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COMPARATIVE EFFECTS OF SCHOOL LIBRARY AND LABORATORY ON STUDENTS ACADEMIC ACHIEVEMENT AND INTEREST IN CHEMISTRY IN PUBLIC SCHOOLS IN UYO EDUCATIONAL ZONE, AKWA IBOM STATE

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ABSTRACT

The study examined the comparative Effects of School Library and Laboratory on Students Academic Achievement and Interest in Chemistry in Public Secondary Schools in Uyo Educational Zone, Akwalbom State. Four purpose of study, four research question and two null hypotheses were formulated to guide the study. Survey research design was adopted for the study and the population of the study consisted of all the ten public secondary schools in the study area. A sample size of 200 senior secondary two (SS II) chemistry students were drawn from four public secondary schools in Uyo educational zone while survey research design was use for the study. Three validators were carefully selected both from University of Uyo and Akwalbom State College of Education AfahaNsi t. The findings of the study reveals that the use of a school library enhances student academic achievement and interest in chemistry in the study area because students taught chemistry in schools were there is a functional school library had a better academic achievement and students interest than their counterpart taught chemistry with the use of library, it was recommended that Government at all levels should ensure that public schools in Uyo should be equipped with a functional school library to boost the effective teaching and learning of chemistry.

KEYWORDS: School Library, Laboratory, Student Academic Achievement and Interest.

INTRODUCTION

The importance of school library and laboratory utilization in science cannot be overemphasized. The significance of science and technology to national development in the life of any country cannot be taken for granted. This is because the knowledge and skills in science and technology are very vital in the developments of any society. Julius (2011) observed that the changes in applications of science and technology and the global reliance on its processes and products in all areas of human endeavor have made them invaluable that any society or country without risks of being alienated from the global village. This means that for an individual to be well-grounded in science and be competent enough to face the challenges of life in his society, he or she must have gone through a science programme that is well planned, assessed and implemented. Silas (2014) stated that when science programmes are well planned and implemented, it will promote the interest of students which is seen in their feelings of wanting to know or learn more about sciences and also boost their interest and academic achievement in this perspective. Sunday (2023), reported that a school library is a special place built and equipped for reading, research and evaluation. He went further to disclosed that a library is an essential school environmental factor needed to enhance students academic achievement, retention and interest in science, he stated that a deterioration in the academic standard of a school system can be attributed to the non availability of a functional school library, he maintained that for an improvement to be

accomplished in students academic performance in science oriented courses, there's need for the provision of a well equipped school library in other to enhance students ac ademic achievement in science.

Emeka (2022) define a library as a building built in a school in the special place where there is no noise pollution and must be equipped with current textbooks, air conditioners, bookshelves, trained Liberians, comfortable tables and chairs as well as a well secure convenience, etc. In his research, he discovered that students whose schools have a functional library performed better than schools without a function library. The importance of science laboratory and adequacy of laboratory facilities in secondary schools is for effective teaching and learning to take place (Calleb, 2014). Stimulates that to access the status of a good laboratory facilities in secondary schools, the adequacy of these facilities must be emphasized by science teachers. Calleb further contended that the laboratory has been a distinctive feature in science teaching and learning. For students to learn efficiently and effectively, teachers should ensure that adequate laboratory facilities are provided to enhance the effective teaching and learning of science subjects.

Pius (2013) define laboratory as a room were scientific apparatus and equipments are set up for experimental and practical exercises to take place. These building are out of bounds for students who have nothing to do with experiments. He further explained that chart, chemicals, instruments, reagent, apparatus are kept in the laboratory. He further explained that a well equipped laboratory must have electricity or generator, water supply, tabl es, laboratory, coverall jackets and cupboards etc.

Pius (2013) examined the adequacy of laboratory facilities and academic performance in basic sciences, and revealed that the adequacy of laboratory facilities had a significant relationship with students' academic performance in Basic Science. Laboratory equipments has been identified as part of the teaching and learning facilities teachers which that students use to express ideas without difficulties, this makes the lesson interesting-motivating and easy to understand (Wright, 2012). Ekong (2015) in a study to determine the effects of availability of laboratory materials and interest of chemistry student in secondary schools in Calabar South Local Government of Cross River State, observed that the availab ility of laboratory materials promotes the interest of students in learning chemistry.

Interest can be defined as the focusing of the sense organs on or giving attention to some person activity, situation or object (Albert, 2013). Describe it as an outcome of experience rather than gift. Albert further said that interest could either result in being focus or cause motivation .

