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# EFFECTS OF LABORATORY PRACTICAL WORK, DEMONSTRATION METHOD AND LEARNING STYLES ON SECONDARY SCHOOL STUDENTS' ACHIEVEMENT IN CHEMISTRY

**Z. C. Njoku[1], C. U. Eze[2], C. A. Ezeano[3], & Dike, Clara Obioma[4]**
[1.]Professor of Science Education. University of Nigeria, Nsukka.
[2&3.]Professors of Science Education. Enugu State University of Science and Technology (ESUT), Agbani, Enugu.
[4.]Department of Science Education. University of Nigeria, Nsukka.
dikeclaraobioma@gmail.com/dikehope9995@gmail.com

**Abstract**
*The study determined the effect of laboratory practical work, demonstration method and learning style on secondary school students' achievement in chemistry in Nsukka Local Government of Enugu State. Three research questions were posed and answered while three null hypotheses were formulated and tested at 0.05 level of significance. Non-equivalent control group quasi experimental research design was adopted for the study. The study was done in Nsukka L.G.A of Enugu State. The population of study comprised all the 409 SS I students in all the public secondary schools in Nsukka L.G.A. A sample of 160 SS I students in secondary schools within the L.G.A was used for the study. Grasha-Reichmann questionnaire was used for classifying students into various learning styles, Chemistry Achievement Test was used as instruments for data collection. The instruments were properly validated and the reliability indices estimated as 0.876 for CAT and 0.851 for CIIS. Data collected were analysed using Mean, Standard deviation and analysis of covariance (ANCOVA). Mean and standard deviation were used to answer the research questions while ANCOVA was used to test the hypotheses at 0.05 level of significance. The findings of the study revealed that; laboratory practical work is significantly more effective than the demonstration method of teaching is enhancing students' achievement in chemistry; Learning styles significantly influence the achievement of students in chemistry with the collaborative learners achieving more in chemistry than the other students with other learning styles followed by the students who are participant learners. One of the implications of the findings is that when students are taught chemistry with laboratory practical work, they are bound to perform better than when taught with demonstration. Thus, it was recommended among others that senior secondary school teachers should be encouraged to adopt laboratory practical work during teaching of chemistry since its efficacy had been proven.*

**Keywords:** Laboratory Practical Work, Demonstration Method, Learning Styles, and Achievement.

## Introduction

All over the world, every country is aspiring to excel in science and technology. These quests are in recognition of the role of science and technology in the development of any nation. The above quests have brought some changes in the educational system of many nations. Here in Nigeria, interest in education system has shifted from Arts to Sciences. This is evidenced in current admission policy of 60% for Science and 40% for Arts student in tertiary institution in the country (Federal Republic of Nigeria, 2004). The emphasis on science above is faced with a lot of challenges. One

of such challenges is the realization of the objectives of science subjects at secondary school level, where the foundations for learning of these science subjects at tertiary level are laid. One of such science subjects studied at secondary school level is chemistry.

Chemistry is a branch of science that studies the make-up of matters their properties and products. The knowledge of chemistry plays a vital role in manufacturing, processing, improvement and development of materials for construction, pharmaceuticals, waterworks, food stuffs, fertilizers, insecticides and herbicides. Aniodoh (2001) opined that proper teaching and learning of chemistry facilitate a candidate's enrolment in medicine, pharmacy, nursing, engineering, biochemistry, architecture among other courses.

Despite the relative important of chemistry, it is very disappointing to note that students' achievement in the subject has remained consistently poor. For instance, West African Examination Council (WAEC) Chief Examiners' Report 2010, 2011 and 2012 showed that students' results in chemistry are not encouraging. For instance, in 2010 the number of students that earned credit and above was 50.70%, in 2011 it was 43.69%, in 2012 the percentage was only 35.53%. The results indicate that there is retrogression instead of progression in students' achievement for the three years 2010-2012: 50.70% > 43.69% > 35.53% (Chief Examiners' Report 2012). In addition, statistics by Ugwuanyi (2004) on WAEC, 2009, 2010, 2011, 2012 and 2013 on some selected Senior Secondary School Students' achievement in Chemistry revealed that the percentage pass at distinction and credit level has taken a downward trend. Ugwuanyi (2004) explained that the cumulative percentage number of students with distinctions and credit for five years is 33.40% while the cumulative number of students with ordinary pass and failure for five years is 60. 80%. The candidates that have ordinary pass and failure cannot use their result for further studies. (Source: Ministry of Education Nsukka L.G.A 2016).

