

Impact of Class-Wide Peer-Tutoring Strategy on Secondary School Slow Learners' Performance in Redox Reactions in Funtua, Katsina State-Nigeria

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Abstract The performance of senior secondary school students in chemistry has been very poor over the years in Nigeria. Teachers' use of inappropriate instructional strategies and students varied abilities has been identified responsible for this problem. This study examined the impact of Class-Wide Peer-Tutoring Strategy on secondary school slow learners' performance in redox reactions in Funtua Education Zone, Katsina State, Nigeria. Quasi-experimental design was adopted for the study. The study involved a population of 977 SS2 Students. A sample of 108 slow learners drawn from two secondary schools were used. Three research hypotheses guided the study. Treatment involved teaching experimental group by trained peer tutors using CWPT while the control group was taught by the teacher using lecture method. Redox Performance Test (REPT) duly validated by experts with a reliability coefficient of 0.85 obtained using test retest method was used for data collection. Hypotheses were tested using t-test at 0.05 levels of significance. Results revealed that slow learners taught by peer tutors using CWPT performed significantly better than those taught by the teachers using lecture method. The study recommended that chemistry teachers should be trained through workshops, seminars and conferences on the use of class-wide peer-tutoring strategy in teaching and learning of chemistry.

Keywords: Academic Performance; Class-wide Peer-tutoring; Redox Reaction and Slow Learners.

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1. INTRODUCTION

Chemistry is a branch of science that is concerned with the study of matter and its composition, structure and properties; as well as the changes that matter undergoes on addition or removal of energy in any of its several forms. Chemistry is defined as the science of materials in the natural and built environment that is concerned with the production of materials that are pivotal to the development in the natural world [30]. Similarly, chemistry is also regarded as an experimental subject that involves study of the processes and interactions that create gases, liquids and solid substances that compose the physical world [37]. This shows that chemists learn how to create new substances from other substances. For example, soap is manufactured from oil and caustic soda; plastics from petroleum products and many others. Chemistry is one of the core science subjects taught at senior secondary school level, hence students are expected to pass chemistry at credit level in order to qualify for admission into tertiary institutions to pursue science-based programmes, such as engineering, medicine, pharmacy, agricultural science and teaching profession in science related subjects [46]. It is therefore on this basis that a good knowledge of chemistry is needed for one to become a professional in any science and technology related disciplines.

The importance of chemistry to mankind, technological development and its central role in other sciences can be seen in almost every human endeavour. For example, [19] stated that knowledge of chemistry is used for the production and invention of materials and instruments that better the life of people and explain the processes of nature happenings in the environment. Similarly, [38] opined that learning of chemistry was imperative in every society if the citizens are to cope with the fast changing development in science and technology. This may account for its inclusion in school curriculum as a compulsory subject for every science student of school age to acquire the appropriate skills to cope with life challenges as observed by [37].

Despite these significant roles of chemistry, it is very disappointing to note that students' performance in the subject in both internal and external examinations have remained consistently poor over the years [50]. It is in line with this [2] opined that the persistent poor performance in chemistry in senior school certificate examinations by secondary school students need urgent attention from chemistry teachers, school administrators, parents and the general public. He added that, although chemistry educators have put efforts aimed at identifying the major problems associated with the teaching and learning of chemistry in the Nigerian schools; the problem has continued to manifest in public examinations. Studies carried out by [4, 35, 42, & 30] attributed students' mass failure in chemistry to the use of inappropriate instructional strategies,

ineffectiveness in classroom interaction with students and students' low level of confidence in some chemistry concepts. Another reason identified by [47] is the students' perception of some chemistry concepts as complex and difficult to understand, such concepts include: stoichiometry; equilibrium in chemical reactions; oxidation and reduction reactions; electrolysis; among others.

