	f.c.	%	f.c.	%	f.c.	%	f.c.	%	f.c.	%
	burners												
20.	Thermometers	18	94.7	01	5.30	06	31.6	13	68.4	14	73.7	05	26.3
21.	Capillary tubes	11	57.9	08	42.1	03	15.8	16	84.2	09	47.4	10	52.6
22.	Retort stands	18	94.7	01	5.30	15	78.9	04	21.1	15	78.9	04	21.1
23.	Knife edges	17	89.5	02	10.5	09	47.4	10	52.6	16	84.2	03	15.8
24.	Graduated cylinder	17	89.5	02	10.5	13	68.4	06	31.6	16	84.2	03	15.8
25.	Barometer tubes (glass)	04	21.1	15	78.9	03	15.8	16	84.2	02	10.5	17	89.5
26.	Copper vessel for heat experiment	11	57.9	08	42.1	02	10.5	17	89.5	07	36.8	12	63.2
27.	Corks	17	89.7	02	10.5	09	47.4	10	52.6	16	84.2	03	15.8
28.	Mercury	06	31.6	13	68.4	03	15.8	16	84.2	02	10.5	17	89.5
29.	Bicycle pump	08	42.1	11	57.9	08	42.1	11	57.9	06	31.6	13	68.4
30.	Ray boxes	18	94.7	01	5.3	04	21.1	15	78.9	15	78.9	04	21.1
31.	Lens holders	16	84.2	03	15.8	11	57.9	08	42.1	15	78.9	04	21.1
32.	Plane mirror	18	94.7	01	5.3	10	52.6	09	47.4	16	84.2	03	15.8
33.	Rectangular blocks	18	94.7	01	5.3	13	68.4	06	31.6	17	89.5	02	10.5
34.	Triangular prisms	18	94.7	01	5.3	11	57.9	08	42.1	17	89.5	02	10.5
35.	Drawing pins	15	78.9	04	21.1	11	57.9	08	42.1	13	68.4	06	31.6
36.	Optical pins	18	94.7	01	5.3	15	78.9	04	21.1	16	84.2	03	15.8
37.	Concave	17	89.5	02	10.5	10	52.6	09	47.4	14	73.7	05	26.3

S/N	Equipment	Availability				Adequacy				Level of Utilization			
		AV.		NAV.		Adequate		Not Ad.		U		NU	
		f.c.	%	f.c.	%	f.c.	%	f.c.	%	f.c.	%	f.c.	%
	mirror												
38.	Convex mirror	17	89.5	02	10.5	10	52.6	09	47.4	15	89.5	04	21.1
39.	Converging lenses	18	94.7	01	5.3	12	63.2	07	36.8	17	78.9	02	10.5
40.	Diverging lenses	17	89.5	02	10.5	10	52.6	09	47.4	15	78.9	04	21.1
41.	Sonometers	03	15.8	16	84.2	02	10.5	17	89.5	01	5.3	18	94.7
42.	Turning fork	11	57.9	08	42.1	03	15.8	16	84.2	08	42.1	11	57.9
43.	Ripple tanks	02	10.5	17	89.5	00	0.00	19	100	01	5.3	18	94.7
44.	Hand spectroscopes	02	10.5	17	89.5	03	15.8	16	84.2	02	10.5	17	89.5
45.	Hand stroboscopes	03	15.8	16	84.2	02	10.5	17	89.5	01	5.3	18	94.7
46.	Bell jar	07	36.8	12	63.2	03	15.8	16	84.2	07	36.8	12	63.2
47.	Set of weights	19	100	00	0.00	13	68.4	06	31.6	16	84.2	03	15.8
48.	Bar magnets	18	94.7	01	5.3	08	42.1	11	57.9	11	57.9	08	42.1
49.	Plotting compasses	09	47.4	10	52.6	03	15.8	16	84.2	06	31.6	13	68.4
50.	Copper wire	17	89.5	02	10.5	10	52.6	09	47.4	12	63.2	07	36.8
51.	Crocodile clips	18	94.7	01	5.3	07	36.8	12	63.2	14	73.7	05	26.3
52.	Polythene rods	03	15.8	16	84.2	01	5.3	18	94.7	03	15.8	16	84.2
53.	Acetate rods	03	15.8	16	84.2	01	5.3	18	94.7	03	15.8	16	84.2
54.	Bulbs	19	100	00	0.00	19	100	00	0.00	14	73.7	05	26.3
55.	G-clamps	15	78.9	04	21.1	05	26.3	14	73.7	12	63.2	07	36.8
56.	Ammeters	18	94.7	01	5.3	08	42.1	11	57.9	17	89.5	02	10.5
57.	Voltmeters	18	94.7	01	5.3	07	36.8	12	63.2	17	89.5	02	10.5

