Evaluation of Chemistry Laboratory Facilities in Tertiary Institutions in Rivers State, Nigeria

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Abstract: **The study evaluated the availability and utilization of chemistry laboratory facilities of tertiary institutions in Rivers. The design of the study was evaluation survey design involving Chemistry laboratories. The population included heads of schools, heads of the Chemistry subject lecturers for Chemistry courses and chief laboratory technologist. Sample in this study included six Tertiary institutions in Rivers state via purposive sampling is the procedure The instruments for data collection was Laboratory Facilities Inventory(LFI) developed by the research and semester results of students The experts checked for clarity of inventory items, and make necessary corrections that improved the instrument. The instrument was subjected to a test retest method of reliability. The information gotten was used in estimating the reliability index which will yield a coefficient of 0.82 using the Pearson correlation coefficient. The data collected was analyzed using mean standard deviation and Analysis of Variance for Regression .The result of the study shows that some laboratory facilities are available and utilized. The finding further reveals that there is significant influence of laboratory facilities utilization on students' academic performance as measured in CGPA. Therefore, the study recommends that government should ensure adequate provision of laboratory facilities, schools should source funds from organizations like NGOs to equip the laboratory**

Keywords: **Evaluation, Laboratory, Facilities and Tertiary**

I. INTRODUCTION

Science and technology are imperious for a viable, liable and universal growth. From side to side the application of science, man guarantees the durability of his life in findings, novelty and discoveries that have better the worth of his existence. Advanced countries of the world are so termed because of their progress and development in science and technology. For Nigeria to be called an advanced country of the world there is the need to make science more motivating amongst populace and make sure that there is effective teaching of sciences in our schools (Ikiroma& Chinda**,**2013).

Chemistry is one of the central components of technology. It is a branch of science that deals with the applied and investigational understanding of natural occurrences. The learning of chemistry entrails from the simple to a more difficult, therefore Chemistry is more of practice than a product. A very vital feature in the teaching of Chemistry is the approaches and resources engaged in conveying knowledge. The teaching and learning of chemistry like every other science subject can only be efficient by the use of instructional materials (visual aids and audio–visuals aids). Instructional materials are aids used by the teacher to improve the efficiency of teaching. They carry exact information intended to stimulate preferred behavioural variation in the students.

Instructional materials comprise a wide-ranging of apparatus and resources used for teaching and learning going from hardware to software. Nonetheless, some of these materials are not sufficiently existing in various Nigerian schools, where they may be available; they may not be utilized by the teachers for teaching chemistry .According to Dienye and Gbamanja (2010), learning is more efficient and get the best out of the environment if it has sufficient resources. A bare and unexciting classroom provide slight or no motivation for learning. Truly, times have come when science teachers should invent and need to be able to improvise essential materials so as to make their teaching more significant and stimulating. Nigeria shall not remain to function an educational system where chemistry classrooms and laboratories are vacant and anticipate to be self-sufficient in the space of science and technology.

Excellence and real teaching of Chemistry rest on sufficient delivery and suitable application of instructional materials. A practical-based method to Chemistry is the vital to a step forward in science and technology development.

Maduabum (2011) defines a laboratory as a room where scientific trainings are conducted by the science teachers for the advantage of the students (learners). The laboratory trainings include; experimentations, and other actions which assist the learners in getting scientific aptitudes. Ezeliora (2014) defined science laboratory as a workshop where science is done or anywhere scientific activities are carried out in favorable setting or room where science apparatus, resources or appliances are stored for safety and protection. Igwe (2011) opined that a laboratory can be indoor such as the appropriately planned and furnished room set up in most schools or open-air involving such places as riverside, workshop, field and even market for carrying out scientific studies. He further stated that whatever the type of laboratory engaged in science teaching, the similar laboratory practice should be achieved, that is involvement in the series of investigational, observational and demonstrating activities which offer chance for learners to improve understanding of practical and theoretical conceptions through solutions of problems. Omari (2011)sees the laboratory as the core of a good scientific programme which permits learners in the school to have practice which are in agreement with the aims

of scientific literacy. This infers that science teaching and learning cannot be completely done in a school where there is no furnished laboratory.