Adebajo (2012) on the other hand said that interest is a feeling of identification with a person and some conditions, things or other person. Dansy (2016) opined that interest could also be viewed as a condition in which an individual associates the essence of certain things or situation with needs or wants. Dansy further maintained that one's interest is rekindled or killed through participation, experience, familiarity, study and work. It is what one perceives in these engagements that shape interest thus the researcher intends to see how the comparative effects of school library and school laboratory could effectively enhance studen ts academic achievement and interest in public secondary schools in Uyo Local Government Area, Akwa Ibom State. Chemistry is a core science subject taught in Senior Secondary Class as spelt out in the senior science secondary school curriculum. It is a mandatory subjects for all science students who have intentions of studying professional courses like, Medicine, Engineering, Basic Medical Sciences, Architecture, Aeronotic Engineering etc. It is pre-requisite by JAMB, NECO, WAEC, SSCE examination bodies that students must have at least a credit pass to be eligible to enroll in the above mentioned professional disciplines. Due to the importance of chemistry, the Nigerian government has supported its development financially, because it sees the teaching of che mistry as a means of building a free, just and egalitarian society, a land full of equal opportunities for all citizens who are able to generate a great and dynamic economy which grows into a strong and self -reliant nation. Uche (2005) also promote the lofty educational programs, government sometimes made direct

financial assistance to the students and educational institutions (Thomas 2008), which is an indication of government interest in the education of her citizens. Jude (2012) observed that despite the importance of chemistry and the efforts by government to sustained it teaching in senior secondary schools, there had been a public outcry on students academic achievement of students in West African School Certificate Examination Council (WASCE), National Examination Council of Nigeria (NECO) and Joint Admission and Matriculations Examinations Result. The poor academic achievement of students in these examination has led to a public outcry on ways to remedy it. It is pertinent to know whether the non availability of school library and laboratory could discourage students interest in learning chemistry, leading to the poor academic achievement of students in the subject. It is also clear that despite the efforts made by researchers and other lovers of Education to bring a lasting solution to the problem of poor academic achievement and interest in chemistry, the problem still persists. In view of this negative development, the researcher intends to embark on the research titled: Comparative effects of school library and laboratory on students academic achievement and interest in chemistry in Uyo, Akwa Ibom State. It is believe that the recommendation of this research and its findings with regards to the topic comparative effects of school library and laboratory will enhance students academic achievement and interest in chemistry in public secondary schools in Uyo, Akwalbom State will effectively enhance students interest and achievement in chemistry.

STATEMENT OF THE PROBLEM

Persistent poor academic achievement of students in chemistry in external examination is a major problem. WAEC Chief Examiners' reports in Nigeria in the just concluded 2024/2025 examination results showed a high percentage of secondary school students academic achievement in chemistry as long as the problem may be associated to poor utilization of school library and laboratory by both teachers and learners in the learning of some concepts in chemistry which are practical driven. Researchers in chemistry education have continually sought for better ways to enforce the provision of well equipped library and laboratory by government to boost students interest in chemistry and to enhance students academic achievements in the subjects. The purpose of this research will be to find out, the comparative effects of school library and laboratory on students' academic achievement and interest in chemistry in Uyo Local Government Area of Akwalbom State to see how utilization will effectively enhance students interest and achievement in the subject.

PURPOSE OF THE STUDY

The aim of the study is to determine the comparative effects of school library and laboratory on student's academic achievement and interest in public secondary schools in Uyo Educational Zone of Akwalbom State. The specific objectives of the study are as follows.

- To determine the comparative effects of school library on students academic achievements in chemistry in public secondary schools in Uyo Educational Zone.
- To determine the comparative effects of school laboratory on students academic achievements in chemistry in public secondary schools in Uyo Educational Zone.
- To determine the comparative effects of school library on students interest in chemistry in public secondary schools in Uyo Educational Zone.
- To determine the comparative effects of school laboratory on students interest in chemistry in public secondary schools in Uyo Educational Zone.

RESEARCH QUESTIONS:

The following research questions were formulated to guide the study:

- What is the comparative effects of school library on students academic achievements in chemistry in public secondary schools in Uyo Educational Zone?
- What is the comparative effects of school laboratory on students academic achievements in chemistry in public secondary schools in Uyo Educational Zone?
- What is the comparative effects of school library on students interest in chemistry in public secondary schools in Uyo Educational Zone?
- What is the effect of utilization of school laboratory on students interest in chemistry in public secondary schools in Uyo Educational Zone?

