



## **Effect of Chemistry Practical on learning of Chemistry among students in Public Secondary Schools in Nasarawa state**

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### **ABSTRACT**

The current study investigates the effect of chemistry practical on learning of chemistry in public secondary school secondary school in Nasarawa state. The objective of the study was to examine whether boys and girls exposed and those not exposed to chemistry practical differ significantly in their average score. To achieve this the study employs a quasi-experimental research design specifically pre-test and post-test score to test the null hypothesis. The sample and sampling techniques were 200 SS2 students and stratified random sampling techniques was used. In post-test, the boys mean values was 11.40 while that of the girls was 13.31. In pre-test the boys mean was 10.30 while that of the girls was 11.27. The findings shows that girls had performed better than the boys in both tests. In the post test mean comparison for boys and girls, assuming equal variances, the t value is -1.213 with degrees of freedom of 236. The two-tailed p value associated with the test is 0.133. 0.133 is greater than 0.05, so we accept the null hypothesis, that is, there is no significant difference in post-test performance in chemistry of girls and boys exposed to chemistry practical's and those not exposed. In the pre-test mean comparison for boys' and girls' schools, assuming equal variances, the T value is -1.703 with degrees of freedom of 236. The two-tailed p value associated with the test is 0.190. The decision rule is given by: If  $p \leq \alpha$ , then reject  $H_0$ . In this analysis, 0.190 is greater than 0.05, so we accept the null hypothesis. This implies that there is no significant difference. It was therefore concluded that students' performance in chemistry in public secondary schools is no gender bias.

Keywords: Chemistry, Practical, Students, Performance

### **Introduction**

Teaching and learning of science have significant roles towards technological development in developing countries like Nigeria. Since chemistry is embedded in our life and society, economically, ecologically and societal influences (Okeke, 2011: 2019). Effective teaching and learning of Chemistry in Nigerian schools is therefore desirable (Tsobaza and Njoku, 2021). The performance of students in science-based subjects like chemistry is closely related to their theoretical and practical knowledge (Akpan, 2010). However, Chemistry teaching and learning in most Nigerian schools do not proceed as desired. This is because students' performance is perennially poor in Chemistry external examinations. The trend in the academic performance of Chemistry students in senior secondary school examinations (SSCE) has not been encouraging (Ajagun, 2006). The West African Examination Council (WAEC) Chief Examiner's reports for senior secondary certificate examination for 6 years (2000-2007, 2012, 2013, 2015 and 2016), identified that one of the reasons for poor performance of students in Chemistry is ineffective teaching method adopted by Chemistry teachers, as well as students' inadequate exposure to practical laboratory work (Tsobaza and Njoku, 2021). Akanbi (2003) on the other hand, attributed the poor performance of students in science subjects to a number of fundamental reasons, which could be due to shortage of science teachers in quality and quantity, inadequate laboratory equipment and facilities, shortage of suitable science textbooks and other factors. Bamidele (2004) observed lack of interest in sciences by students due to preconceived idea that physics and chemistry are difficult subjects has affected the enrolment and performance of students.

The poor performance chemistry is no gender exception it cut across both male and female but it is very important to find out the level of failure between male and female so as to proffer adequate solution to it. Effect of gender on school science cannot be overemphasised. Gender difference is characterised by female underrepresentation and underachievement in science (Gipps 2004). Gender has remained a burning issue and has also remained relevant in education because it has been linked to achievement and participation in certain professions (Ventura, 2008). Certain cultures restrict particular gender to certain professions like: farming, engineering and trading (Okeke, 2019). Therefore; using gender as moderating variables in an experimental study can yield useful practical information. However, there have been conflicting findings on how gender influences academic achievement. It seems the influence of gender varies according to school subjects (Olatoye & Afuwape, 2007).

Adeyemo (2010) in his findings, showed that there is a significant sex difference in academic Achievement in science with male achieving higher than female in Nigeria Schools. It seems therefore that the results in Nigeria favour male students. Thus, studies outside Nigeria supported the males' superiority in academic achievement over female. However, Adeyemo (2010) was not in complete agreement with the males' trend in sex differences with regards to achieving in science. His study also showed that the performance of students in co-educational schools were better than those in single schools. He also found that female in single schools had better scores in Chemistry than male in single schools.

### ***Statement of the problem***

This study intends to examine the effects of chemistry practical learning of chemistry by SS2 students in Nasarawa Eggon, Akwanga and Wamba local government area of Nasarawastate. Poor performance of students in Chemistry has continued to be the major concerns, the increasing failure rate that fluctuates from year to year in Chemistry in school examinations becomes worrisome to concerned stakeholders in Nasarawa state.