The present study focused on oxidation and reduction reactions as one of the topic considered to be difficult to understand by Students. An oxidation-reduction reaction (Redox reaction) is the transfer of electron from one atom to another. Similarly, [1] defined redox as a reversible reaction that involves transfer of oxygen or hydrogen atoms or electrons from one unit of matter to another. Some examples of this concept as observed by [36] usually occur in the process of photosynthesis, respiration, combustions, browning of fruits and corrosion or rusting of metals among others. However, [39] observed that, students perform poorly in redox reactions concept in public examinations at the secondary schools level.

The use of ineffective methods in teaching chemistry has resulted in memorization of scientific concepts and principles by learners without having deep understanding of scientific phenomena, concepts and theories [9 & 31]. Selection and use of appropriate instructional methods, effective strategies and use of relevant instructional materials are the basic condition for successful teaching and learning [9].

Chemistry teaching need to be friendly and relevant in order to make necessary provisions for students' active participation in the learning process so that students will be able to connect scientific theories and concepts to real purposes and practices in the world in which they live [13 & 25]. Among the methods and strategies for teaching chemistry are problem solving method, expository method, inquiry – based teaching approach, demonstration and cooperative learning among others as noted by [26]. Unfortunately most teachers teach chemistry using predominantly the lecture method.

According to [7] lecture method is defined as a teaching approach that entails verbal presentation of scientific facts, concepts and principles to learners. [35&42] added that during lecture teacher focuses the students' attention on the key points in the lesson and may use diagrams or other representations to elaborate on the subject matter. Research conducted by [9] indicated that the predominant use of lecture method does not enhance understanding of chemistry concepts by secondary school students. She added that, the method does not take care of the individual differences and students' learning abilities.

A neglected variable in the teaching and learning of chemistry is the students' learning abilities [36]. The rate at which students learn differs, some learn slowly while others learn very fast as noted by [8]. Slow learners are

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students that performed below average and their intelligence test scores are too high for consideration as students with mental retardation [23]. In addition [43] opined that a slow learner in diagnostic category is a term used to describe students who has the ability to learn necessary academic skill, but at a rate and depth below average of same age peers. Study conducted by [14] revealed that one of the objectives of science teachers are to identify the ability of students in their classroom and devise teaching strategies that could best carry along the entire class during lesson. However, the work of [41] reported that, it is extremely difficult for a teacher to meet the individual needs of students with varied ability in a lesson using lecture method. Hence, the need for a strategy that will ease the way teacher teaches such as class-wide peer-tutoring that allow students to learn at their own pace. The present study therefore, examined the effect of class-wide peer-tutoring strategy on secondary school slow learners performance in redox reactions.

Peer-Tutoring (PT) is defined by [49] as the acquisition of knowledge and skill through active helping and supporting among status equals or matched companions. Similarly, [40] opined that Peer tutoring consists of two or more students, working together, teaching and learning from each other. Moreso, [15] reported that, Class-wide peer-tutoring strategy is very important where there is large class size that will not allow teacher to give individualized attention to the students. Research by [10] added that, Class-wide peer-tutoring involves pairing brighter students or fast learners (tutors) with less bright or slow learners (tutees) on a particular concept. Another research conducted by [2] indicated that in Class-wide Peer-Tutoring session, students are opportune to interact actively among themselves and by so doing learn from their peers. Similarly, [24] reported that Class-Wide Peer-Tutoring has been commonly implemented in many educational settings in variety of contents and across a wide range of ages and gender.

The issue of gender cannot be overlooked in this study, since most of the schools in the study area are coeducational with mixed classes of boy and girls. Study conducted by [25] indicated that, there was a lot of gender influence on students' Performance in science. For example, [22] reported significant impact of gender on academic Performance with boys having better scores than girls in chemistry. Conversely, [6&33] found no gender difference in academic Performance of students exposed to different teaching strategies in science. However, [45] indicates that, boys perform well in any rigorous work while girls show to settle for less rigorous work. In this study, gender differences in secondary school slow learners' performance in redox reaction when taught using class-wide peer-tutoring strategy was investigated.