S/N	Equipment	Availability				Adequacy				Level of Utilization			
		AV.		NAV.		Adequate		Not Ad.		U		NU	
		f.c.	%	f.c.	%	f.c.	%	f.c.	%	f.c.	%	f.c.	%
58.	Galvanometers	16	84.2	03	15.8	03	15.8	16	84.2	15	78.9	04	21.1
59.	Power units	02	10.5	17	89.5	00	0.00	19	100	02	10.5	17	89.5
60.	Electric motor	03	15.8	16	84.2	01	5.3	18	94.7	03	15.8	16	84.2
61.	Immersion heater	07	36.8	12	63.2	01	5.3	18	94.7	07	36.8	12	63.2
62.	Coil	12	63.2	07	36.8	07	36.8	12	63.2	09	47.4	10	52.6
63.	Zinc plates	06	31.6	13	68.4	07	36.8	12	63.2	05	26.3	14	73.7
64.	Copper plates	08	42.1	11	57.9	02	10.5	17	89.5	05	26.3	14	73.7
65.	Rheostats	17	89.5	02	10.5	02	10.5	17	89.5	17	89.5	02	10.5
66.	Electric bells	04	21.1	15	78.9	04	21.1	15	78.9	02	10.5	17	89.5
67.	Resistors	19	100	00	0.00	14	73.7	05	26.3	17	89.5	02	10.5
68.	Plug keys	16	84.2	03	15.8	08	42.1	11	57.9	14	73.7	05	26.3
69.	Wheatstone bridges	06	31.6	13	68.4	05	26.3	14	73.7	05	26.3	14	73.7
70.	Jockeys	16	84.2	03	15.8	15	78.9	04	21.1	14	73.7	05	26.3
71.	Lead-acid accumulators	09	47.4	10	52.6	01	5.3	18	94.7	05	26.3	14	73.7
72.	Daniel cells	09	47.4	10	52.6	03	15.8	16	84.2	04	21.1	15	78.9
73.	Leclanche cell	10	52.6	09	47.4	04	21.1	15	78.9	08	42.1	11	57.9
74.	Constantan wire	15	78.9	04	21.1	10	52.6	09	47.4	12	63.2	07	36.8
75.	Potentiometers	18	94.7	01	5.3	02	10.5	17	89.5	16	84.2	03	15.8
76.	Battery charger	07	36.8	12	63.2	06	31.6	13	68.4	05	26.3	14	73.7
77.	Open wound solenoids	04	21.1	15	78.9	01	5.3	18	94.7	03	15.8	16	84.2
78.	Induction	06	31.6	13	68.4	05	26.3	14	73.7	04	21.1	14	73.7

S/N	Equipment	Availability				Adequacy				Level of Utilization			
		AV.		NAV.		Adequate		Not Ad.		U		NU	
		f.c.	%	f.c.	%	f.c.	%	f.c.	%	f.c.	%	f.c.	%
	coil												
79.	Resistance boxes	19	100	00	0.00	02	10.5	17	89.5	17	89.5	02	10.5
80.	Connecting wires	18	94.7	01	5.3	17	89.5	02	10.5	14	73.7	05	26.3
81.	Gold-leaf electroscope	02	10.5	17	89.5	02	10.5	17	89.5	01	5.3	18	94.7
82.	Chemical / scale balance	13	68.4	06	31.6	08	42.1	11	57.9	11	57.9	08	42.1
83.	Iron	09	47.4	10	52.6	07	36.8	12	63.2	05	26.3	14	73.7
84.	Demonstration transformer	07	36.8	12	63.2	03	15.8	16	84.2	05	26.3	14	73.7
85.	Test tubes	18	94.7	01	5.3	14	73.7	05	26.3	17	89.5	02	10.5
<b>Weighted Average</b>		<b>1046</b>	<b>64.77</b>	<b>569</b>	<b>35.23</b>	<b>560</b>	<b>34.67</b>	<b>1055</b>	<b>65.33</b>	<b>878</b>	<b>54.37</b>	<b>737</b>	<b>45.63</b>