Some research studies have shown that poor achievement in science subjects such as chemistry are due to inappropriate methods of teaching in senior secondary schools (Okoye & Okeke 2007, Nwagbo; 2009), learning style of students (Dunn 2000), lack of laboratory facilities, the ability levels of the learners, gender issues, shortage of scientific equipment, teaching- learning environment, students' background, student cognitive styles among other variables (Eccles; 2002, Moore; 2000, Mukalia; 2000, Oguniyi; 2002,).

Okoye and Okeke (2007) explained that the manner in which the subject is presented to students can significantly influence their interest and learning. Similarly, Norom (2009) asserted that majority of the teachers do not apply appropriate science strategies (guided discovery approach) as identified and recommended to be effective for science instruction (FGN, 2004). Therefore, the classroom activities are dominated by teacher-centred instruction instead of learners–centred instruction as

stipulated in the chemistry curriculum 1994, 2004 and 2012. Nwosu; (1991), Nwagbo; (1999) and Okoli, (2006) explain that expository/lecture method is a teaching technique, in which one person, the teacher, presents a spoken discourse on a particular subject. The teacher shies away from activity–oriented teaching methods like inquiry method, discovery method, and investigatory laboratory approach, which help the students' to attain that self-actualization in the learning of chemistry and dominate the classroom interaction.

Viiri and Saari (2009) opined that lecture/expository methods inhibit learning because there is no room for the students to think among themselves as a result of poor or no interaction between the teacher and students of different learning styles. Students vary in their academic abilities and learning styles which tend to be reflected on the extent to which they are affected by a particular teaching method. This is in line with Okeke's (2001) assertion that instructional strategies are known to produce different effects on learners. Diamond and Onwuegbuzie (2001) asserted that there is a great effect of different teaching methods on learning benefits of students of different ability groups. Thus, differences in intellectual capacity will necessitate variation in instructional strategies, for learning to take place. In addition, Njoku (2009), Udeji (2007), Ezeh (2004), and Okeke (2000) opined that teaching methods have differential effects on students of different academic ability levels (low, average, high level) with one group benefiting more from a particular teaching method than the other. Udeji (2010) and Eze (2013) are of the opinion that students' interest in chemistry can be dampened by the use of inappropriate teaching methods. Thus, Eze (2013) stressed that teaching methods should be tailored as much as possible to meet the personality characteristics of the learner for better achievement. When the various methods are used, high ability group achieve significantly better than the other groups. Equally various methods may have different effects on the students' academic achievement as a result of their different learning styles.

A learning style may be defined as a special approach of acquiring environmental information by an individual in such a way that the information could be processed, stored, or retrieved for utilization when needed. Felder (2000) and Gay (2004) explained that learning style reflects our preferred manner of acquiring, using, and thinking about knowledge. Learning styles are various approaches or ways of learning. They involve education methods, particular to an individual that are presumed to allow that individual to learn best (Wikipedia free Encyclopaedia Dictionary, 2014). Learning is an individual thing (Dunn, 2000). People vary in ways they interact with, taking in, and processing stimuli or information, because of the difference in their personalities, cultural experiences and values. Felder (2000) opined that "Students are characterized by different learning styles prudentially focusing on different types of information and tending to operate on perceived information in different ways". Learning style is each learner's preferred way of learning or how an individual learns. Learning style is related to cognitive style but they are different concepts. Cognitive style is absorption of information, i.e. function

of brain and Gestalt development while learning style is a way of responding to a certain situation (interest of the learner) on how an individual learns, and these individual differences reflect different learning styles in human personality. This shows the diversity in learning style and academic achievements (Grasha, 2003).

There have been many attempts made to enhance students' academic achievement. It has always been the main concern of many dedicated teachers and parents that their student and children be as much successful as possible. Many teachers are convinced that students need the positive academic attitude to succeed academically. Often, one's learning style is identified to determine the strength for academic achievement. For instance, Dunn, Beaudry and Klavas (2004) assert that through voluminous studies, it has been indicated that both low and average achievers earn higher scores on standardized achievement and aptitude tests when they are taught within the realm of their learning styles. Chuacha in Onimisi (2006) discussed the importance of learning styles as being not only necessary, but also important for individuals in academic settings. Most students favour learning in particular ways with each style of learning contributing to the success in retaining what they have learnt. The author asserted that students retain 10% of what they read, 26% of what they hear, 30% of what they see, 50% of what they see and hear, 70% of what they say, and 90% of what they say as they do something (Onimisi, 2006). These facts reveal that each learning style has its own strengths and weaknesses. Some students learn in many ways while others might only being favoured by one or two. Those students with multiple learning styles tend to gain more and obtain higher scores compared to those who rely on one style (Dunn, Beaudry and Klavas 2012). According to Wikipedia Encyclopaedia Dictionary (2014) learning styles are various approaches or ways of learning. They involved education method particular to individuals that are presumed to allow that individual to learn best. Hence, learning style plays a vital role in classroom achievement. Achievement is accomplishment of goals while academic achievement refers to the accomplishment of academic goals, the educational outcome of students, teacher achieved educational objectives (Wikipedia free encyclopaedia, 2004). Achievement is an important academic factor that has been identified to be influenced by teaching methods.