2. STATEMENT OF THE PROBLEM

Persistent poor performance of senior secondary school students in chemistry in senior school certificate examination has continued to receive research attention. Many factors such as inadequate qualified chemistry teachers, dilapidated chemistry laboratory, large class size, and use of inappropriate teaching methods by chemistry teachers have been identified by researchers like [12 & 48] as contributing to students' poor performance in chemistry. Several studies have shown Class-wide peer-tutoring as an important factor that enhances performance in other school subjects such as Physical and health Education, Agricultural Science, Social studies, English Language, Mathematics, Acquisition of science vocabulary words and Music (44, 32, 21, 15, 49, 29 & 51). However, there is relatively few works on the impact of class-wide peer-tutoring strategy on senior secondary school slow learners' performance in redox reactions particularly in Katsina state.

The need therefore arises for a study of the impact of class-wide peer-tutoring strategy on secondary school slow learners performance in redox reactions in Katsina State. It is base on forgoing that the study seeks to close the gap.

3. OBJECTIVES OF THE STUDY

The objectives of the study is to find out the mean performance scores of slow learners when taught redox reactions by trained peer tutors using CWPT and those taught the same concept by the regular chemistry teacher using lecture method. It also examines the differences in the performance of male and female slow learners in redox reaction concept when taught using CWPT.

4. RESEARCH HYPOTHESES

The following hypotheses were formulated to guide this study. They were tested at 0.05 alpha levels of significance

1. There is no significant difference between the performances mean scores of slow learners taught redox reactions using CWPT and those taught the same concept using lecture method.
2. There is no significant difference between the performances mean scores of male and female slow learners taught redox reactions by peer tutor using CWPT.

5. METHODOLOGY

5.1 Research Design

The design of the study was quasi-experimental research design. It utilized the non-randomized pre-test post-test control group design. The classes used were intact classes. The design is presented as follows:

$$EG \rightarrow O_1P \rightarrow X_1 \rightarrow O_2P$$

$$CG \rightarrow O_1P \rightarrow X_0 \rightarrow O_2P$$

Figure 3: Illustrations of Research Design.

Key

EG = Experimental group- exposed to CWPT; CG = Control group - exposed to Lecture Method; O_1P = Pre-test on Performance in redox reaction; O_2P = Post-test on Performance in redox reaction; X_1 = Class-Wide Peer-Tutoring Strategy; X_0 = Lecture Method.

6. TARGET POPULATION

The population for the study consists of all the secondary school slow learners in SS2 offering chemistry in Funtua education zone of Katsina State, Nigeria. The total population of SS2 students is nine hundred and seventy seven (977) distributed across the six local governments Area in the zone.

7. SAMPLE AND SAMPLING TECHNIQUES

The sample of the study comprised of one hundred and eight (108) SS2 chemistry students selected from two public co-educational secondary schools in the study area. Stratified Random Sampling was used to group the twenty-one (21) schools in the study population into stratum according to the six (6) local government areas in Funtua Educational Zone, and one (1) school is randomly selected from each strata. A general chemistry performance test was administered to SS2 students in each of the six schools selected to determine their equivalence in terms of academic performance. This was achieved by subjecting the students test scores for the six schools to Analysis of Variance and Scheffe test. The following schools Government Senior Secondary School, (GSSS) Funtua and Government Senior Secondary School (GSSS) Kurami were found to be relatively similar. The status of the schools was determined using simple random sampling technique involving balloting. The names of the two schools were written on a piece of paper, folded and placed in

a container. The papers were pick without replacement and placed into two different containers labelled as experimental and control groups. As a result of this exercise GSSS Funtua was assigned as experimental group while GSSS Kurami as control group.

The subjects used for the study were slow learners in each of the SS2 class identified by their chemistry teachers based on the following characteristics highlighted by [9]:

- Ability to learn necessary academic skills at a rate and depth below average of same age peers.
- Scores consistently low in achievement tests.
- Masters skills slowly; some skills may not be mastered at all.

A total of one hundred and eight (108) slow learners drawn from the two schools are used as the subject for the study. There were 61 slow learners in the experimental school and 47 slow learners in the control school. However in the experimental group, twelve (12) slow learners were randomly selected, and trained by the researcher to serves as tutors and the remaining 49 slow learners serves as tutees. While all the 47 slow learners in the control group were taught same concepts by the regular chemistry teacher using lecture method.