### ***Purpose of the study***

The purpose of this study was to investigate the effect of Chemistry practicals on learning of Chemistry among secondary school students.

### ***Objective of Study***

Find out whether boys and girls exposed and those not exposed to chemistry practicals differ significantly in their average score.

#### **Research Questions**

The following two research questions guided the study:

1. What are students' mean scores in Chemistry practical skills when taught using group work?
2. What are the male and female students' mean scores in acquisition of Chemistry practical skills?

### ***Research Hypotheses***

A research hypothesis is generated for the study and tested at significance alpha level of 0.05. **H<sub>0</sub>**: There is no significant difference in performance in chemistry between girls or boys exposed to chemistry practicals and those not exposed.

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## **Method of the study**

The study involves the use of regular class periods in their various schools and locations. The study adopted survey as the design of the study. The area of the study is Nasarawa North senatorial zone. The population of the study comprises all the senior secondary schools SS2 Chemistry Students in Nasarawa senatorial zone. The zone comprised of the three local governments. They are Akwanga local government area, Nasarawa Eggon local government and Wamba local government area. In each of the LGA, five public secondary schools were selected. In all, fifteen public secondary schools were randomly selected. One girl schools and others are mixed schools. The researchers had earlier visited the sampled schools and made known to the principals and chemistry teachers their intention to carry this research in their schools. The researchers interacted to identifying the existing problem of poor performance in chemistry and related hindrances within an academic environment. They urged them to step up the teaching of chemistry practical in their schools as it may turn out to be good omen for the students and teachers in the struggle to be great Science. Thereafter, both formative and summative evaluation of learners were given priority during data collection in the so-called pre-test and post-test non-randomized experimental group. Apart from tests given to learners, a questionnaire was designed and sent to 30 selected science teachers to gain their insight into practical work and hindrances towards successful implementation. The data obtained from the rating of the research subjects were analyzed to answer the research questions and test the hypothesis. The statistics involved in the data analysis were mean and standard deviation of scores. T-test analysis was used to obtain t-calculation and hence t-critical.

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## **Results and Discussion**

The results of the analysis, were presented in Tables and discussions of findings of this study

### ***Performance of Girls and Boys Exposed to Chemistry practical's and Those Not Exposed***

The study sought to examine the null hypothesis that there was no significant difference in performance in chemistry between girls and boys exposed to chemistry practicals and those not exposed.

**Table 1: Comparison of Boys' and Girls' Performance**

	Type of school	N	Mean	Std. deviation	Std. error mean
Post test	Boys	85	11.40	2.87	.134
	Girls	100	13.31	2.28	.169
Pre test	Boys	85	10.30	3.18	.312
	Girls	100	11.27	3.06	.227

The Table 1, gives the descriptive statistics for each of both pre-test and post- test for boys and girls. In post -test, the boys mean values was 11.40 while that of the girls was 13.31. In pre-testthe boys mean was 10.30 while that of the girls was 11.27. The findings shows that girls had performed better than the boys in both tests.

**Table 2: Shows T-Test Results on Performance of Girls and Boys Exposed to Chemistry Practicals and Those Not Exposed**

Independent test	T	Df	Sig. (2- tailed)	Mean difference	Std. Error difference
Post test	-1.213	236	.133	-.405	.239
Pre test	-1.703	236	.190	-1.05	.328

Table 2, shows the findings obtained after conducting independent T test on performance in chemistry of girls and boys exposed to chemistry practicals and those not exposed. The independent T test compares any significant difference between two means for both pre-test and post-test of girls and boys. In the post test mean comparison for boys and girls, assuming equal variances, the t value is -1.213 with degrees of freedom of 236. The two-tailed p value associated with the test is 0.133. 0.133 is greater than 0.05, so we accept the null hypothesis, that is, there is no significant difference in post-test performance in chemistry of girls and boys exposed to chemistry practicals and those not exposed.

In the pre-test mean comparison for boys and girls' schools, assuming equal variances, the T value is -1.703 with degrees of freedom of 236. The two-tailed p value associated with the test is 0.190. The decision rule is given by: If  $p \leq \alpha$ , then reject  $H_0$ . In this analysis, .0.190 is greater than 0.05, so we accept the null hypothesis. This implies that there is no significant difference in pre-test performance in chemistry of girls and boys exposed to chemistry practicals and those not exposed.

## Conclusion and recommendations

Students' performance in chemistry in public secondary schools is no gender bias; however, female students are better in performance than male students

### Recommendation

1. The study recommends thatthe government should equip secondary school laboratory with chemicals and other equipment to enable students' demonstration during chemistry practical class.
2. Employment of qualify chemistry teacher to teach the students will help to increase students' interest and performance in chemistry.
3. Chemistry teachers should adopt group work strategy in their Chemistry practical teaching/learning activities as it enhances the overall performance of students in Chemistry practical activities.

