EFFECTS OF LABORATORY-BASED INSTRUCTIONAL STRATEGY ON SECONDARY SCHOOL STUDENTS' ATTITUDE TOWARDS CHEMISTRY IN EKITI STATE.

BY

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Abstract
The study investigated the effects of Laboratory-Based Instructional Strategy on the students' attitude towards Chemistry and the impact of gender differences on student's achievement in Chemistry. One research question and one research hypothesis were formulated. The research design adopted in this study was pre-test post-test control group quasi experimental design. The senior secondary one (SSS1) Chemistry students were used. The research design adopted in this study was pre-test post-test control group quasi experimental design. The data collected were analyzed using descriptive and inferential statistics. The research question was answered using means and standard deviation. The hypotheses generated was tested using Analysis of Covariance (ANCOVA) and Univariate Analysis of Variance (two-way ANOVA) at 0.05 level of significance. The data collected was compared in respect of location and gender. The data collected for this study were analyzed using descriptive and inferential statistics. The findings revealed that there was a better improvement in the attitude of students towards Chemistry resulting from their exposure to laboratory-Based Instructional Strategy. The study revealed that Laboratory Based Instructional Strategy is not gender biased.

Keywords: Student's Attitude, exposure, location, Instructional Strategy

Introduction
Science is a field of human endeavor which seeks to explain accurately the events and circumstances that exists within our natural environment. Scientific and technological skill acquisitions are vital tools in coping with the present day challenges. Science is man's way of discovering and investigating about his natural habitation and the entire universe. Science is an activity based subject that is concerned with understanding the working of our world. Science comprises of different subjects out of which Chemistry is one. Chemistry help us to discover more about the behaviour of different kinds of matter. It gives us the reasons for this behaviour and obtains a deep understanding of nature. . Chemistry is fundamental to the world of industrialization.

According to John and Moore (2011), Chemistry is the study of the composition and properties of matter and the changes it undergoes, including energy changes. Chemistry is a practical oriented science subjects that requires a lot of laboratory activities through the incorporation of laboratory-Based Teaching Strategy. John (2016), stated that the term laboratory practical activities means experiences in school settings where students interact with materials to observe and understand the natural world. According to Joshua

(2014), effective laboratory activities that are carefully planned will enhance students' experience, motivation, understanding skills and enjoyment of Chemistry. For effective implementation of chemistry curriculum, teacher should base his teaching on regular laboratory practical work through the adoption of laboratory-based instructional strategy since chemistry is a practical - oriented subject. This could reduce the abstractive nature of chemistry and thereby enhancing better comprehension of the chemical concepts being taught.

Laboratory-based instructional strategy improves students' understanding and retention of information. According to Ojediran, Oludipe & Ehindero (2014), Chemistry is a subject that allow for involvement of students practically for adequate comprehension of the topic taught by the teacher. Therefore, theoretical explanation needs to be supported with actual practices either in the laboratory or outside the laboratory. Doing this will help to simplify learning by making the teaching–learning process effective and understandable to the learners.

It was noted that the low academic achievement of secondary school students in Chemistry was attributed the nonuse of laboratory-Based Teaching Strategy but rather regular use of traditional teaching method. In this case, laboratory work has a central role to play in any such vision of chemistry education. The achievement of students has been a source of concern; our students are not achieving as well as are expected of them and their attitude towards learning of Chemistry is not impressive as expected of them. The result of the study revealed that the school environment of most secondary schools in South West Nigeria are not supportive when it comes to the teaching of science in which chemistry is not an exception. The issue of separate laboratory for science subject is very scarce in the school.

It was observed that many teachers give notes to students in chemistry without better explanation and demonstration through experiment, and this has negative effects on students attitude and' academic performance in chemistry. There are some challenges that is affecting teaching learning process of the learner. Those problems are connected with the teaching methods employed by the teachers, as most of them are not teachers but only accept teaching as the last resort (Terngu. (2010). It was observed that, some students cannot identify many of the apparatus not to talk of how to use them, this was as a result of the lack of exposure to laboratory equipment and laboratory practical activities.