8. INSTRUMENT

The research instrument used for this study was developed by the researcher and tagged Redox Performance Tests (REPT) comprising of 40 items test, to determine the academic performance of chemistry students before and after the treatment. Six redox reactions concepts are distributed in the instrument consist of 35 objective test items and 5 True or False questions. The pretest was used to establish the baseline of slow learners before the commencement of the treatment. The posttest was used to determine the effect of class-wide peer-tutoring on academic performance of slow learners in senior secondary school.

9. VALIDATION

The instrument REPT was subjected to both contents and face validity. The content validity was accomplished by ensuring that the test reflected the test blue print. Face validity was carried out by three lecturers in the Science Education and Chemistry Department, Federal University Dutsin-ma, Katsina State. The validators were given the research topic, research questions and hypotheses to enable them validate the instruments.

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10. RELIABILITY

To ensure that the items are consistent, test retest reliability method was used. Thirty (30) slow learners that are not part of the study were tested on the items. REPT was administered and re-administered after the interval of two weeks to the slow learners. The scores of the two tests were compared using Pearson Product Moment Correlation Coefficients (PPMC). REPT gave a reliability coefficient of 0.85.

11. TRAINING PROGRAMME FOR PEER TUTORS

Twelve (12) slow learners (8 girls and 4 boys) randomly selected from the sixty-nine slow learners in the experimental group were trained as peer tutors by the researcher. The researcher groomed by subjecting them to training for a period of one week at one hour training per day by the researcher. They were trained on how to conduct instructions in chemistry based on the general process of implementing a peer tutoring lesson:

1. The researcher trained the (peer tutors) on the process of peer tutoring and strategies for fulfilling their role as tutors in the following ways:
 - The peer tutors were trained on how to teach the redox reactions sequentially to the tutees following the lesson step by step.
 - The peer tutors were guided on how to use simple explanations to teach each redox reaction concepts using the language level of the tutees for easy understanding.
 - They were guided on how to use questions and answers session and by so doing provide immediate feedback to the tutees.
2. Peer tutors retrieved their tutoring materials prepared by the researcher and followed the structured tutoring procedure, in which tutors presented the selected redox reactions concepts to the tutees.

At the end of the training, one trained tutor is assigned to each of the seven tutoring dyads in the experimental group and the remaining five trained tutors were kept as reserved.

12. METHOD OF DATA ANALYSIS

The hypotheses were tested at 0.05 levels of significance using independent sample t-test. The t-test was deemed appropriate for testing the hypotheses because it is procedure for testing two means. The posttest scores of the experimental and control group were used for analyzing the data.

13. RESULTS

14.1 Hypothesis One

There is no significant difference in the performance mean scores of slow learners taught redox reactions using CWPT and those taught the same concepts using Lecture Method.

Table 1 shows that, the t-value of 3.16 was obtained and the P-value observed was 0.02 at the degree of freedom of 94. The critical P-value of 0.02 is less than the alpha value of 0.05. This indicates that there was a significant difference in the performance of students taught redox reaction using class-wide peer-tutoring and those taught using lecture method. Thus, null hypothesis that states, there is no significant difference in the performance mean scores of slow learners taught redox reactions using CWPT and those taught the same concepts using Lecture Method is hereby rejected.

14.2 Hypothesis Two

There is no significant difference between the performances mean scores of male and female slow learners taught redox reactions by peer tutors using CWPT.

Table 2 shows that the t-value of 1.55 was obtained and the P-value observed was 0.13 at the degree of freedom of 47. The critical P-value of

Table 1: t-test Analysis on Post-test Performance Mean Scores of Slow learners in Experimental and Control Groups.

Groups	Subjects	Mean	Std.dev.	Df	t	p	Decision
Experimental	49	23.39	5.19	94	3.16	0.02	Significant
Control	47	19.87	5.97				

Table 2: t-test Analysis on Post test Performance Mean Scores of Male and Female Slow learners in the Experimental Group.