HYPOTHESES:

Four research hypotheses were formulated to guide the study:

- There is no significant difference on the comparative effects of school library on students academic achievements in chemistry in public secondary schools in Uyo Educational Zone.
- There is no significant difference on the comparative effects of school laboratory on students academic achievements in chemistry in public secondary schools in Uyo Educational Zone.
- There is no significant difference on the comparative effects of school library on students interest in chemistry in public secondary schools in Uyo Educational Zone.
- There is no significant difference on the comparative effects of school laboratory on students interest in chemistry in public secondary schools in Uyo Educational Zone.

Literature Review

Theoretical Framework

Piaget's Theory of Cognitive Development (Piaget, 1936)

This theory was propounded by Jean Piaget in 1936. He lived between 1896 and 1980. Piaget was a Swiss psychologist and genetic epistemologist. An important implication of Piaget's theory is adaptation of instruction to the learner's developmental level. The content of instruction needs to be consistent with the developmental level of the learner. The teacher's role is to facilitate learning by providing a variety of experiences. Teacher should obviously provide opportunities for learners to explore and experience, by doing so is encouraging learner's new understandings. Piaget emphasizes the opportunities that allow learners of different cognitive levels to work together and encourage less mature students to advance to create understanding. This theory further emphasizes on the use of concrete hands of experiences to help learners learn additional suggestions. Piaget also emphasizes that teachers should allow opportunities to classify and group information to facilitate assimilating new information to facilitate assimilating new information with previous knowledge. This theory is related to the present study as instruction in Chemistry which will be adopted to enhance student's interest through the use of laboratory equipments that will make the teaching of Chemistry more practical and visible and this will thereby enhance their academic achievement and interest.

EMPIRICAL FRAMEWORK

Aladejana (2007) examined the effects of school laboratory and academic performance of students. The ex-post facto research design was use for the study. A sample of 328 students were randomly selected students and was taken from a population of all Senior Secondary School chemistry students in a Lagos State, Nigeria. The research instrument for the study was Science Laboratory Environment Inventory (SLEI) that was administered on the selected students. Data analysis was done using descriptive statistics and Product Moment Correlation. Findings revealed that students could assess the five components (Student cohesiveness, Open-endedness, Integration, Rule clarity, and Material Environment) of the laboratory environment. Student cohesiveness has the highest assessment while material environment has the least. The results also showed that the five components of the science laboratory environment are positively

correlated with students' academic performance. The findings were discussed with a view to improving the quality of the laboratory environment, subsequent academic performance in science and ultimately the enrolment and retaining of learners in science. Umara (2017) conducted a study on the effects of availability and utilization of Biology laboratory facilities and students' academic achievement in secondary schools in Yobe state of Nigeria. The study adopted a Correlational survey research design and was guided by two research questions and one null hypothesis tested at 0.05 level of significance. The population of the study comprised of all the 42 biology teachers and 10,231 biology students across all the senior secondary schools in Yobe state. Stratified random sampling technique was used to select the student sample (370). The entire 42 biology teachers were used for the study since the size was manageable. A questionnaire containing a checklist (Biology Laboratory Facility) and a Proforma were used for data collection. Data for research questions were analyzed using Mean and Standard Deviation while Pearson Product Moment Correlation Coefficient and Multiple Correlation analysis were used for the null hypotheses. The reliability coefficient of the instrument was obtained to be 0.84 using Cronbach Alpha. The findings of the study revealed that biology laboratory facilities are either not available entirely, or where they are available they are inadequate and therefore they are not utilized by the high number of students population. There was a significant relationship between biology laboratory facility availability and utilization, and student's academic achievement $r = .614$, $n = 42$, $p < 0.05$, $r = .572$ and $r = .590$, $n = 370$, $p < 0.05$. Adeyemi (2008) examined science laboratories and the quality of output from secondary schools in Ondo State, Nigeria. The design was made along the lines of a descriptive survey while the study population comprised all the 257 secondary schools that presented candidates for the year 2003 senior secondary Certificate Examinations in the State. The sample size for the study consisted of 168 secondary schools drawn randomly from the study population. The instrument used to collect data for the study was an inventory while the data collected were analysed using the one-way analysis of variance and Least Significant Difference test. Semi-structured interviews were conducted for principals and education officers while their responses were analysed through the content analysis technique. The findings showed that the quality of output was best in schools having laboratories in three science subjects, physics, chemistry and biology. The mean scores were highest in schools having three science laboratories. The interviewees' responses agreed with the findings of the study.