Dienye and Gbamanja (2010) observed that laboratory technique of teaching is an action connecting a two-way approach carried out by one or more individuals through the exercise and experimental methods both of which are valuable in science teaching. The experimental approach provides an opportunity for students to seek information using experimental procedures. These procedures call for careful observations, and interpretation of data. It has the qualities of questioning, investigating and confronting the unknown. Whereas the exercise approach is that of programmed routines assuring a predetermined answer. But desirable experiments are exercised, arranged as logical thought and intellectual action rather than performance. Laboratory experiment and exercise are inter-changed. What functions and purposes does laboratory teaching have?

Dienye and Gbamanja (2012) grouped functions of the laboratory into 4 main categories which represent important goals in science education and also demonstrate how teaching science in the laboratory is congruent with advancement in science and technology.

1. Laboratory teaching makes the learner learn about the nature of science and technology in order to foster the knowledge of human enterprise of science and thus enhance the aesthetic and intellectual understanding of the child. Science is known to be a way of doing certain things by the observation of natural phenomena, quantifying the observed things, integration of such quantities and interpretation of the results in order to make useful meaning out of the exercise. During this period the child is able to match his abilities with the laboratory experiences he is exposed to by the manipulations and control of any available variables. He can identify some cause and effect relationships and will develop important skills. By this the child's aesthetic and intellectual understanding grows. Such exercise are very essential for students from our rural areas in particular who have been stuffed with superstition.
2. Learning scientific inquiry skills that can be transferred to another spheres of problem solving (i.e. acquisition of problem solving skills).A basic goal of science teaching is t help students learn skills that can be applied to other life situations in future. It thus follows that the exercise of transfer of such learning condition must have something in common with the situation to which it will be applied. In a laboratory situation teacher assists students while they are given opportunities to handle objects and problems in the laboratory which can enable them classify these facts into groups for easy identification and meaningful usage. Students can, in experimenting in the laboratory, generate data, and new observations and interpretations could emerge from these. Skills are developed by such to meet the demands of science education. The laboratory therefore proves good here in helping students learn to observe, discriminate, arrange, classify, measure, experiment, evaluate and possibly engage in other scientific processes.
3. Students learning to appreciate and in part emulate the role of the scientist through acquisition of manipulative skills student can be allowed to investigate by.
    a. Indirect observation of objects and materials for the acquisition of mental as well as manipulative skills, e.g., measuring substances, using balances, pipettes, cylinders; etc such activities cause both physical and mental development analytical skills can be applied by students in course of gathering data as a means of generating an orderly explanation of kinds of things which they have observed. Ultimately the result of such research work is that students learn to organize precepts systematically and categorical.
    b. Through multiple trials students can in the process of fiddling with materials and activities without stated theories arrive at useful conclusion.
    c. Given a known theory student can be guided to observation some phenomena selected by teacher and from such observation some phenomena selected by teacher and from such observations make predictions that are likely to occur.
4. Developing interests, attitudes and values: The experimental method offers chance for learners to seek evidence using experimental procedures. These processes call for cautious observations and clarification of data. It has the potentials of inquiring, probing and challenging the mysterious. me of the facilities were seldom adequate in school

Ivowi (1993); Ihuarulam (2008) andIgboabuchi (2010) perceived that the utilization of laboratory facilities in chemistry teaching empowers students to cultivate problem solving skills and affirmative approach, interest to science learning.