Gender	Subjects	Mean	Std.dev.	Df	t	P	Decision
Male	29	23.71	6.09	47	1.55	0.13	Not Significant
Female.	20	21.28	3.43				

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0.13 is greater than the alpha value of 0.05. The null hypothesis which states that there is no significant difference between the performance means scores of male and female slow learners taught redox reactions by peer tutors using CWPT is retained.

DISCUSSION OF RESULTS

The result of this study revealed that class-wide peer-tutoring strategy is a good science instructional strategy that leads to high performance and greater achievement level. This was evident in the performance mean scores of slow learners in the experimental group taught redox reaction concepts by the peer tutors using CWPTS. This finding is in agreement with the findings of [1, 6, 33, & 3]'s finding which revealed that Peer-Led Guided Inquiry and Class-Wide Peer Tutoring Instructional Strategies are more effective than conventional lecture method in terms of enhancing students' academic performance in practical chemistry. In addition, [6&33) confirmed that students exposed to Class-wide Peer-tutoring strategy in pasture and forage crops concepts of agriculture performed significantly better than those exposed to conventional lecture method [F2, 137 = 7.072; $p < 0.05$].

The result of the study also showed that the male slow learners score higher than the female slow learners in both experimental and control groups. This proved that gender has a role to play in academic performance of slow learners. Supporting this finding; [11] had reported from their study that male students performed significantly better than their female counterparts in science, both in the pretest and posttest of Biology Achievement Test after exposing the students to the concept mapping teaching method. Thus the findings of previous studies are in agreement with the findings of the present study.

Moreover, the result of the study showed that Male and female slow learners in experimental group not differ significantly in performance when redox reaction concept taught by the peer tutors using CWPTS. Thus, CWPTS is said to be gender friendly. This report agrees with the earlier reports by [14, 32, & 45]. [14]'s reported that there is no significance difference between students' performance in biology and chemistry but reported a significant difference in physics (boys scoring higher). Findings from the work of [45] reported that student's achievement in Agricultural science is not influenced by gender. [32] Confirmed that, there was no significant difference between male and female achievement in science.

CONCLUSION

Peer tutoring instructional strategy can be taken as one of the teaching strategies that could be used to enhance academic performance of slow learners in redox

reaction concept of chemistry. Slow learners in the experimental group tend to do better than their counterparts in the control group. Class-wide Peer tutoring is a one of the strategy in the teaching – learning process and could contribute in improving persistent poor academic performance in chemistry existing amongst senior secondary school students in Nigeria. Hence, secondary school chemistry teachers should combine peer tutoring instructional strategies with their usual classroom teaching to enhance academic performance of secondary school slow learners in chemistry.

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RECOMMENDATIONS

Based on the findings from the study, the following recommendations are made:

- Seminars, Conferences and Workshops should be organized to train teachers on the knowledge and skills of effective implementation of class-wide peer-tutoring programmes in schools since it facilitates academic performance in slow learners.
- Teacher training colleges and faculties of education in Nigerian Universities should incorporate class-wide peer-tutoring instructional strategy in their curriculum so that prospective teachers will acquire basic skills for design and implementation of peer tutoring programmes.

REFERENCES

- [1] Ababio, O. (2008). *New School Chemistry for Senior Secondary Schools* Onitsha, Anambra
- [2] Abdulmalik, S. (2015). *Impact of Class-wide Peer-tutoring Strategy on Secondary School Students' Academic Performance and Confidence in Redox Reaction in Katsina State Nigeria*. An Unpublished Masters Dissertation Submitted to the Department of Science Education Ahmadu Bello University Zaria.
- [3] Abiodun, D. B. (2010) *Peer-Led Guided Inquiry and Class-Wide Peer Tutoring Instructional Strategies as Determinants of Senior Secondary School Students Performance and Practical Problem-Solving in Chemistry Being a Research Proposal Submitted to the Science Unit, Department of Teacher Education, Faculty of Education, University of Ibadan, Nigeria*.
- [4] Achimugu, L. (2009). *Senior Secondary School Certificate Practical Chemistry*, HEB Publishers PLC. Ibadan.
- [5] Achimugu, L. *Strategies for Effective Conduct of Practical Chemistry Works in Senior Secondary Schools in Nigeria*, *Journal of the Science Teachers Association of Nigeria*. **47(1)**, 126–136 (2012).
- [6] Adekoya. Y. M. & Olatoye, R. A. *Effect of Demonstration, Peer- Tutoring and Lecture Teaching Strategies on Senior Secondary School Students Achievement in*