The major objectives of the educationist and psychologists are to maximize learning achievement from the minimum resources at their disposal. Academic achievement is the key component in the process of teaching and learning. In order to maximize learning achievement, teachers should be well equipped with the necessary teacher factors and experience needed for use in teaching school subjects, if students are to learn meaningfully. One of the teacher factors is the instructional strategies, which usually affect the cognitive, affective and psychomotor outcomes of students differently as a result of their different mode of perceiving, interacting and responding to the learning environment. In support of this assertion, Saleh (2008) submitted that many researchers have adduced that poor students' achievement in public examination is traceable to teaching methods used by teachers, because

various teaching methods yield different result even in the same gender for the fact that the students are of different cultural experiences and values.

Differences in learning styles have also been reported between gifted children and the under achievers, between the learning disabled and average achievers; among different types of special education students, and among secondary students in comprehensive schools and their counterparts in vocational education and industrial Arts. Dunn and Dunn (2000) observed that identifying students' learning styles produces better outcomes. Some special students favour kinesthetic instruction, such as experimental activities, mind on and hands-on, while many others are more auditory and visually oriented (Dunn, 2000). Dunn and Dunn (2000) further asserted that low achievers tend to have poor auditory memory because of their inability to remember information through lecture, discussion, or reading, this causes their low achievement especially in traditional classroom environment where teachers dominate. Felder (2000) opined that students learn more when information is obtainable in a variety of approaches than when only a single approach is applied. However, experiential research of Dunn and Dunn 2000 indicate that learning styles can either hamper or increase academic achievement in several aspects while, matching teaching and learning styles will significantly enhance academic achievement.

Achievement is successful accomplishment or performance in particular subjects, areas or courses, usually by reasons of skill acquired, hand work and interest. To make one achieve in particular subject depends on methods, level of intelligence, quality of learning facilities and on other factors such as learner readiness, but the most important of all is to stimulate the interest of the learners. Saleh (2008) Baker and Droyer (2005) stated that in order to increase interest in learning, teachers should design projects that enable students share their knowledge with others. Also Davis (2008) asserted that for teachers to stimulate students' interest in learning, they should create an atmosphere that is open and positive that will help students feel that they are valued members of a learning community. For instance, teaching methods like demonstration and laboratory practical work make students to be either passive or active in the learning process which will hinder or promote interest and consequently lead to low or high achievement, although the degree of achievement will be different as a result of different learning style among the students.

Laboratory practical work is experimentation method of teaching in science or is a term used to involves experimentation with apparatus while demonstration implies to show how something is done or demonstration is an activity carried out by a teacher in full view of the students who do not participate, but only watch and learn from what is going on. Demonstration in teaching science, especially chemistry, is a useful alternative method to students' laboratory activities when materials and equipment may not be enough for all the students while laboratory practical work

helps students to develop manipulative skills, interest, attitude and other desirable values, because they experience the real things which will now increase their interest during investigation. Thus, the questions is, which of the methods (demonstrations and laboratory practical work) favour students' with groups of Gragha-Reichmann learning styles.

Though many researchers have defined learning style from their own perspective, all agreed that it refers to individual characteristics of learning behaviour that is pervasive and consistent in nature. Thus, these individual differences reflect different learning styles in human personality.