The inadequacies in students' practical competence in Chemistry indicated that there is much to be done in the teaching and learning activities going on in the Chemistry class. The study revealed that adequate teaching and learning of laboratory activities are not taking place in the Chemistry class because majority of Chemistry teacher still use traditional teaching method more than laboratory method of teaching which does not allow students to be actively involved in, and interact with peers.

All the above mentioned reasons will surely result to poor learning outcomes and negative attitude of students towards Chemistry.

Laboratory-Base Instructional Strategy

Laboratory—Base Instructional Strategy is a kind of teaching strategy that involve teaching and learning activities

in which students' working either individually or in small group are involved in manipulating and observing real object and materials. Laboratory activities constitute integral part of Chemistry. Peter and Akeem (2015) opined that Chemistry consists of many topics that can be verified experimentally and which may create an enabling environment for students to learn most of the concepts that are presumed to be abstract. They stressed further that Laboratory method of teaching are of great importance to Chemistry as it increases students interest and performance.

Factors affecting Students Learning Outcome in Chemistry:

Despite the important of chemistry there are some factors that had contributed to the negative attitude of students towards Chemistry and non-acquisition of skills in Chemistry by the secondary school students. Those challenges are mentioned bellow:

- inadequate laboratory facilities,
- inadequate laboratory activities
- teachers' method of teaching (methodology),
- inadequate fund.

Students' Attitude towards Learning of Chemistry

Students' attitude have consequences on how well students learn at their various school. Due to the way the students perceived Chemistry as abstract subject has contributed in no small measure to the students' negative attitude towards Chemistry. Attitude is the inner feeling of an individual towards something or somebody. According to Oxford Advance Learner's Dictionary (2010), attitude is a disposition or state of the mind. Positive attitude in students help to improve performance. The attitude that one has towards an object makes one make judgement as to whether the object is good or bad. Attitudes are linked with academic achievement and that attitudes predict behaviors (Osborne et al. 2010) in Ikechukwu and Akeem (2015)

The attitude of children in their school work is deeply affected by the degree of encouragement their parents give them, and the degree of encouragement given to them by their teacher, and by their own level of emotional stability. There is the tendency for them to exhibit positive or negative encouragement by way of information or demonstration given, or exhibited to them from the onset. It therefore becomes imperative to estimate learners' attitudes towards the instructional medium and instructional approach used for conceptual change to occur. (Jaakkola et al. 2011; Pyatt and Sims 2012).

School Location and the effect on students' academic performance

School location can simply be describes as the settlement or area in which a school is situated. That settlement could either be urban or rural. The school location has an important role to play on the educational achievement or academic performance of the learner in which the schools is located. A school located in rural area will have all the characteristics of rural environment and an urban school will have characteristics of an urban environment based actives that is peculiar to its environment but different from rural location.

Among the factors that affected the effective teaching and learning of chemistry and students' attitude towards Chemistry was attributed to school location. Adu (2016) in his study on

student outcome and school factors as determinant of secondary school effectiveness in Ekiti state Nigeria reported that varies in school tone made negative contribution towards secondary school effectives For example, a school that was located in an isolated area which is also very far away from where people are living is quite different from a schools in time without much stress, many of students are living very far away from their various schools so they treck for hours in the morning before they could reach their schools. Because, many of them are not going by school bus or cars. But Joseph (2015) observed that rural schools tends be smaller than urban schools and that has number benefits since rural student class tend to be smaller, student enjoy more individual attention towards practical work from their teachers and government.

The school location matter most in the student attitude. Oginni and Awobodu (2013) in their study on school location reported that, an enriched environment could result in better performance of students and that at the same time, the environment in which a school is located brings about different responses and behaviours from learner.

Ezeudu et al (2013) in their study on the effect of gender and location on student achievement in chemistry in secondary school in Nsukka local government area of Enugu state, Nigeria reported that there is no significant difference in the academic achievement of student in both urban and rural schools.

The Laboratory-Based Instructional Strategy could perhaps have serious impact on students attitudes towards Chemistry,. It was in the light of this unpleasant occurrence that this study was set out to investigate the Effects of Laboratory-Based Instructional Strategy on Secondary School Students' Attitude towards Chemistry in Ekiti State, Nigeria.

