ATTITUDE AND CHEMISTRY STUDENTS' ACADEMIC PERFORMANCE IN SENIOR SECONDARY SCHOOLS IN NORTH-CENTRAL, NIGERIA

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Abstract
The importance of science and technology underscores the need to ensure that more and more students are encouraged to specialize in science-based courses. This is important especially when concerns are being raised on the declining interest of secondary school students in science. This study was carried out to determine the relationship between Chemistry students' attitude towards learning Chemistry and their academic performance in senior secondary schools in North-Central, Nigeria. The study was a descriptive ex-post facto research of the survey type. The sample for the study comprised of one thousand, one hundred and fifty (1150) senior school III (SS III) Chemistry students in the North-Central geopolitical zone of Nigeria. The research instrument used for the study was a researcher-designed questionnaire, entitled Students' Attitude to Chemistry Questionnaire (SACQ) which had a reliability coefficient of 0.72. Data were collected by direct administration and analyzed using frequency count, percentage, and Pearson Product Moment Correlation, while chemistry students' grade in joint mock examinations conducted by states in North-central Nigeria in 2012 represented their academic performance. The finding of the study revealed that the attitude of the students towards the learning of Chemistry in senior secondary schools in North-Central Nigeria was positive, and that it correlated with their academic performance in the subject. It is recommended among other things that Chemistry teachers should device appropriate instructional methods that would sustain and even improve the attitude of the students towards the learning of Chemistry.

Keywords: Attitude, Chemistry Students, academic Performance, Senior Secondary Schools

Introduction
The declining students' interest in science courses and careers is a worldwide concern. Since students' attitudes toward science affect course and career choices, as science becomes ever more deeply embedded in our everyday life, how ordinary people perceive science is attracting growing attention not only from the scientific community, but also from social scientists (Bak, 2001). One of the key factors in learning science is students' attitudes and the development of positive attitudes towards science can motivate students' interest in science education and science related careers (George, 2006).

Baron and Byrne (1994) revealed in their argument that attitudes dictate individual's perception of the world and their social interaction. An individual should have new experiences and information, to change his/her attitude towards an object, this means that human beings are not born with attitudes; they learn them afterwards from experiences, knowledge and skills gained. However, attitude is not static; it changes in the course of time (Erdemir & Bakiri, 2009).

According to Oskamp and Schultz (2005), an attitude may be defined as a predisposition to respond in a favourable or unfavourable manner with respect to a given attitude object. Attitudes associated with learning science appear to affect students' participation in science as a subject and had influence on performance in science (Jegede, 2007). Attitudes are acquired through learning and can be changed through persuasion using a variety of techniques. Attitude, once established, help to shape the experiences the individual has with object, subject or 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).

Chemistry teaching can only be result-oriented when students are willing and the teachers are favourably disposed, using the appropriate methods and resources in teaching the students. Attitude is viewed as a set of affective reactions towards attitude object, derived from concepts or beliefs that the individual has concerning the object, and predisposing the individual to be having in a certain manner towards the object (Abba, 2000).

Students' beliefs and attitudes have the potential to either facilitate or inhibit learning (Yara, 2009). The National Policy on Education (FRN, 2004) also stated in section 18(d) as one of its goals, the need to "mould the character and develop sound attitude and morals in the child (p. 9). Papanastasiou (2001) reported that individuals who have positive attitude towards science tend to perform better in the subject, because the affective behaviours are strongly related to performance.

The benefits of positive attitudes to learning according to Glover (2010) include: self-motivation, disappearance of any problem one may experience, better self-esteem, elimination of stress, increased creative thinking and performance of success. Oluwatelure and Oloruntegbe (2010) examined the attitude of students towards Biology and Chemistry. The result of their study revealed that performances of students in science are a function of their attitudes to the subject.

Escalona (2005) determined the correlation between attitude toward Chemistry and Chemistry performance of second year students who were enrolled in Chemistry at John B. Lacson Colleges Foundation in Bacolod. The result showed that there was a positive and significant relationship between the students' attitude towards Chemistry and Chemistry performance. Similarly, a study conducted by Oyedokun (2000) revealed a significant relationship between students' attitude and their school academic performance. However, Ma and Kishor (1997) after analyzing the correlation of attitudes and performances in classical studies found that this correlation was not statistically significant.

Statement of the Problem

Generally, the academic performance of Nigerian candidates in School Certificate Chemistry has not been encouraging over the years. For instance, Figure 1 presents the performance of Nigerian students in Chemistry in the May/June West African Senior School Certificate Examinations (WASSCE) conducted by the West African Examinations Council between 2006 and 2012.