The learning style model of Grasha and Reichmann (2003) considers how interpersonal relationship of peers and student - teachers help to gain, understand and assimilate information. This model focuses on students' learning, classroom activities, teachers and peers Grasha's original idea was to compare the participative, collaborative and independent, avoidant, dependent and competitive styles. The authors described their learning style models in six different categories namely: participative learning style, competitive learning style, Collaborative learning style, dependent learning style, independent learning style and avoidant learning style

Grasha and Reichmann (2003) were of the opinion that individuals learn best in the situation that meet their social and emotional needs and these determine how they react to any content of learning stressed. Thus, they prefer that teacher should develop activities that will match students' perceptions. In order words, student-centred method of teaching should be adopted to enhance academic achievement (Ali, 2009; Chukwu, 2002; Lemons and Tinajero 2012). Tom (2011) opined that teachers should be well equipped with the necessary –teacher factors and experiences needed in teaching school subjects if students are to learn maximally, because instructional strategies adopted by teachers influence the cognitive, affective and psychomotor outcomes. There should be a departure from the traditional/conventional method of teaching to an innovative method of teaching, which is student or learner-centred of teaching, so as to increase learners interest. Hence, the study seeks to investigate the effects of laboratory practical work, demonstration and learning style on secondary school students' achievement in chemistry.

**Purpose of the Study**

The main purpose of the study is to investigate the effect of laboratory practical work (LPW) demonstration method (DM) and learning style {LS} on students' achievement and interest in chemistry. Specifically, the study sought to:

3. Ascertain the effect of laboratory practical work method of teaching on students' mean achievement scores in chemistry.
4. Ascertain the effect of demonstration method of teaching on students' mean achievement scores in chemistry.

5. Find out the influence of learning styles on mean achievement scores' of students in chemistry

**Research Questions**

The following research questions guided the study:

1. What are the mean achievement scores of students taught chemistry using laboratory practical work and those taught using demonstration method?
2. What is the effect of learning styles on mean achievement scores of students in chemistry?
3. What is the interaction effect of teaching methods and learning styles on students achievement in chemistry?

**Hypotheses**

The following hypotheses were formulated to guide the study and tested at 5% probability level.

**$H_{01}$:** There is no significant difference between mean achievement scores of students taught chemistry using laboratory practical work and those taught using demonstration method of teaching.

**$H_{02}$:** There is no significant effect of learning styles on students' mean achievement scores in chemistry.

**$H_{03}$:** The interaction effect of teaching method and learning styles on students achievement in chemistry are not significant ($P<0.05$).

**Methodology**

Design of this study is pre-test –post test non-randomized control group quasi-experimental design. According to Kurumeh (2007), quasi experimental design is often adopted when it is not possible to have complete randomization of the subjects. In this study, intact classes were used to avoid disruption of normal class lesson. The design used was 3x2 factorial designs, which has the following symbolic representation.

$O_1$ $x_1$ $O_1$

.....

$O_1$ $x_1$ $O_2$

**Where** $O_1$ stands for pre-test

$O_2$ stands for post-test

$X_1$ stands for treatment(laboratory practical work)

$X_2$ stands for treatment (demonstration)

…….. Non equivalent

The study was conducted in Nsukka L.G.A of Enugu State. Nsukka L.G.A was chosen because of the consistent poor performance of students in S.S.C.E. in Chemistry since 2010 till date. Equally, the researcher is familiar with the locations of all the schools within the area, which will give the researcher the opportunity to monitor and supervise the experiment properly. The population of the study comprised all public

co-educational senior secondary school class 1 (SS1) students that were offering chemistry in the area of the study. Four hundred and nine students (409) from two co-educational secondary schools in Nsukka L.G.A was used for the study. The justification for the choice of public co-educational senior secondary school was that the schools have the same characteristics in term of curriculum and the population in public school is prominent in co-educational school. SSI was chosen because that is where the foundation for chemistry is laid and the unit of interest Acid, Base and salt is within the SSI chemistry curriculum. The sample comprised 160 SS I chemistry students drawn through the multistage sampling technique from the population of SSI chemistry students in the Nsukka L.G.A, two secondary school were randomly selected, two intact classes of the SSI were use as experimental group I while two intact classes of the SSI in the other school was used as the experimental group II. Three instruments that will be used in the study include: Grasha-Reichmann questionnaires for classifying students into learning styles, chemistry achievement test (CAT) based on the contents used for teaching, chemistry interest scale (CIS) for assessing students interest. Chemistry Achievement Test (CAT) which will consisted of 30 multiple choice objectives questions developed by the researcher. The multiple choice question items were developed using chemistry text books on the content that was taught in the lessons.

he CAT was used for the pre-test and post-test treatments after grouping the students using Grasha-Reichmann learning style questionnaires respectively. The CAT question numbers was reshuffled before administering for post-test treatment. While Grasha-Reichmann learning style questionnaires comprised 60 items. It had been designed to help one clarify students' based on their learning styles, the response format was of the type strongly Agree (SA) Agree (A) Disagree (DA) strongly Disagree (SD) and their learning scale norms for each style by age (see Appendix H and I, page 119-121). The instrument was face and content validated by three experts in the Faculty of Education University of Nigeria Nsukka. One of the experts is in measurement and evaluation department and the other two from Chemistry Education Unity of Science Education Department respectively. Data collected was through pre-tests (CAT) were analysed using mean and standard deviation while the hypotheses formulated was tested using Analysis of covariance (ANCOVA) statistic at 5% level of significance.