The following questions were raised for the study.

Research Question 1: What is the effect of laboratory-Based Teaching Strategy on students' attitude towards Chemistry?

The following null hypotheses were formulated for the study.

Hypothesis 1: There is no significant difference in the attitude of students exposed to laboratory-based instructional strategy and conventional methods before and after treatment

Hypothesis 2: There is no significant influence of location on the academic performance of students exposed to Laboratory=Based Instructional Strategy.

Research Instruments

1. Chemistry Achievement Test (CAT)
2. Questionnaire on Students' Attitude towards Chemistry (QSAC)
3. Teacher's Instructional Guide on Laboratory

RESULTS AND DISCUSSION

The results contain the descriptive analysis of the data collected to answer the research questions, as well as hypotheses testing.

Results

Descriptive Analysis of Research Questions

Research Question 1: What is the effect of laboratory-based instructional strategy on students' attitude towards Chemistry?

Table 1: Mean and Standard Deviation of Effect of Laboratory Method of Teaching on Students' Attitude Towards Chemistry

Strategy	Test	N	Mean	S.D	Mean Diff.
Laboratory	Before Treatment	74	71.88	2.10	33.58
	After Treatment	74	105.46	3.72	

Table 1 shows the mean pre-treatment and mean post-treatment scores of attitude of students exposed to laboratory method. The mean pre-treatment score of attitude of students was 71.88 while mean post-treatment score of attitude of students was 105.46. The Table above shows that the mean difference in students' attitude in Chemistry between pre-treatment and post-treatment scores for laboratory method was 33.58. The graphical representation below further shows the effect of laboratory method in eliciting students' attitude towards Chemistry.

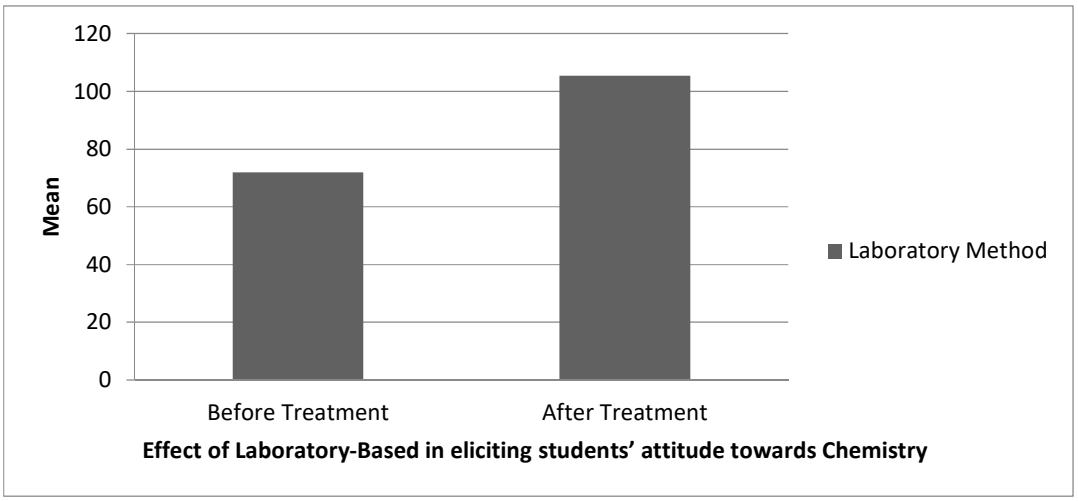

Figure i: Bar Chart Showing Effect of Laboratory-Based Teaching Strategy on Students' Attitude towards Chemistry?

Testing of Hypotheses

Hypothesis 1: There is no significant difference in the attitude of students exposed to laboratory-based instructional strategy and conventional methods before and after treatment

Table 2: Analysis of Covariance (ANCOVA) for Attitude of Students Before and After Treatment Under the Groups

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	11660.713[a]	2	5830.356	652.349*	.000
Intercept	980.188	1	980.188	109.672*	.000
Pre-Attitude	.169	1	.169	.019	.891
Groups	11571.706	1	11571.706	1294.740*	.000
Error	1170.809	131	8.937		
Total	**1275190.000**	**134**			
Corrected Total	**12831.522**	**133**			

a. R Squared = .909 (Adjusted R Squared = .907) *P < 0.05

Table 6 shows pre-attitude P value = 0.891>0.05, this implies that there was no significant difference in the attitude of students in the groups before treatment. The result also presented in Table 6 shows F-value of 1294.740 is significant because the p-value of 0.000 is less than 0.05 level of significance. This result led to the rejection of the null hypothesis. By implication, there was significant difference in the attitude of students exposed to laboratory and conventional methods before and after treatment.