### References

- Adeyemi, T. O. (2010). A comparative study of students' academic performance in public examinations in secondary schools in Ondo and Ekiti States. *Nigeria Current research Journal of Economic Theory*. 3(36-42).
- Adodo, S. A. &Oyeniya, J. D. (2013). Students variables as correlates of secondary school student Performance in Biology. *International Journal of Science and Research*, 2 (7), 34- 42.
- Daso, P. O. (2013). Science education reforms in Nigeria: Implication for science teachers. *Global Advanced Research Journal of Peace, Gender and Development Studies*, 2(5), 86-90.
- Eze, C. U. (2006). Ensuring Effective utilization of the laboratory in science pedagogy: A challenge to science Education in the 21st century Nigeria. Ebonyi State University. *Journal of Education*; 4(1),84-88.
- Federal Ministry of Education (2009).Senior secondary schools curriculum: *Biology for senior secondary schools*. Abuja-Nigeria: NERDC press.
- Federal Republic of Nigeria (2014).*National Policy on Education.(4th Edition)*. Lagos: NERDC
- Odutuyi, M. O. (2015). Effects of laboratory learning environment on students' learning outcomes in secondary school Chemistry. Selected from six Local Government Areas (LGAs) of Ondo State. *International Journal of Arts and Sciences*, 8(2), 507-525.
- Johnson. D.W. and Johnson R.T. (1987). *Learning Together and Alone: Co-operation and Individualizatian(2"EDITION)* New Jersey Eagle Wood Diff.
- Okeke, O.1 (2011) Effect of Mend Mapping Teaching Strategy on students Interest, Achievement andRetention in Senior Secondary School Chemistry.

Unpublished Ph.D. Thesis. University of Nigeria, Nsukka

- Akpan, E.U. (2010) government and science and technology education in Nigeria, *Journal of educational issues*. 1(1), 101-113.
- Okeke, O.J. (2015) Quality Assurance in Teaching and Learning in Tertiary Institutions in Nigeria. A paper presented to the Academic Forum (TAF) Titled QUALITY ASSURANCE IN TERTIARY EDUCATION IN NIGERIA held around September 17<sup>th</sup>-19<sup>th</sup> *Journal of Science Education*, 3(1&2), 198-203.
- Akanbi A.O. (2003). Trend in physics education in secondary school in kwara state. *Lafiagi Journal of science education*, 5(1& 2), 69- 75.
- Tsobaza, M. K. & Njoku, Z.C. (2021). Effect of Practical Chemistry Teaching Strategies on Students' Acquisition of Practical Skills in Secondary Schools in Kogi State *African Journal of Science, Technology & Mathematics Education (AJSTME)* ISSN: 2251-0141 Vol. 6, (1) Pp 195-205.
- Njoku, Z.C. (2007). Comparison of students' achievement in three categories of questions in SSCE practical Chemistry Examination. *Journal of the Science Teachers Association of Nigeria*. 42(1 & 2), 1-2.
- Adeyemo, S.A. (2010). Teaching/ learning physics in Nigerian secondary school: The curriculum transformation, issues, problems and prospects. *International Journal of Educational Research and Technology*, 1 (1), 99-111
- Ajagun, G.A. (2006). Towards good performance in science education. *Journal of Teacher Education and Teaching*, 2(1), 117-125.
- Gipps, K. S. (2004). Gender inequality. In Therney, H. (Ed.) *Women's Studies Encyclopedia*. New York: Peter Bedrick Books.
- Olatoye, R. A. & Afuwape, M. O. (2007). *Emergency issues in enhancing teaching and CT Mining of science in schools*, in O. A. Afemikhe and J. G. Adewale (Eds). *Issues in educational measurement and evaluation in Nigeria*. Institute of education university of Ibadan: Ibadan, Nigeria.
- Bamidele, L. (2004). Students' poor performance in physics. A bane to our nation's technological development. *Nigerian Journal of Science Education and Practice*, 2(1), 174
- Bello, G. (2002). Gender difference in school science: Implication for science teacher education. *Journal of Curriculum and Instruction*, 6(1&2) 55-6
- Okeke O.J. (2019). Influence of Chemistry Practical on Students Interest and Academic Achievement in Senior Secondary Schools Chemistry. *South East COEASU Journal of Teacher Education* 3(1): 206-211.
- Ventura, F. (2008). Gender, science choice and achievement: A maltese perspective. *International Journal of Science Education*, 14(4), 445-461.
- WAEC (2015). Chief Examiner's reports for May/June WASSCE. Lagos: WAEC