RESEARCH METHODOLOGY:

Research Design

The study will adopt a survey research design.

Area of the Study

The area of the study wasbeUyo Local Government Area of Akwalbom State. Uyo Local Government Area is the capital of Akwalbom State. It is surrounded by 10 (ten) Local Government Area which include Ibiono, Itu, Ikono, NsitIbom, Uruan, Okobo, Ibesikpo, Ikono and IkotEkpene Local Government Area respectively. According to the Uyo Local Education Board Committee, there are 14 public secondary schools in Uyo and three tertiary institutions located in Uyo, which are the University of Uyo, Metropolitan Polytechnic and the Uyo City Polytechnic and the common source of livelihood in Uyo are Civil Service work and private business.

Population of the Study

The target population for this study was all the SSII chemistry students in the 2024/2025 academic session in all the 10 (Ten) public schools in Uyo and this study consists of four (4) SSII secondary schools students. There are about 2000 students offering chemistry in the study area according to (Local Education Board, Uyo) 2024.

Sample and Sampling Technique

The sample size consisted of 200 senior secondary two (SSII) chemistry students drawn from four (4) public secondary schools in the study Area. A simple random sampling technique will be use to select the sample size as well as the schools that will be use for the study.

Instrumentation

Three (3) instruments was to develop by the researcher for data collection namely (i) comparative effect of students library questionnaire (CESLQ) (ii) comparative effect of students school laboratory questionnaire (CESSLQ) and (iii) students interest scale in chemistry (SISC). The above questionnaire will be use for the study. The instruments will adopt a face and content validation and will be validated by five (5) experts, two experts will be drawn from test and measurement department, University of Uyo, while the remaining two will be selected from Chemistry Department and Science Education Department all from University of Uyo.

Method of Data Collection

The three (3) instruments was administered to the selected students in a normal school and about one hour thirty minutes (1hr 30 minutes) was use to administer the instruments to each students would participate in the study, thereafter the chemistry achievement score of the participating students was drawn from the school examination records.

Method of Data Analysis

The data collected was analysed using mean and standard deviation to answer the research questions and independent t-test statistics was use for the research hypotheses.

RESULTS

Research Question One:

What is the comparative effects of school library on students academic achievement in chemistry in public secondary schools in Uyo Educational Zone?

S/N	Effects of School Library on Student Academic Achievement	VGE	GE	LE	VLE	Mean ()	Std	Decision
1.	Power supply	260	200	107	25	3.16	0.66	GE
2.	Provision of textbooks	242	230	105	25	3.15	0.65	GE
3.	Availability of librarian	206	250	96	70	2.90	0.95	GE
4.	Provision of reading function	186	239	101	101	2.71	1.01	GE
5.	Provision of fan/air condition	196	259	101	52	2.90	0.91	GE
6.	Provision of textbooks cerb	173	202	103	141	2.66	1.20	GE

Where VGE = Very Great Extent GE = Great Extent, LE = Low Extent, LE = Little Extent and VLE = Very Little Extent

Table 1 shows that each of the items on the effects of school library on students academic achievement had a mean scores of 3.18 and 2.66 which are above the decision level of 2.50 which indicate that the use of school library enhances students academic to a very great extent.

Research Question Two:
What is the comparative effects of school laboratory on students academic achievement in chemistry in public secondary schools in Uyo educational zone.

S/N	Effects of Laboratory on Students Academic Achievement	VGE	GE	LE	VLE	Mean ()	Std	Decision
1.	Supply of chemicals	187	239	102	102	2.81	1.03	GE
2.	Water supply	175	209	103	143	2.66	1.21	GE
3.	Apparatus	185	241	107	97	2.82	1.02	GE
4.	Electronic m	207	235	93	95	2.88	1.03	GE
5.	Provision of safety materials	219	185	131	95	2.83	1.06	LE
6.	Practical furnitures	262	233	105	30	3.15	0.85	GE

Where VGE = Very Great Extent, GE = Great Extent, LE = Little Extent and VLE = Very Little Extent

Research Question Three:
Mean and standard deviation on the extents of influence of school library on students interest in chemistry.