Mathew (1998) studied the utilization of laboratory apparatus and learners' academic performance, and revealed that application of laboratory facilities had a progressive relationship with students' academic achievement concerning science teaching and encourages better academic performance in the subject. Maduabum (1998) examined the utilization of laboratory apparatus and academic achievement in science and establish that learners who use laboratory facilities during science teaching and learning succeed higher than those who had no involvement in laboratory practical's in science. Furthermore, Chukwuemeka (2010) results founded out that utilization of laboratory facilities/equipment in secondary schools revealed that 74% of the science tutors apply laboratory facilities in the course of science teaching and learning, while 26% of the tutors never used laboratory facilities. The results also show that laboratory facilities significantly affect students' academic performance in science. Maduabum (1998) studied the application of

laboratory resource and academic performance in science and establish that learners that applied laboratory facilities during science teaching and learning achieved higher than those who had no experience in laboratory activities in science. Etiuben (2010) examined the influence of utilization of Chemistry laboratory facilities and academic performance in Chemistry. The results revealed that utilization of Chemistry laboratory facilities has no significant effect on learners' academic performance in Chemistry.

Neji, Ukwetang and Nja (2014) evaluated the adequacy of laboratory facilities on student's academic achievement in secondary schools in Calabar, Nigeria. The research was an evaluative research. Two research questions were posed and two hypothesis guided the study. The population of the students was 2652 chemistry students in Calabar zone. The sample size was three hundred and fifty (350) SS III chemistry via multistage sampling technique. The instruments for data collection were a questionnaire on adequacy of laboratory facilities and a Chemistry Achievement Test (CAT). The data gathered was analyzed using Analysis Variance (ANOVA) and Pearson Product Moment Correlation. The findings of the study reveals that 24 out of the 50 laboratory facilities were not significant with regards to adequacy, however, 26 out of the 50 laboratory facilities were significant. This shows that there is a positive relationship between adequacy of laboratory facilities and students' academic achievement but the observed positive correlation was not statistically significant. The study recommends that government should provide laboratory apparatus/resources for efficient teaching and learning of Chemistry.

Olajide, Adebisi and Tewogbade (2017) assessed laboratory resources, teachers and students involvement in practical activities in Basic science in Osun State Nigeria. The study adopted the descriptive survey design. Three research questions were posed in the study. The population of study comprises of all Basic science teachers and facilities for teaching Basic Science in Ogun State, Nigeria. The sample size consists of 10 school from each Senatorial District via simple random sampling procedure. 300 JS II students and 35 teachers were also used for the study via purposive sampling procedure 3 instrument were used for the study Observation Checklist for Basic Science Laboratory Facilities (OCBSLF), Questionnaire on the Extent of Use of Laboratory Resources (QEULR) and Students Questionnaire on Basic Science Laboratory Facilities (OCBSLF). The date collected was analyzed using simple percentage. The result reveals that Basic Science facilities are not available for teaching and learning in schools. The finding further reveals that teachers did not effectively utilize the available resources to teach basic science and student's participation in practical is relatively low. The study recommends among others that tenders should has a re-orientation through seminar conferences and summits on the efficient use of laboratory materials.

Ndifon and Igwebuike (2019) examined institutional academic culture and effective implementation of educational technology curriculum in tertiary institution in Cross Rivers State, Nigeria. Two research question and two hypothesis guided the study. The design for the study was ex-post facto design. Population of the study was 2,771 students. The sample size was 682 students via sample random sample technique. The instrument for data collection was a questionnaire named Institutional Practice and Educational Technology Curriculum Implementation in Tertiary Institution Questionnaire (IPCITIQ). The data generated was analyzed using Analysis of Variance (ANOVA). The findings reveals that there is significant influence of laboratory experience on educational technology curriculum implementation in tertiary institutions. The finding further reveal that there is significant difference of creativity on curriculum implementation in tertiary institution. The study recommend among other that lecturer should implement the use of laboratory facilities so that the students can be exposed to these facilities so that they use it as they progress in their career.