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- an Aspect of Agricultural Science the Pacific Journal of Science and Technology **12** (1), 320–332 (2011).
- [7] Ameh, O. A. & Dantani, Y. M. Effects of Lecture and Demonstration Methods on the Academic Achievement of students in chemistry in Nasarawa Local Government Area of Kano state, *International Journal of Modern Social Science*, **1**(1), 29–37 (2012).
- [8] Atadoga M. M & Lakpini, M. A., A Comparison of Numeracy Achievement of Primary School Pupils Taught Using Whole Class and Varied Classroom Organization Instructions. Proceedings of Multicultural African Conference, Held at Faculty of Education, Ahmadu Bello University, Zaria Between 11th – 15th June, 2013.
- [9] Azubuike, E. N. (2012) Effect of Peer Tutoring Instructional Strategy on Achievement in Biology of Senior Secondary School Slow Learners in Anambra State. An unpublished Master's Thesis Submitted to the Department of Science Education Faculty of Education Nnamdi Azikiwe University, Awka
- [10] Brittany. H. & Jennifer. W., (2012), Peer Tutoring Being Paper Presented at the Council for Learning Disabilities George Mason University Jasnee Sahni, Marymount University.
- [11] Ezeugo, N. C. & Agwagah, U.N. Effect of Concept Mapping on Students Achievement in Algebra: Implication for Secondary Mathematics Education in the 21st century. *The Journal of Mathematical Association of Nigeria*, **25**(1), 1–12 (2000).
- [12] Graham, C. R. Factors for effective learning groups in face-to-face and virtual environments. *Quarterly Review of Distance Education*, **3**, 307–319 (2002).
- [13] Gumel, A. S., & Mari, J. S., Effects of Jigsaw Model of Cooperative Learning on Self-Efficacy and Performance in Chemistry among Concrete and Formal Reasoner. In *Colleges of Education International Journal of information and Education Technology*. **5**(3), 306–315 (2014).
- [14] Haruna, (2013) Effectiveness of indoor and outdoor laboratory teaching technique in senior secondary school students' of varied ability performance in chemistry in annual emirate school in Jigawa State. Proceedings of Multicultural African Conference, Held at Faculty of Education, Ahmadu Bello University, Zaria between 11th – 15th June, 2013
- [15] Horvath, K. (2011). Effects of Peer Tutoring on Student Achievement. Ohio: Ronard Publishers Ltd.
- [16] Imoko, I. B. & Agwagah, U. N. Improving Students Interest in Mathematics Technique. A focus on gender. *Journal of Research in Curriculum and Teaching* **1**(1), 30–31(2006).
- [17] Jamilu, G. A. (2015) Relative Effectiveness of Computer-Assisted Instruction on Academic Achievement in Electrolysis Concepts among Senior Secondary School Students in Katsina State, Nigeria. An unpublished Master's Thesis Submitted to the Departments of Science Education, Ahmadu Bello University Zaria, Kaduna State -Nigeria.
- [18] Johnson, D. W. & Johnson, R. T. (1998). Cooperative Learning and Achievement. In S. Sharan (Ed.), *Cooperative learning: Theory and research* (pp. 23-37). New York: Praeger.
-