S/N	Item Statement	VGE	GE	LE	VLE	Mean ()	Std	Decision
1.	Availability of librarian	203	179	147	101	2.77	1.08	GE
2.	A well equipped library	198	146	139	147	2.63	1.07	GE
3.	Provision of electricity	163	152	198	117	2.57	1.09	GE
4.	Updated textbooks	180	161	121	168	2.63	1.02	GE
5.	Ventilation	203	179	147	101	2.77	1.08	LE
6.	Provision of security personnel	151	214	120	145	2.59	1.26	GE

Response of students as shown on Table 5 implies that school library influences students' interest in chemistry to a great extent. Their mean rating on all the items are above the decision level of 2.50 implying that all the items enhances students interest in learning chemistry to a great extent.

Research Question Four:
Mean ratings and standard deviation of students responses on the influence of school laboratory on students interest in chemistry.

S/N	Statement of Items	VGE	GE	LE	VLE	Mean ()	Std	Decision
1.	Provision of Laboratory Assistant	210	170	130	120	2.75	1.02	GE
2.	Provision of burson burners	139	137	260	2.51	2..88	0.899	GE
3.	Provision of tripod stand	189	157	180	3.07	1.03		GE
4.	Laboratory manual	200	89	110	2.60	1.08		GE
5.	Qualified chemistry teacher	105	143	63	2.55	1.04		GE

Data on Table revealed students responses on the influence of school laboratory in learning chemistry. Their mean rating scores on the 6 items enhances student interest to a great extent in learning chemistry.

Hypothesis One:
There is no significant difference on the comparative Effects of School Library on Students Academic Achievements in Chemistry in Public Secondary Schools in Uyo Educational Zone.

Table 5: t-test analysis of the difference between the responses of students learning chemistry using laboratory and those students studying chemistry without the use of laboratory.

Groups	N	Mean	SD	df	Sig	t-cal	t-crit	Decision Accepted
Student taught with laboratory	268	26.18	4.581	638	0.09	1.664	1.962	
Without laboratory	362	25.60	3.770					

Data on table 5 has shown that the t-calculated value of 1.764 is lesser than t-critical value of 1.962 at 628 degrees of freedom and 0.05 significant level. This implies that there is no significant difference between the responses of students with students taught chemistry using the laboratory and that students taught chemistry has a greater achievement than those taught without laboratory.

Hypothesis Two:
There is no significant difference on the comparative effects of school laboratory students' academic achievements in chemistry public secondary schools.

Table 6: t-test on the difference in the responses of students taught chemistry using laboratory and those taught without laboratory.

Groups	N	Mean	SD	df	Sig	t-crit	Decision Accepted
Students taught	278	25.87	4.680	63.8	0.05	1.962	
Chemistry with laboratory	352	25.4	3.642				

Data on table 8 has shown that the t-calculate value of 1.260 is less than t-critical value of 1.962 at 638 degrees of freedom and at 0.05 level of significance which implies that there is no significant difference between students taught chemistry using laboratory and those taught without laboratory.

DISCUSSION OF FINDINGS

In this study four research questions and four hypothesis were formulated to guide the study on the comparative effects of school library and laboratory on students academic achievement and interest in chemistry in Akwalbom State. The study shows that with the decision level of 3.18 and 2.60 which is the above the conventional decision level of 2.50 indicates that the use of library and a functional science laboratory enhances the students interest in learning/chemistry and also enhance a better academic achievement in educational zone in Uyo.

CONCLUSION

Based on the data collected and analyzed in the study, it is concluded that: there is no significant difference between the responses of students taught chemistry using a functional science laboratory and a functional library in public school in Uyo Educational Zone.

EDUCATIONAL IMPLICATIONS OF THE FINDING

The finding have a number of educational implications for Students, Teachers, Principals, Local Education Committee, Ministry of Education, State Secondary Education Board, Council Development that making good use of the library and laboratory will improve students interest in Chemistry and also enhances their academic achievement in the subject.

RECOMMENDATIONS

The following recommendations are made base on the findings of this study.

- The Akwa Ibom State Ministry of Education and State Secondary Education Board should henceforth ensure that secondary schools are provided with standard laboratory to enhance students understanding of the concept of Chemistry taught.
- Principals of public secondary schools in Akwalbom State should ensure that Chemistry teachers do frequently used Chemistry laboratory in teaching the students to make the subject looks more visible and practical.
- The State Ministry of Education and State Secondary Education Board should organize seminars and workshops for all public secondary school teachers on the importance of teachers training. On the use of a functional school library to boost students interest in learning chemistry.

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