Ikiroma, Chinda and Bankole,(2021) examinedRivers undergraduate students' awareness level of safety signs in Chemistry laboratory. Three research questions and two hypotheses directed the study. The design for the study was analytic descriptive survey design. 60 year 3 undergraduate students learning Chemistry Education (B.Sc. Ed) and Pure Chemistry (B.Sc.) were randomly selected from three universities namely; University of Port Harcourt (Uniport), Rivers State University (RSU) and Ignatius Ajuru University of Education (IAUE) with each university 20 students. A researchers made test instrument, titled, Chemistry Laboratory Test on Safety Signs (CLTSS) which had reliability coefficient of 0.94 through Cronbach Alpha was used for data gathering in the study. The appropriate data collected were subjected to simple percentages, mean, standard deviation, t-test and analysis of variance (One-way ANOVA) as statistical tools. The finding of the study exposed that must of the students did not understand the meaning of chemical hazards. In addition, they proficient misperception in matching chemicals frequently seen in Chemistry laboratory (i.e., sodium hydroxide) and the importance of chemical securitysymbolsign that undergraduates' awareness level of safety signs is low. A second result of the study indicated that there is a difference in the awareness level of safety signs between Chemistry Education (B.Sc. Ed) students and their pure Chemistry (B.Sc.) counterpart, however, the difference was not significant statistically. Also, the result showed that the awareness levels of safety signs among undergraduate Chemistry students are not significantly reliant on institutional types. From results of the study and the statistic that the outcomes from this study offer rudimentary information for teaching and learning. The study recommends that, lecturers during teaching should encourage students' awareness of the right handling, storing and discarding of harmful resources/chemicals regarding their safety signs.

It is against this background that this study examined the extent of availability and utilization of chemistry laboratory facilities of tertiary institutions in Rivers State.

Research Questions

The study was guided by the following research questions

1. To what extent are laboratory facilities available in tertiary institutions in Rivers State?
2. To what extent are laboratory facilities used in tertiary institutions in Rivers State?
3. What is the influence of the use of laboratory facilities on students' academic performance in chemistry?

Hypothesis

- There is no significant influence of the use of laboratories on students' academic performance in chemistry.

II. METHODOLOGY

The design of the study was evaluation survey design involving Chemistry laboratories. The population included heads of schools, heads of the Chemistry subject lecturers for Chemistry courses and chief laboratory technologist. Sample in this study included six Tertiary institutions in Rivers state via purposive sampling is the procedure The instrument for data collection was Laboratory Facilities Inventory(LFI) developed by the research and semester result of students The experts were requested to check for clarity, and make necessary corrections that may improve the instrument. The instrument was subjected to a test retest method of reliability. The information gotten was used in estimating the reliability index which will yield a coefficient of 0.82 using the Pearson correlation coefficient. The data collected was analyzed using mean standard deviation and Analysis of Variance for Regression

III. RESULTS

Research Question: To what extent are laboratory facilities available in tertiary institutions in Rivers State?

Table 1: Mean analysis on availability of laboratory facilities.