-
- [19] Jonstone, A. Chemical Education Research in Glasgow in Perspective. *Journal of Chemical Education Research and Practice*, **7**, 49–63 (2006). <http://dx.doi.org/10.1039/B5RP90021B>
- [20] Kahle, J. B., Parker, L. H., Rennie, L. J. & Riley, D., Gender Differences in Science Education: Building a Model. *Educational Psychologist*, **28(4)**, 379–404(1993). http://dx.doi.org/10.1207/s15326985ep2804_6
- [21] Kankia, A. D. Comparing Lecture Method with Discovery Method at the level of Productivity to Learning Mathematics in Overcrowded Classes in Kastina State Secondary Schools. *Journal of Educational Research and Policy*, **3(1)**, 90–95 (2008).
- [22] Kelvin, S. (2016) Effect of process based instruction on concrete and formal secondary school students on performance and acquisition of science skills in qualitative analysis Concepts in Katsina State, Nigeria. An unpublished Master’s Thesis Submitted to the Departments of Science Education, Ahmadu Bello University Zaria, Kaduna State -Nigeria.
- [23] Khan, S. M. (2008). Education of Slow learners [http://research-educationedu.blogspot.com/search/Label/Education %20 of %20 Slow learner](http://research-educationedu.blogspot.com/search/Label/Education%20of%20Slow%20learner). Retrieved on 25 January 2009
- [24] Maheady, L., & Gard, J. Class-Wide Peer Tutoring: Practice, Theory, Research and Personal Narrative. *Intervention in School and Clinic*, **46**, 71–82 (2010). <http://dx.doi.org/10.1177/1053451210376359>
- [25] Mari, J. S., Gender Related Difference in Acquisition of formal Reasoning Schemata Pedagogical Implication of Teaching Chemistry, Learning Process- Based Approach. A Term paper Presented at Departmental Seminar, Department of Education, Ahmadu Bello University Zaria on 13th August 2009.
- [26] Mari, J.S. Effects of Jigsaw Model of Cooperative Learning on Self Efficacy and Performance in Chemistry Among Concrete and Formal Reasoner in College Of Education in Nigeria. *Journal of Science and Mathematics Education.*, **1(1)**, 66–73 (2014).
- [27] Mesler, L. (2009). Making retention count: The power of becoming a peer tutor. *Teachers College Record*, **11(8)**, 1894–1915.
- [28] Michael, M. C. (2008). *Essential Biology for Senior Secondary Schools*, Lagos: Tonad Publishers Ltd. State: Revised Sixth Edition 2011. African First Publishers PLC.
- [29] Miller, D., Topping, K. & Thurston, A. Peer tutoring in reading: The effects of role and organization on two dimensions of self-esteem. *British Journal of Educational Psychology*, **80**, 417-433 (2010). <http://dx.doi.org/10.1348/000709909X481652>
- [30] Njoku, Z.C. Development and Preliminary Validation of a Scale for the Assessment of Students Interest in 0 Level Practical Chemistry Activities, *Journal of the science Teachers Association of Nigeria* **38 (1&2)**, 15-29 (2003).
- [31] Okoli, J. N. & Egbunonu, R. N. Effect of Blended Learning on Senior Secondary School Students’ Achievement in Biology. *International Journal of Education Research and Development (EJERD)*, **4(1)**, 91–97 (2012).
- [32] Olatoye, R. A. (2008). “Self-Concept and Science Achievement in Co-Educational and Single- Sex Junior Secondary School in Ogun State, Nigeria”. *Review of Higher*
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- Education and Self -Learning. 1(1):69-74. <http://www.intellectbase.org>. Accessed 2011.
- [33] Olatoye, R. A. & Adekoya, Y. M. Effects of Projects Based, Demonstration and Lecture Teaching Strategy on Senior Secondary School Students Performance in an Aspect of Agriculture. *International Journal of Education Research and Technology*. **1(1)**, 19–29 (2010).
- [34] Olorundare, A. S. (2010). Best Practices in the Teaching of Science in Secondary School in Nigeria. Lead Paper Presented at the Nigerian Educational Research and Development Council, NERDC capacity Building Workshop, Kwara State.