## RESULTS

**Research Question One**: What are the mean achievement scores of students taught chemistry using laboratory practical work and those taught using demonstration method?

**Table 1:** Mean and standard deviation of achievement scores of students taught chemistry using laboratory practical work and those taught using demonstration method.

| Group | Pre-test | | | Post-test | | |
|---|---|---|---|---|---|---|
| | n | Mean | SD | Mean | SD | Mean Gain Score |
| Laboratory Practical Work | 83 | 16.73 | 5.12 | 46.57 | 17.29 | 29.84 |
| Demonstration Method | 77 | 14.88 | 4.11 | 30.16 | 11.20 | 15.28 |

Table 1 shows that the students who were taught chemistry using laboratory practical work had mean achievement score of 46.57 with a standard deviation of 17.29 at the post-test against their pre-test mean achievement score of 16.73 and standard deviation of 5.12 while those who were taught using demonstration method had mean achievement score of 30.16 with a standard deviation of 11.20 at the post-test against their pre-test mean achievement score of 14.88 and standard deviation of 4.11. Mean gain scores of 29.84 and 15.28 for the two groups respectively imply that the students who were exposed to laboratory practical work in chemistry had higher gain score than those taught using demonstration method. However, post-test standard deviations of 17.29 and 11.20 for the students taught using laboratory practical work and those taught using demonstration method respectively imply that there was a wider gap in the individual achievement scores of those exposed to laboratory practical work than those exposed to demonstration method. Since the probability value of 0.000 is less than the 0.05 level of significance, the null hypothesis was rejected. Thus, there is a significant difference between mean achievement scores of students taught chemistry using laboratory practical work and those taught using demonstration method of teaching in favour of those taught using laboratory practical work.

**Research Question Two:** What is the influence of learning styles on mean achievement scores of students in chemistry?

**Table 2:** Mean and standard deviation of achievement scores of students of different learning styles

| Learning Styles | Pre-test | | | Post-test | | |
|---|---|---|---|---|---|---|
| | n | Mean | SD | Mean | SD | Mean Gain Score |
| Dependent | 29 | 14.51 | 3.98 | 37.55 | 14.18 | 23.04 |
| Participant | 38 | 16.02 | 4.36 | 31.44 | 17.03 | 15.42 |
| Collaborative | 58 | 15.82 | 5.05 | 47.74 | 18.35 | 31.92 |
| Independent | 35 | 16.77 | 5.09 | 32.45 | 5.67 | 15.68 |

Table 2 shows that the post-test mean achievement score of students who are dependent learners is 37.55 with standard deviation of 14.18, those who are participants learners had post-test mean achievement scores of 31.44 with standard deviation of 17.03, those who are collaborative learners had post-test mean achievement score of 47.74 with a standard deviation of 18.35 while those who are independent learners had post-test mean achievement score of 32.45 with standard deviation of 5.67. Mean gain scores of 23.04, 15.42, 31.92 and 15.68 for the dependent, participant, collaborative and independent learners respectively imply that the collaborative learners had higher post-test mean achievement score than the others followed by those who are dependent learners. However, post-test standard deviations of 14.18, 17.03, 18.35 and 5.67 for the dependent, participant, collaborative and independent learners respectively imply that the collaborative learners had wider variation in their achievement scores followed by participant learners. Since the probability value of 0.000 is less than the 0.05 level of significance, the null hypothesis was rejected. Thus, there is a significant influence of learning styles on students' mean achievement scores in chemistry.

**Research Question Three:** What is the interaction effect of teaching methods and learning styles on mean achievement scores of students in chemistry?