SN	Items	X	SD	CM	Remark
1	Pipettes	3.00	.000	2.00	Available
2	Cylinder	2.17	.577	2.00	Available
3	Test tubes	2.92	.289	2.00	Available
4	Flasks	2.83	.389	2.00	Available
5	Beaker	2.92	.289	2.00	Available
6	Condenser	2.17	.389	2.00	Available
7	Funnel	2.25	.452	2.00	Available
8	Gas jar	2.00	.426	2.00	Available
9	Gas trough	2.00	.426	2.00	Available
10	Indicator bottles	2.17	.389	2.00	Available
11	Reagent bottles	2.67	.492	2.00	Available
12	Thermometer	2.00	.000	2.00	Available
13	Thermometers	2.00	.000	2.00	Available
14	Watch glass	1.50	.522	2.00	Not available
15	Weighing bottles	1.58	.515	2.00	Not Available
16	Dropping pipette	1.83	.577	2.00	Not Available
17	Fire blanket	1.75	.866	2.00	Not Available
18	Mortar and pestle	2.42	.515	2.00	Available
19	Burette brushes	1.75	.389	2.00	Not Available
20	Funnel (plain polyethene)	2.42	.669	2.00	Not Available
21	First aid box (container)	1.83	.426	2.00	Available
22	Periodic table	1.92	.492	2.00	Available
23	Retort stand	2.75	.452	2.00	Available
24	Retort clamps	2.75	.452	2.00	Available
25	Spatula	2.33	.492	2.00	Available
26	Test tube brushes	2.00	.853	2.00	Available
27	Test tubes racks	2.58	.515	2.00	Available
28	Test tubes holders	2.42	.515	2.00	Available
29	Sand bucket	2.25	.452	2.00	Available
30	Tripod stand	2.17	.577	2.00	Available
31	Wash bottles	2.08	.289	2.00	Available
32	Water gauze	2.00	.426	2.00	Available
33	Water baths	1.83	.577	2.00	Not Available
34	Filter Paper	2.83	.389	2.00	Available
35	First aid box (content)	2.33	.651	2.00	Available
36	Fire extinguisher	2.42	.515	2.00	Available
37	Litmus papers	2.75	.452	2.00	Available
38	Ammonium chloride	2.75	.452	2.00	Available
39	Calcium chloride	2.42	.669	2.00	Available
40	Calcium oxide	2.08	.669	2.00	Available
41	Calcium trioxocarbonate (iv)	2.33	.492	2.00	Available
42	Iodine	2.17	.577	2.00	Available
43	Methyl orange indicator	2.17	.389	2.00	Available
44	Phenolphthalein	2.17	.389	2.00	Available
45	Sodium metal	2.08	.515	2.00	Available
46	Sodium Hydroxide	2.67	.492	2.00	Available
47	Sodium Chloride	2.75	.452	2.00	Available
48	Sodium Trioxonitrate(v)	2.58	.515	2.00	Available
49	Acetic (ethanoic acid)	2.42	.515	2.00	Available
50	Aqueous Ammonia	2.67	.492	2.00	Available
51	Calcium	2.17	.577	2.00	Available

52	Diethyl ether(ethoxyethane)	2.17	.577	2.00	Available
53	Calcium Hydroxide	2.67	.492	2.00	Available
54	Ethanol	2.92	.289	2.00	Available
55	Hydrochloric acid	2.92	.289	2.00	Available
56	Methylated spirit	2.08	.669	2.00	Available
57	Mercury	2.08	.669	2.00	Available
58	Oxalic acid (ethane-dioic acid)	2.17	.389	2.00	Available
59	Concentrated tetraoxosulphate (iv) acid	2.25	.452	2.00	Available
	Pooled Mean	136.78/59 =2.31		2.00	Available

From the table above, out of the 59 apparatus outlined, 7 of those apparatus were found to be not available and 52 of those apparatus were available. However, by dividing the total mean by the number of apparatus outlined we get 2.31 which is greater than the criterion mean value. Therefore, we can say that laboratory facilities in tertiary institutions in Rivers State are available.

*Research Question 2***:** What extent are laboratory facilities used in tertiary institutions in Rivers State.

Table 2: Mean analysis on the use of laboratory facilities.