- [35] Olorundare, A. S. (2011). Correlates of Poor Performance of Secondary School Students in the Sciences in Nigeria. Paper Presented at the Virginia State University, Petersburg, Virginia, USA.
- [36] Olson, M. V. (2010). Oxidation-Reduction Reaction, *Encyclopedia Britannica, Ultimate Reference Suite*. Chicago: Encyclopedia Britannica.
- [37] Omoniyi, O. A. (2014). The Effects of Constructive Based Teaching Strategy on Gender- Related Differences on Students' Misconceptions in Chemistry. State Ministry of Education. Akure, Nigeria. *Journal of Science and Mathematics Education*. **1(1)**, 66–73 (2014).
- [38] Onwukpa, F.A.W., & Nweke A. O. (2000). Enriching Science Technology and Mathematic Education in Secondary Schools through Effective Utilization of Resources in the Classrooms in Matt A.G.A (Ed), 41st Annual Conference Proceedings 2000 Science Teachers Association of Nigeria. HEBN PLC.
- [39] Ojokuku, G. O & Amadi, E. O. (2010). STAN Chemistry Panel Series6: Teaching Electro- Chemistry A Handbook for Chemistry Teachers. (pp.4-14).
- [40] Paul G., Lisa F. & Vanesa, T. (2006)., Effects of Peer Tutoring, Attitude and Personality on Academic Performance of First Year Introductory Programming Students. 36th Frontiers in Education Conference, October 28–31 at San Diego.
- [41] Pat, R. & Joan, W. (2010). Bio Buddies: Peer Tutoring as an Instructional Strategy 41st Annual conference on Building Research Partnership, 20th to 22nd October, 2010. Connecticut University, Xing Liu.
http://digitalcommons.uconn.edu/near_2010/3. Retrieved on 10 September, 2014.
- [42] Sam, O. (2011). Mass Failure Worries Stakeholders. Sun Newspapers from <http://www.sunnewspaper.com/url/> . Retrieved May, 25, 2011.
- [43] Shaw, S., Grimes, D., & Bulman, J. Educating slow learners: Are charter schools the last, best hope for their educational success? *The Charter Schools Resource Journal*, 1(1). (2005). <http://www.ehhs.cmich.edu/~tcsrj/shaw4> Retrieved 20 January 2009.
- [44] Shiri .A. (2005). Effects of Class-Wide Peer Tutoring on the Performance of Sixth Grade Students During Volleyball Practice and Game Play, a Thesis Presented in Partial Fulfillment of the Requirements for the Degree Master of Arts in the Graduate School of The Ohio State University.
- [45] Usman, I. A. The Effects of Indoor and Outdoor Instructional Methods on Academic Achievements of JSS Integrated Science in Zaria Local Government Area, Kaduna State. *Journal of Science and Mathematics Education*, **1(1)**, 66–73(2010).
- [46] Unified Tertiary Matriculation Examinations (2009), Abuja, Nigeria.
-

-
- [47] Upahi, & Olorundare, A. S., Difficulties faced by Nigerian Senior School Chemistry Students in Solving Stoichiometry problems. *Journal of education and practice*, **3(12)**, 181–189(2012).
- [48] Spencer, V. G. Peer tutoring and students with emotional or behavioral disorders: A review of the literature. *Behavioral Disorders*, **31(2)**, 204–222 (2006).
- [49] Topping, K.J. Trends in Peer Learning. *Journal of Educational Psychology*, **25(6)**, 631–645 (2005). <http://dx.doi.org/10.1080/01443410500345172>
- [50] West African Examinations Council, (2014). May/June. Chief Examiner’s Report. Lagos.
- [51] William, T. M., Georgette, Y., Michael, I., Scott, H., & Rene, R. (2003). Reciprocal Peer Tutoring: An embedded Assessment technique to improve Students learning and Achievement. A Paper presented at the annual meeting of the American Education Research Association, Chicago.

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Wide Peer-Tutoring
Strategy on
Secondary School
Slow Learners’
Performance in
Redox Reactions
in Funtua, Katsina
State-Nigeria