**Table 3:** Mean and standard deviation for the interaction effect of methods and learning styles on students' achievement chemistry.

| Pre-test Group | Learning Styles | N | Mean | SD | Post-test Mean | SD | Mean Gain Score |
|---|---|---|---|---|---|---|---|
| Laboratory Practical | Dependent | 6 | 16.50 | 2.07 | 36.66 | 14.52 | 20.16 |
| | Participant | 11 | 19.09 | 4.10 | 54.45 | 12.66 | 33.36 |
| | Collaborative | 58 | 15.82 | 5.05 | 47.74 | 18.35 | 31.92 |
| | Independent | 8 | 20.25 | 6.51 | 34.75 | 5.09 | 14.50 |
| Demonstration Method | Dependent | 18 | 13.50 | 4.35 | 39.00 | 15.95 | 25.00 |
| | Participant | 17 | 14.41 | 4.28 | 22.82 | 6.26 | 8.41 |
| | Collaborative | 16 | 15.31 | 3.19 | 25.18 | 7.92 | 9.87 |
| | Independent | 26 | 15.88 | 4.22 | 31.92 | 5.81 | 16.04 |

From Table 3, it should be observed that apart from the dependent and independent learning style groups in demonstration method, which had higher mean gain scores (25.00 and 16.04) than their counterparts in laboratory practical method (20.16 and 14.50), all other learning style groups in laboratory practical method had higher mean gain scores than their counterparts in demonstration method. This shows that there may be an interaction effect of method and learning style on students' achievement in chemistry. However, whether the interaction effect is significant or not will be determined when hypothesis 3 is tested. The post-test standard deviations show that there was a higher variation in the individual achievement scores of the collaborative learners exposed to laboratory practical work followed by the dependent learners exposed to demonstration method. Since the probability value of 0.271 is greater than the 0.05 level of significance, the null hypothesis was accepted meaning that there is no significant interaction effect of teaching methods and learning styles on students' mean interest scores in chemistry.

**Discussion of the Findings**

The result in table 1 revealed that students who were exposed to laboratory practical work in chemistry had higher gain score than those taught using demonstration method. Besides, Table I showed that there is a significant difference between mean achievement scores of students taught chemistry using laboratory practical work and those taught using demonstration method of teaching in favour of those taught using laboratory practical work. This finding seems to depicts the true nature of laboratory practical work. This approach is naturally activity oriented and because the students were actively involved in the teaching and learning encounter, their interests were activated in the process thereby performing better than their counterparts who were

taught using demonstration method. This finding agrees with the findings of Anyigbo (2004), Nwagbo (2001), Ugwuanyi (2004) and Okoli (2006) who in their respective similar studies found that innovative activity oriented teaching approaches are more effective in enhancing the achievement of students in science subjects than the conventional method. For instance, Anyigbo (2004) found that students taught with guided discovery method did significantly better than those taught with lecture method.

The findings of the study in Table 2 showed that collaborative learners had higher mean achievement score than the others followed by those who are dependent learners. Thus, Table 2 showed that there is a significant influence of learning styles on students' mean achievement scores in chemistry. Post Hoc multiple comparison tests in Table 3 revealed that mean achievement scores of students who are collaborative learners contributed highest to the significant influence of learning style on their achievement in chemistry. Buttressing this finding, Verma and Sherma (2001) found that learning styles significantly influenced students achievement in which the students who are participant learners performed better than the others.

The findings of the study in Table 3 indicated that the students who are dependent, participant, collaborative and independent learners and were exposed to laboratory practical work had higher post-test mean scores than those exposed to demonstration method. Further it was revealed in Table 3 that there is a significant linear interaction effect of teaching methods and learning styles on students' mean achievement scores in chemistry. This finding agrees with the finding of Lewis (2004) who found that there is a significant interaction effect of methods and learning styles on the students' academic achievement in science subjects. Similarly, Ango (2004) found that instructional methods interact with learning styles to effect the achievement of students.

**Conclusions and Recommendation**

Based on the findings of this study, the following conclusions were drawn; laboratory practical work is significantly more effective than the demonstration method of teaching in enhancing students' achievement as result of their interest in chemistry. Learning styles significantly influence the achievement of students in chemistry with the collaborative learners achieving and having more interest in chemistry than the other students with other learning styles followed by the students who are participant learners. It was therefore recommended that:

i. Senior secondary school chemistry teachers should be encouraged to adopt laboratory practical work during teaching of chemistry since its efficacy had been proven.
ii. Government should collaborate with Science Teacher Association of Nigeria (STAN), Faculties and Institutes of Education in Universities to organize in-service training programmes, workshops and seminars for serving chemistry teachers to update their knowledge on the use of laboratory practical work.

iii. Curriculum planners should incorporate innovative strategies such as laboratory practical work into their various teaching education programmes.
iv. Chemistry students should be encouraged by their teachers to adopt most effective learning style such as collaborative learning style during teaching and learning of chemistry.

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