S/N	Items	X	SD	CM	Remark
1	Pipettes	2.66	.542	2.00	Utilized
2	Cylinders	2.28	.683	2.00	Utilized
3	Test tubes	2.54	.603	2.00	Utilized
4	Flasks	2.43	.603	2.00	Utilized
5	Beakers	2.39	.652	2.00	Utilized
6	Condenser	1.96	.749	2.00	Utilized
7	Funnel	2.21	.721	2.00	Utilized
8	Gas Jar	1.92	.751	2.00	Utilized
9	Gas trough	1.91	.722	2.00	Utilized
10	Indicator bottles	2.18	.706	2.00	Utilized
11	Reagent bottles	2.21	.744	2.00	Utilized
12	Thermometer	1.89	.818	2.00	Utilized
13	Thermometers	1.89	.772	2.00	Utilized
14	Watch glass	1.95	.633	2.00	Not Utilized
15	Weighing bottles	2.08	.727	2.00	Utilized
16	Dropping pipette	1.96	.715	2.00	Not Utilized
17	Fire blanket	1.96	.744	2.00	Not Utilized
18	Morter and pestle	2.13	.709	2.00	Utilized
19	Burette brushes	2.17	.781	2.00	Utilized
20	Funnel (plain polyethene)	2.03	.727	2.00	Utilized
21	First aid box (container)	2.08	.773	2.00	Utilized
22	Periodic table	2.33	.640	2.00	Utilized
23	Retort stand	2.28	.721	2.00	Utilized
24	Retort clamps	2.12	.724	2.00	Utilized
25	Spartula Nickel	2.08	.740	2.00	Utilized
26	Test tubes brushes	1.89	.731	2.00	Not Utilized
27	Test tubes racks	2.13	.655	2.00	Utilized
28	Test tubes holders	2.13	.660	2.00	Utilized
29	Sand bucket	2.03	.733	2.00	Utilized
30	Tripod stand	2.07	.698	2.00	Utilized
31	Wash bottles	1.91	.698	2.00	Not Utilized
32	Wire gauze	2.05	.776	2.00	Utilized
33	Water bath	1.74	.667	2.00	Not Utilized
34	Filter Paper	2.49	.635	2.00	Utilized
35	First aid box (content)	2.18	.657	2.00	Utilized
36	Fire extinguisher	2.21	.732	2.00	Utilized
37	Litmus paper	2.25	.651	2.00	Utilized
38	Ammonium chloride	2.50	.608	2.00	Utilized
39	Calcium chloride	2.18	.722	2.00	Utilized
40	Calcium oxide	2.16	.745	2.00	Utilized
41	Calcium trioxocarbonate(iv)	2.17	.726	2.00	Utilized
42	Iodine	2.21	.647	2.00	Utilized
43	Methyl orange indicator	2.16	.648	2.00	Utilized
44	Phenolphthalein	1.98	.750	2.00	Not Utilized
45	Sodium metal	2.03	.709	2.00	Utilized
46	Sodium Hydroxide	2.19	.690	2.00	Utilized
47	Sodium Chloride	2.20	.705	2.00	Utilized
48	Sodium Trioxonitrate	2.12	.724	2.00	Utilized
49	Acetic ethanoic acid	2.13	.705	2.00	Utilized
50	Aqeous Ammonia	2.13	.709	2.00	Utilized
51	Calcium	2.01	.761	2.00	Utilized
52	Diethyl ether (ethoxyethane)	2.03	.709	2.00	Utilized
53	Calcium hydroxide	2.13	.732	2.00	Utilized
54	Ethanol	2.18	.733	2.00	Utilized
55	Hydrochloric acid	2.27	.742	2.00	Utilized
56	Methylated spirit	2.03	.755	2.00	Utilized
57	Mercury	2.10	.726	2.00	Utilized
58	Oxalic acid (ethane-dioic)	1.94	.748	2.00	Not Utilized
59	Concentrated tetraoxosulphate (iv) acid	2.03	.750	2.00	Utilized
	Pooled Mean	125.57/59 =2.12		2.00	Utilized

From the table above, out of the 59 apparatus outlined,13 of those apparatus were under Utilized and 46 of those apparatus are been used. However, by dividing the total mean by the number of apparatus we have a mean which is greater than the criterion mean value. Therefore, laboratory facilities in tertiary institutions in River State are utilized.

Research Question 3: What is the influence of the use of laboratory facilities on students' academic performance in Chemistry courses?

Hypothesis 1: There is no significant influence on the use of laboratory facilities on students' academic performance in Chemistry courses.

Table 3: Regresssional analysis of the influence of the use of laboratory facilities on students' academic performance in Chemistry

Variable	N	X	SD	R	R^2
CGPA	120	3.33	.62	.202	.041
Utilization	120	2.12	18.01		

Model	SS	Df	MS	F	Sig	Decision
Regression	1.887	1	1.887	5.023*	.027	Sig
Residual	44.318	118	.376			
Total	46.204	119				

