

# Effects of Reflective Teaching Strategy on Attitude of Chemistry Students in Senior Secondary Schools in Ondo State, Nigeria

<sup>1</sup>Oke J. AJOGBEJE, (Ph. D) & <sup>2</sup>Olufunke O. BORIS (Ph. D)

<sup>1</sup>Department of Mathematics, School of Science, College of Education, Ikere-Ekiti, Ekiti State, Nigeria.

<sup>2</sup>School of Education, College of Education, Ikere-Ekiti, Ekiti State, Nigeria.

Received: December 03, 2019

Accepted: January 06, 2020

**ABSTRACT:** *The study examined the effects of Reflective teaching strategy on attitude of Chemistry students in secondary schools in Akure South Local Government Area of Ondo State, Nigeria.*

*It also examined the effect of Reflective Teaching on gender of chemistry school students. The study employed the quasi-experimental pretest – posttest control group design. The subjects were randomly assigned to two groups (Experimental and Control group). The sample consisted of 60 Senior Secondary School 1 Chemistry teachers and all Chemistry Students in Senior Secondary 1 (SS1) that were on ground in each of the school chosen. Two hundred and ten students were assigned to each of the experimental and control groups respectively. The instrument used to collect data was Chemistry Achievement Test (CAT) and Chemistry attitudinal Scale (CAS). The reliability coefficient of the CAT instrument was 0.82. Chemistry attitudinal Scale (CAS) was developed to measure the attitude of students towards learning of chemistry. The Instruments was administered on the subjects before and after the treatment. The data generated were subjected to analysis of variance (ANOVA) and analysis of covariance (ANCOVA) to test for the acceptance or rejection of the null hypotheses at 0.05 level of significance. Results of the analyses showed that Reflective teaching strategy has no effect on the attitude of students to chemistry. Also, Reflective teaching strategy has no effect on gender of the students. Based on the findings, appropriate recommendations were made.*

**Key Words:** *Reflective, teaching, Reflective teaching, academic Achievement, secondary school.*

## Introduction

The contemporary world is driven by science and technology and the two are interrelated. Whereas science probes into the question “Why”, technology probes in the “How” aspect from the onset of the scientific age to date, society has been tallying on science to help solve the mesh in technology. Science has become such an indispensable tool that any nation, developed or developing. Wishing to progress in the socio-economic sphere, will afford to relegated its learning in her school to background. Science and Technology therefore have become the hallmark for sustainable development in any national economy.

Research evidence have proved that the contribution of chemistry to quality of life and nation building are worthwhile in all aspects. Any nation aspiring to be scientifically and technologically developed must have adequate level of chemistry education (Eke, 2008). The role chemistry is playing in the development of the scientific base of a country cannot be over emphasized, chemistry couples a pivotal position in science and technology and is needed by everybody and in every aspect of human endeavour (Olayemi, 2009 & Eke, 2008).

Chemistry education occupies a central a position to all science disciplines and has been identified to be one of the major bedrock for the transformation of the nation’s economy. The importance of teacher education in the nation’s educational system has been amply demonstrated and initiated by the population statement in the national policy on education that, “No educational system can rise above the quality of its teachers (NPE, 2004). The educational system is obviously faced with the greatest challenge of the need to explore the possibility of equipping teachers with professional teaching skill that will enable them to perform their numerous assignments credibly. Since the aim of teaching is learning. Good education depends on good teachers and effective teaching can be regarded as a systematic rationale and knowledge skills, attitude and values in accordance with certain professional principles (Adediwura & Bada, 2007).

The attitude of a student triggers his behavior. Attitude are antecedents which serve as inputs or stimuli that triggers actions. Attitude can distort the perception of information and affect the degree of their retention. Attitude affect people in everything they do and infect, reflect what they are. Hence, attitude is a determining factor of student’s behavior (Aiken, 2000). Students with a positive attitude towards a subject are more likely to continue their learning in the area.

According to Adebisi (2006), attitudes are positive or negative feelings that an individual holds about an object or idea. There is a general belief that a positive attitude more often than not, leads to successful learning. Aiyebegan (2003) identified attitude as one of the factors affecting students performance in physics and that there is a strong relationship between attitude and achievements. Ghasman & Albarracin (2006) concluded that there is a correlation between attitude and future behaviours. That is, attitude is a potential for predicting future preferences, especially if there is a direct interaction between participants and the object (i.e. objects that are related to attitude like science lessons).