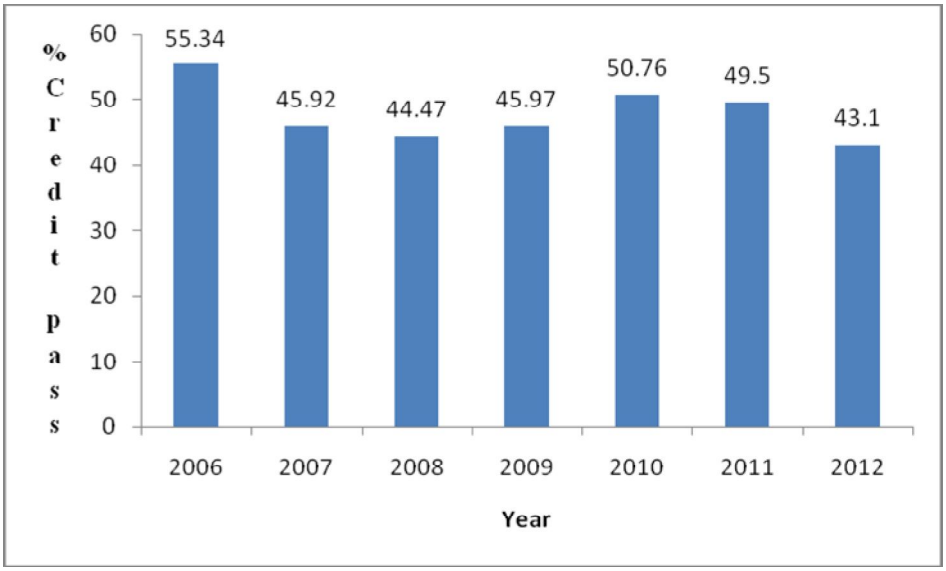

Fig 1: Graphical representation of WASSCE candidates' performance in Chemistry between 2006 -2012

A critical examination of figure 1 shows that the highest performance (55.3%) was in the year 2006 while the lowest performance (43.1%) was in the year 2012. Going by the submission of Jegede (2007) that attitude had influence on students' performance in science, one of the factors that may be responsible for the unsatisfactory performance of students in Chemistry may be their attitude towards the learning of the subject. Therefore, this study sought to find out if there was any relationship between students' attitudes toward learning Chemistry and the academic performance of senior secondary school Chemistry students in North-Central, Nigeria.

Purpose of the Study

The purpose of this study was to find out the relationships between students' attitude to learning chemistry and academic performance of Chemistry students in senior secondary schools in North-Central, Nigeria. Specifically, the study determined:

(i) the attitude of senior school Chemistry students towards learning of Chemistry in North-Central, Nigeria.

(ii) the relationship between Chemistry students' attitude towards learning Chemistry and their academic performance in the subject.

Research Questions

The following research questions were raised in the study:

(i) What is the attitude of senior school Chemistry students towards learning of Chemistry in North-Central, Nigeria?

(ii) What is the relationship between students' attitude towards learning Chemistry and their academic performance in the subject in North-Central Nigeria?

Research Hypothesis

HO_1: There is no significant relationship between secondary school students' attitude towards learning Chemistry and their academic performance in the subject in North-Central, Nigeria.

Methodology

The population of the study was all Chemistry students in the Senior School Three (SS III) in North-Central, Nigeria. The selection of students cut across Kogi, Kwara and Niger States within this region. Stratified random sampling was used to select One thousand, two hundred (1200) SS III Chemistry students in the three states for the study.

The instrument used for the study was a students' attitude to Chemistry (SAC) questionnaire constructed by the researchers in consultation with existing related literature. The items were drawn from related concepts which are important components of attitude considered in this study. They were 4-point Likert attitudinal scale items with response modes of strongly Agree (SA), Agree (A), Disagreed (D) and Strongly Disagree (SD) which attracted 4, 3, 2 and 1 scores respectively.

The questionnaire was validated by three lecturers in the Department of Science Education, University of Ilorin, Ilorin, Nigeria. The reliability of the questionnaire was determined using test re-test method of two weeks interval, in which the questionnaire was administered to thirty Chemistry students from another school not involved in the main study. The data obtained was subjected to Pearson Product Moment Correlation Statistic. A reliability coefficient of 0.72 was obtained.

One thousand, one hundred and fifty 1150 correctly filled copies of the questionnaire were selected for data analysis. The data obtained were subjected to descriptive statistics of frequency counts, mean, percentage and standard deviation. Pearson Product Moment Correlation was also employed to determine if there was correlation between the attitudinal scores of the respondents with their performance scores in the Joint Mock Chemistry Examination conducted in Kogi, Kwara and Niger States, Nigeria in 2012.

Results

The data obtained in respect of each of the research questions are presented and explained as follows:

Research Question 1: What is the attitude of senior school Chemistry students towards learning of Chemistry in North-Central, Nigeria?

Table 1 presents data on the attitude of students toward learning Chemistry among the respondents. A mean range of 2.5 to 4.0 (4.0 is the maximum) was taken to represent positive attitude, while a mean of less than 2.5 was taken to represent negative attitude.