Significant, P(.027)<0.05 level of significance

The mean for the CGPA is 3.33and the mean for utilization is also 2.12. The regressional relationship between CGPA and utilization is .202, this relationship is positive but low relationship between CGPA and utilization. However, the R^2 is the proportion of CGPA that can be explained from utilization or the proportion of utilization that can be explained from CGPA The result shows that only 4% of CGPA can be used to explain utilization or 4% of utilization can be used to explain CGPA.However, the ANOVA associated with the regression shows that the relationship between utilization and CGPA is significant, meaning that utilization influences CGPA because the F ratio calculated is found to be significant. Hence, we will reject the null hypothesis and accept the alternative, that there is significant influence of the use of laboratory facilities utilization on students' academic performance as measured in CGPA

IV. DISCUSSION OF THE FINDINGS

Availability of Laboratory Facilities in Tertiary Institution

The results in Table 1 shows that the laboratory facilities are available in the six tertiary Institutions in Rivers State and some of the laboratory facilities available include the following: pipettes, Beakers, Flasks, indicator bottles, Reagent bottles, Litmus papers, Hydrochloric acids, etc. There are some that laboratory facilities that are not found to be available and they include weighing bottles, watch glass, fire blanket, water baths, etc. Since the value gotten after dividing the total mean by the number of apparatus in greater than 2.00 which is the criterion mean, we can say that laboratory facilities in tertiary institutions in Rivers State is available. The result is in line with what Etiuben (2010).Motswiri (2013) showed that availability of laboratory equipment has a significant relationship with students' academic performance in science. The study is in disagreement with Neji, Ukwetang and Nja, (2014) Olajide, Adebisi, and Tewagba(2017) found that laboratory resources are not available for teaching in most of the schools.

Utilization of Laboratory Facilities

The results in Table 2 shows that the laboratory facilities in the tertiary institutions in Rivers State are been utilized. Some of the laboratory facilities been utilized. Include the following: Pipettes, beakers, flask, litmus paper, burette etc. There are some of the Laboratory facilities that are not been utilized or under-utilized and they include; Condenser, gas trough, test tube brushes, water bath, etc. Since, the value gotten after dividing the total mean by the number of apparatus is greater than 2.00 which is the criterion mean, we can say that laboratory facilities in tertiary institutions in Rivers State is been utilized. This result is in line with what Chukwuneka (2010) Maduabum (2013) found that laboratory equipmentutilized during science teaching and learning and it leads to higher achievement. The result of this study is inconsistent with Ndifon and Igwebuike (2019) Neji, Ukwetang and Nja, (2014). Olajide, Adebisi, and Tewagba(2017).The extent of utilization of laboratory facilities forteaching Chemistry in school is significantly less than expectation and most of the resources in the laboratory are not used and students' involvement in the practical activities with the students is grossly low.

Influence of the Laboratory Facilities on Students Academic Performance

The results for table 4.3 shows that only 4% of CGPA can be used to explain utilization or only 4% of utilization can be used to explain CGPA. However, the regression relationship between the two of them is significant, meaning that utilization influences CGPA because the F ratio calculated is found to be significant. Also, there is significant influence of the use of laboratory facilities in student academic performance as measured in CGPA. The result is line with whatIkiroma,B , Chinda and Bankole(2021). Ndifon and Igwebuike (2019) Neji, Ukwetang and Nja, (2014).

Olajide, Adebisi, and Tewagba(2017) asserts that utilization of laboratory facilities and has positive relationship with students' academic performance towards science teaching and promotes good academic performance in the subject.Similarly Brewton (2010) found that effective utilization of laboratory equipment during classroom interaction influenced students' academic performance in Science.

V. CONCLUSION

This study focused on the effect of availability and use of laboratory facilities in student's performance in Chemistry

courses in tertiary institutions in Rivers State. The result reveals that some laboratory facilities were found to be available and utilized in the various tertiary institutions. The finding also shows that there is significant influence of laboratory facilities utilization on students' academic performance as measured in CGPA. Consequently, sufficient laboratory apparatus's must be delivered if the teaching and academic achievement of under graduates studying Chemistry courses in tertiary institution must improve.