Adesoji (2008) defines attitude as cognitive, emotional, and action tendency to a particular behaviour intent. He ascertain that attitude is an important factor that determined achievement of students in sciences. Adesoji (2002) in his study in managing student attitude towards science through problem solving established the fact that acceptable methods of instruction are capable of changing students' attitude towards science. Adesoji (2008) who affirms that in other to increase the level attitude and success in science education, new teaching methods and technology need to be introduced into science education. Akinyemi (2009) states that attitude are required through learning and can be changed through persuasion using variety of techniques. Attitude, once established, helps to shape the experiences the individual has with object subject on person, although attitude changes gradually people constantly form new attitudes and modify old ones when they are exposed to new information and new experiences (Adesina & Akinbobola, 2005).

Attitudes as observed by Oskamp & Schults (2005) composed of past and present experiences and are not obstacle as such, but are evidenced in behaviour. Teachers' Practices significant impact on students' achievement, current and past researches as indicates that the teacher is the most important in teaching and learning. The quality teacher is one who believes they have the power to influence and to facilitate the learning of all students through innumerable methods and strategies strong. Faye (2010) declared that attitudes are generally regarded as enduring though modifiable be experience of perfusion, and are also learnt rather than innate. He went further to say that achievement of any learner will to a great extent depend on his attitude towards the learning materials. There is general belief that a positive attitude more often than not lead to successful learning.

Reflective teaching has to do with deliberate examination of how we teach and learn. Gatumu (2006) reflective teaching means looking at what you do in the classroom, thinking about why you do it and thinking about if it works or not, A process of self observation and self evaluation in which strength and weaknesses are indentified and then adjust to replan for better performance. There are three modes of reflection. Reflection for action (before), the reflection in action (during) and the reflection on Action (After).

Effective reflective teaching involves careful consideration of both sight and action to enhance the learning through experience. By collecting information about what goes on in the classroom and by analyzing and evaluating this information, teachers identify and explore their own practices and underlying beliefs. This may then lead to changes and improvements in the teaching.

Reflective teaching has to do with deliberate examination of how we teach and learn (Gatumu, 2006). it is more towards critical thinking of how we teach and learn. It is a kind of teaching strategy which has to be viewed in terms of what the teachers can do for himself and his students to ascertain producing in his teaching and in his students' learning. Hence reflective teaching is a call to let the teacher combine theory and practice to maintain and sustain his teaching profession (Ige & Olayode, 2010).

Reflective teaching is also about a skilled teaching of knowing what to do. In this manner reflective teaching is a professional alternative to action research. It is a personal means of conducting one's own ongoing professional life by solving problems in a systematic manner (Gatumu, 2006). Polland (2006) regard reflective teaching as a cyclic process by which teacher interprets his/her classroom practice. Reflective teaching enables teacher to form the known to the unknown by making use of recalled experiences in a critical manner. Reflective teaching is a deliberate move to allow the teacher think critically of his/her teaching, so that his/her students can maximize their learning reflective teaching is a mark of a concerned teacher who skilled enough to exam his/her beliefs, values and assumptions behind the teaching practice (Ige & Olayode, 2012).

### Research Hypotheses

The following hypotheses were generated and tested at 0.05 level of significance.

HO<sub>1</sub> There is no significant different in the attitude of students in the experimental and control groups before the treatment

- HO<sub>2</sub> There is no significant difference in the attitude of male and female students to chemistry in each of the experimental and control groups after the treatment.
- HO<sup>3</sup> There is no significant different in the attitude of male and female student from Urban and rural schools in the experimental and control groups after the treatment.
- HO<sub>4</sub> There is no significant difference in the attitude of male student from urban and rural schools in the experimental and control groups after the treatment.

### Research Method

The study is a pretest, post test quasi experimental control group design. The target population of the study consisted of all Senior Secondary Class 1 (SS1) chemistry students in all the public senior secondary schools in Ondo State. SS class 1 students was used based on the assumptions that reflective teaching will fully integrate them into chemistry class and that SS1 students are considered knowledgeable enough to be able to read and understand the questionnaire and have good interpretation while teaching them.

The sample for this study comprised 60 senior secondary 1 (SS1) chemistry teachers. The sample was selected using multistage sampling technique. The first stage was the selection of 12 Local Government (four from each of the three senatorial districts) using stratified random sampling. The second stage was the selection of five schools from each of the selected local governments (to give a total of 60 schools) using location (i.e. rural and Urban) were randomly selected. The third stage was to select SS1 Chemistry students to cater for gender, purposive and stratified random sampling technique was used using subject and sex as purposive and stratification variable respectively from each of the sixty senior secondary schools to make a total of 410. The participants were randomly assigned to the experimental and control groups respectively in rate 1:1 i.e 205 in each group.