Hypothesis 2: There is no significant influence of location on the academic performance of students exposed to Laboratory=Based Instructional Strategy.

Table 3: Two-way Analysis of Variance (ANOVA) for Influence of Location on Academic Performance of Students Exposed to Laboratory-Based Instructional Strategy.

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	33.677[a]	4	8.419	37.945*	.000
Intercept	5.912	1	5.912	26.645*	.000
Location	.081	1	.081	.367	.547
Performance	7.756	1	7.756	34.957*	.000
Location* Performance	.000	1	.000	.002	.966
Error	15.310	69	.222		
Total	**18961.000**	**74**			
Corrected Total	**48.986**	**73**			

a. R Squared = .687 (Adjusted R Squared = .669) * P < 0.05

Table 8 shows that the F-cal value of 0.002 is not significant because the P value (0.966) is greater than 0.05. This implies that the null hypothesis is not rejected. Hence, there was no significant influence of location on the academic performance of students exposed to laboratory method of teaching.

Discussion

The study indicated that there was no significant difference in the pre-test mean score and attitude of students exposed to laboratory-based and conventional methods. The performance, and attitude of students in both experimental and control groups were low and do not differ statistically. This finding established the homogeneity of the two groups involved in the study prior to the experiment. In other words, it could be said that the knowledge baseline, and attitude for the two groups involved in the study are equal. Consequently, any significant difference recorded afterwards would not be ascribed to chance, but to the specific treatment applied.

The study shows that there was significant difference in the pretest and post-test mean score of students exposed to laboratory and conventional methods. There was a better improvement in the attitude of students resulting from their exposure to laboratory-based instructional strategy. This study agrees with the findings of Omotayo (2016) that application of laboratory method yielded better results than the conventional method because, it gives flexibility for students' learning in terms of learning style and study time, it improves students' experience and enhances their engagement. The findings of this study revealed that there was significant difference in the attitude of students exposed to laboratory-based and conventional methods after treatment. Students exposed to laboratory-based instructional strategy showed good attitude towards learning of Chemistry than those in the conventional group because, it integrates the use of face

to face and demonstration which facilitates proper assimilation and comprehension.

The study also pointed it out that there is no significant influence of location on the academic performance of students exposed to laboratory-based method. By implication, laboratory-based instructional strategy is not location biased because location of the student has no influence on their academic performance when taught Chemistry using laboratory-based method of teaching. This result supports the findings of Kolawole and Olofin (2018b) who concluded in their study that there is no significant difference in the performance of students in rural and urban settings. But the result contradicted the findings of Oginni, Awobodu and Alaka (2013), who concluded that students in urban settings performs better than their counterparts in rural settings because of the favourable environmental setting.

Summary

The findings from the analysis are as follows

1. There was significant difference in the attitude of students exposed to laboratory-based instructional strategy and conventional methods before and after treatment
2. There was no significant influence of location on the academic performance of students exposed to laboratory-based instructional strategy.

Conclusion

Based on the findings of this study, it could be concluded that, the use of Laboratory-Base Instructional Strategy enhanced student's attitude towards Chemistry. That shows that Laboratory-Based Instructional Strategy is more effective. Laboratory-Base Instructional Strategy is not gender biased and potent in all locations.

Recommendations

Based on the findings of this study, the following recommendations were made.

1. Teacher should be encourage to develop the attributes of using laboratory-Based Instructional Strategy in teaching Chemistry in the secondary schools so as to enhance better academic performance of students, attitude towards Chemistry.
2. Government should provide more laboratory equipment to schools to facilitate teaching-learning process.
3. There should be regular assessments and training for the science teachers especially Chemistry Teachers.

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