VII. RECOMMENDATIONS

On the basis of the study findings as indicated in the conclusion, the following recommendations are provided:

- Students' enrollment should correspond with increase in teaching resources including laboratory equipment and chemical to facilitate learning both theoretically and practically.
- Government should ensure adequate provision of laboratory facilities,
- Schools should source funds from organizations like NGOs to equip the laboratory
- Lecturers should develop the spirit of professionalism by using the available laboratory facilities in teaching.

REFERENCES

[1] Brewton, C. C. (2000). Gender equality in science, technology and Mathematics education. *Journal of Science Teachers' Association of Nigeria*, 42(2), 37-39.

[2] Chukwuemaka, P. C. (2008). Efficacy of utilization of laboratory resources on the acquisition of science process skills among primary science pupils. Paper presented at the 49thannual Science Teachers' conference STAN, Nsugbe, August 3-5.

[3] DienyeN.E.& Gbamanja S.P.T. (1990). *Science Education Theory and Practices*. Port Harcourt: Totan Publisher Limited.

[4] Etiubon, R. U. (2010). Effect of Instructional Strategies and Students' Variables on their Cognition of World Economic Meltdown. *Journal of Science Teachers' Association of Nigeria*, 52, 413-418.

[5] Igwe.I.O. (2003*) Principles of Science & Science Teaching in Nigeria (An Introduction)*. Enugu: Jones Communications Publishers.

[6] Igboabuchi, A. (2010). Biology Laboratory Facilities as a Strategy for Salvaging Dwindling Economy. *Journal of Science Teachers' Association of Nigeria*, 42, 251-254.

[7] Ihuarulam, A. I. (2008). Chemistry Teachers' Perception of Availability and Utilization of Resources for Curriculum Development in Kano State. Published M.Ed. thesis, *Universityof Kano, Nigeria*.

[8] Ikiroma, B. & Chinda, W**.**(2013). The Impact of Inquiry, Project and Lecture/demonstration

[9] Teaching Methods on Senior Secondary Student's Achievement in separation of Mixtures

[10] Practical Test. *Journal of issues in ProfessionalTeacher Education* **6** (2): 16-30.

[11] Ikiroma,B , Chinda,W. Bankole, I .S.(2021). Chemistry Laboratory Safety Signs Awareness among Undergraduate Students in Rivers State *Journal of Chemistry: Education Research and Practice*, *5: 47-54.*

[12] Ivowi, U. (1983). Relationship Between Laboratory Facilities and Students' Academic Performance in Anambra State. *Journal of Nigeria Educational Research Association*, 8, 32-33.

[13] Motswiri, M. (2010). Supporting Chemistry Lecturers in Implementing Formative Assessment inn Investigative Practical work in Botswana. A Thesis for award of PhD degree at *University of Twente Enschede* .

[14] Maduabum, M. A. (1998). Teaching integrated science effectively. Onitsha: Space Matrix.

[15] Mathew, J. C. (1998). Objectives of laboratory teaching education in Chemistry. Journal of Science Teachers Association of Nigeria, 6, 206-208.

[16] Neji, H.A. Ukwetang, J.O. & Nja, C.O. (2014). Evaluating the Adequacy of Laboratory Facilities on Student's Academic Performance in Secondary School in Calabar, Nigeria. *Journal of Research & method in Education* 4, (3), 11-14.

[17] Ndifon, R. & Igwebuike O. (2019) Institutional Academic Culture and Effective Implementation of Educational Technology Curriculum in Tertiary Institution in Cross Rivers State Nigeria.*International Journal of Education Learning and development*, 7(11): 12-21.

[18] Omari, I. M. (2011*). Concept and Methods in Educational Research. A Practical Guide Based On Experience.* Dares Salaam: Oxford University Press.

[19] Olajide, S.O., Adebisi, T.A. & Tewagba T.A. (2017) Assessment of Laboratory Resources Teachers' and Students' Involvement in Practical's Activities in Basic Science in Junior Secondary Schools in Ogun State Nigeria. *Journal of Education and Social Research* 7(3) 139-146.