The instruments used for the study was Chemistry Achievement test (CAT) drawn by selecting questions relating to the topics that were concerned by this study from the past questions of Senior School Certificate Examination conducted by both West African Examination Council (WAEC) and national Examinations Council (NECO) and the research instrument was validated by expert.

Chemistry attitudinal Scale (CAS) was developed to measure the attitude of students towards learning of chemistry. The instrument is of two sections, section A consisted of the personal data of the students and section B consisted of 25 items intended to measure students attitude towards learning of chemistry. The areas of attitude measured are reading, study habit, note taking, teacher/student interaction, punctuality, take home assignment etc. The response will scored as follows, Strongly Agree (SA- 4 points, Agree (A) 3 points, Disagree (D) = 2 points, Strongly Disagree (SD) -1 point.

A field test was carried out which involved thirty (30) senior secondary school (SS1) students offering chemistry randomly selected. The students were drawn from two Local Government areas of Ondo State which were not part of the Local Government areas selected for the study to avoid interactive effect of respondents. The mean score and standard deviation were obtained. Reliability was determined using Kuder Richardson 21 and found to be 0.80 and 0.84 at 0.05 level of significance which was considered reliable enough for use.

The package for the study consisted of scheme of work and lesson notes on selected topics in chemistry. The topics in the schools scheme of work prescribed for the period of this study by the ministry of education was used. The package was prepared on weekly basis according to the scheme of work for the senior secondary school chemistry

Teachers self –reflective rating package was given to the selected teachers to be completed by them first and then the researcher assistants completed their own to provide a fuller understanding of the achievements of the participating teachers as well as areas they may need to continue working on. This was done weekly so that the teacher will readjust if need be. Audio recording was done at least once in each of the schools in the experimental group. Individual teacher had a diary of his/her written account of his/her lessons which were analysed and discussed by the teacher and the research assistants at least weekly. Steps to reflection as explained were used by the mentor teacher and the teacher in the experimental groups as part of the reflective package.

The research was in stages, the first stage is the training of the research assistant which lasted for one week, the second stage was the administration of pretest to all the students participating in the study, this lasted for one week. The next stage was the treatment stage for only experimental group while lecture method was used for the control group and this also lasted for four weeks while the last stage was the

administration of posttest to both experimental and the control group .Altogether, seven weeks were used for the study.

The hypotheses generated were tested using inferential statistics involving Analysis of variance (ANOVA) and analysis of covariance.

## Results and Discussion

**Hypothesis 1:** There is no significant difference in the attitude of Male and Female students to chemistry in each of the experimental and control groups before the treatment.

In testing the hypothesis means scores on attitude of Male and Female students to chemistry before treatment in the experimental and control groups of were computed and compared for statistical significance using analysis of variance (ANOVA) at 0.05 level. The result is presented in table I below.

**Table I: ANOVA summary of students' achievement in chemistry before treatment by gender and treatment**

Score	SS	df	MS	F <sub>cal</sub>	F <sub>table</sub>	P
Corrected Model	246.219	3	82.073	1.595	2.60	.190
Gender	14.654	1	14.654	0.285	3.84	.594
Group	161.593	1	161.593	3.140	3.84	.077
Gender * Group	78.028	1	78.028	1.516	3.84	.219
Error	21408.629	416	51.463			
Corrected total	21645.848	419				
<b>TOTAL</b>	<b>1633408.629</b>	<b>420</b>				

The result in table I shows that there is no significant difference in the attitude of male and female students to chemistry in each of the experimental and control group before treatment ( $F = 1.516, P > 0.05$ ). The null hypothesis is accepted. Similarly the main effect of gender ( $F = 0.285, P > 0.05$ ) and treatment ( $F = 3.140, P > 0.05$ ) on students' attitude to chemistry prior to treatment is not statistically significant at 0.05 level in each case.

**Hypothesis 2.** There is no significant difference in the attitude of male and female students to chemistry in each of the experimental and control groups after the treatment.

In order to test the hypothesis, means scores on male and female attitude to chemistry each of the experimental and control groups after treatment were compared for statistical significance using analysis of covariance (ANCOVA) at 0.05 level as shown in table 2.

**Table 2: ANCOVA Summary of Students' Attitude to Chemistry by Gender and Treatment.**

Score	SS	df	MS	F <sub>cal</sub>	F <sub>table</sub>	P
Corrected Model	7129.359	4	1782.340	59.715	2.37	.000
Covariate	16.856	1	16.856	0.565	3.84	.453
Gender	10.518	1	10.518	0.532	3.84	.553
Group	7088.294	1	7088.294	237.482	3.84	.000
Gender * Group	0.021	1	0.021	0.001	3.84	.979
Error	12386.781	415				
Corrected total	19516.140	419				
<b>TOTAL</b>	<b>1902351.000</b>	<b>420</b>				

$P > 0.05$

Table 2 shows that  $f_{cal}$  (0.001) is less than  $F_{table}$  (3.84) at 0.05 level of significance, the null hypothesis is accepted. This implies that there is no significant difference in the attitude of male and female students to chemistry in each of the experimental and control groups after the treatment. Also, the effect of gender on students attitude to chemistry after treatment is not significant at 0.05 level ( $f = 0.352, p < 0.05$ ). However, treatment had significant effect on the attitude of the subjects on exposure to treatment ( $F = 237.472, P < 0.05$ ).

**Hypothesis 3:** There is significant different in the attitude of female students from urban and rural schools in the experimental and control groups.

Means scores on female student attitude to chemistry from urban and rural schools in the experimental and control groups were computed and subsequently compared for statistical significance using analysis of Covariance (ANCOVA) at 0.05 level of significance. The result is present in Table 3.

**Table 3: ANCOVA summary of female students' attitude to chemistry by school location and treatment.**

Source	SS	dF	Ms	F <sub>cal</sub>	F <sub>table</sub>	P
Corrected Model	3674.651	4	918.663	29.033	2.42	.000
Covariate(Pretest)	0.544	1	0.544	0.017	3.89	.896
Location	4.135	1	4.135	0.131	3.89	.718
Group	3672.399	1	3672.399	116.059	3.89	.000
Location Group	15.840	1	15.840	0.501	3.89	.480
Error	6676.567	211	31.64			
Corrected Total	10351.218	215				
Total	985477.000	216				

$p > 0.05$

Table 3 shows that  $F_{cal}$  (0.501) less than  $F_{table}$  (3.89) at 0.05 level of significance. The null hypothesis is accepted. This implies that there is no significant difference in the attitude of female students from urban and rural schools in the experimental and control groups after treatment. The main effect of school location on female is not significant at 0.05 level ( $F=0.131, P > 0.05$ ). In contrast, treatment had significant effect on female students attitude to chemistry ( $F=116.059, P < 0.05$ ).

**Hypothesis 4:** there is no significant difference in the attitude of male students from urban and rural schools in the experimental and control groups after treatment.

In testing the hypothesis, attitude of male students from urban and rural schools were compared for statistical significance using analysis of covariance. The result is as presented

**Table 4: ANCOVA summary of attitude of male students in chemistry by school location and treatment**

Source	SS	df	Ms	F <sub>cal</sub>	F <sub>table</sub>	P
Corrected Model	3594.055	4	894.514	32.238	2.42	.000
Covariate (Pretest)	9.963	1	9.963	0.357	3.89	.551
Location	32.250	1	32.250	1.157	3.89	.283
Group	3470.110	1	3470.110	124.504	3.89	.000
Location group	94.454	1	94.454	3.389	3.89	.067
Error	5546.298	199	27.871			
Corrected Total	9140.353	203				
Total	916874.000	204				

Table 4 shows that  $F_{cal}$  (3.389) is less than  $F_{table}$  at 0.05 level of significance. The null hypothesis is accepted. This implies that there is no significant difference in the attitude of male student from urban and rural schools in the experimental and control groups after the treatment. Similarly, the effect of location ( $F=1.157, P > 0.05$ ) on students attitude to chemistry is not statistically significant at 0.05 level. However, treatment had significant effect on students attitude to Chemistry. ( $F=124.504, P < 0.05$ ).

## Discussion

Findings from this study revealed that there was virtually little variation in the experimental and control groups before the treatment, this establish the homogeneity of the two groups prior to the experiment. The findings of this study are consisted with Macmillan (2012), Onah & Ugwu (2010) that schools location makes no significant contribution to attitude and achievement. The implication of this result showed that gender is not a significant predictor of students attitude in chemistry, this is at variance with Logan & Kramp (2008), Ezeudu & Obi (2013) who in their separate studies reported that gender is a major factor that influenced career choice and interest of students in subjects.

## Conclusions

Based on the findings of this study, it could be concluded that reflective teaching produced better effect on the attitude of the subjects on exposure to treatment but found not to vary with gender and school location It could therefore be concluded that if reflective teaching is used with time, it will continue to produce more better attitude than the conventional method

## Recommendations

Teachers can rebrand positive attitude in students by re-enacting the confidence lost by the students towards science through reflective teaching method. Workshop and seminar can be organized constantly on reflective teaching. Curriculum experts in pre service teachers education should ensure utilization of reflective teaching programmes for the pre service teachers.

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