Table 1: Summary of ranks of mean attitude scores of students towards learning of Chemistry among senior school Chemistry students in North-Central Nigeria

S/N	Item	Mean	Rank	Attitude of students
10	I like to study chemistry because it helps me discover the importance of science for the development of man and society.	3.24	1	Positive
20	Chemistry is an appropriate subject for developing scientific literacy.	3.23	2	Positive

6	I prefer working in group in chemistry class because group work helps the student to develop scientific attitude.	3.21	3	Positive
27	I have regard for those who study chemistry as a career in higher institution.	3.20	4	Positive
3	I need chemistry in my course of study.	3.19	5	Positive
11	Studying chemistry leads the students to think objectively and helps them develop the spirit of enquiry.	3.18	6	Positive
18	I believe that chemistry teachers should be specially trained before they go to class to teach.	3.18	6	Positive
19	Relevant materials from our environment can be used to learn chemistry.	3.17	8	Positive
9	I study chemistry because it is compulsory for science students in the secondary school certificate.	3.15	9	Positive
2	Chemistry is an interesting subject to learn.	3.13	10	Positive
28	I don't miss chemistry class because it is always interesting.	3.13	10	Positive
15	My chemistry teacher(s) is/are highly motivating while teaching and always approachable.	3.05	12	Positive
16	My chemistry teacher uses the examples found in the environment to teach chemistry successfully.	3.02	13	Positive
14	When I am having problem in acid-base titration, I try to discuss it with the teacher.	2.98	14	Positive
17	My chemistry teacher uses instructional materials to arouse my interest while teaching some concepts in chemistry.	2.98	14	Positive
23	I develop the ability to observe, identify, report and analyze problems through the study of chemistry.	2.97	16	Positive
26	Solving problems in chemistry is my hobby, and that enhances my good performances in the subject.	2.95	17	Positive
1	Chemistry is my favorite subject.	2.88	18	Positive
5	Topics/activities in chemistry are too many.	2.85	19	Positive
13	During practical class, I finish my practical work within the time allowed for the practical period.	2.67	20	Positive

Table 1: Summary of ranks of mean attitude scores of students towards learning of Chemistry among senior school Chemistry students in North-Central Nigeria (continued)

SN	Item	Mean	Rank	Attitude of students
29	Inadequate period allocated to chemistry lesson makes the subject difficult to learn.	2.65	21	Positive
24	My parents compelled me to study chemistry.	2.53	22	Positive
4	Chemistry topics/concepts are too difficult for me to understand.	2.47	23	Negative

8	I find reading chemistry textbooks to be boring and uninteresting because the textbooks are too complex.	2.43	24	Negative
12	I hate chemistry because the syllabus is too wide which makes me find it difficult to understand when I read it.	2.36	25	Negative
22	I hate chemistry because I have to use my own initiative most of the time.	2.25	26	Negative
7	I hate chemistry because it is time consuming.	2.20	27	Negative
25	My parents told me ever before I got admission into secondary school that chemistry is a difficult and volatile subject and so I do not like it.	2.09	28	Negative
21	My chemistry teacher is too harsh.	2.04	29	Negative

Twenty-two out of twenty nine items in the Chemistry Attitude Scale ranked within the range of positive attitude towards learning Chemistry, with the mean scores ranging from 3.24 to 2.53, while the remaining seven ranked within the range of negative attitude of students toward learning Chemistry. Hence, majority of the items were ranked as positive attitude, the overall attitude of the respondents towards the learning of Chemistry could be described as positive.

Research Question 2: What is the relationship between students' attitude towards learning and their academic performance in the subject in North Central Nigeria?
The corresponding hypothesis to this question is hypothesis 1.

HO_1: There is no significant relationship between students' attitude towards learning Chemistry and their academic performance in the subject in North-Central, Nigeria.

Table 2: Chemistry students' grades in joint mock examinations conducted by states in North – Central, Nigeria in 2012

States	Grades									Total
	A1	B2	B3	C4	C5	C6	D7	E8	F9	
Kwara	4	3	5	11	28	36	50	49	214	400
Kogi	26	6	14	32	44	88	66	50	74	400
Niger	2	39	47	59	53	62	43	23	22	350
Total	32	48	66	102	125	186	159	122	310	1150

Source: State Ministries of Education.

Tables 2 and 3 show the level of Chemistry students' academic performance in the Joint Mock Examinations conducted in Kogi, Kwara and Niger States of Nigeria in 2012. The result shows that only 559 (48.61%) of the respondents from Kogi, Kwara and Niger states passed at the credit level. It could be concluded that the level of academic performance of Chemistry students was low.

Table 3: Description of chemistry students' grades in joint mock examinations in Kogi, Kwara and Niger States, Nigeria in 2012

Grade	Frequency	Percentage	Cumulative percentage
A1	32	2.8	2.8
B2	48	4.2	7.0
B3	66	5.7	12.7

C4	102	8.9	21.6
C5	125	10.9	32.4
C6	186	16.2	48.6
D7	159	13.8	62.4
E8	122	10.6	73.0
F9	310	27.0	100.0

Mean score is 49.39

Table 4: Summary of Pearson Product Moment correlation between students' attitude towards learning Chemistry and academic performance of senior school Chemistry students in North – central, Nigeria

Variables	No	Mean	Standard Deviation	df	Calculated r	p-value
Students' attitude to Chemistry	1150	81.18	11.030	1148	0.117*	0.000
Academic performance		49.39	12.480			

*: Sig. at P< 0.05

Table 4 shows that [r(1148,0.05)=0.000]. This means that there was a significant relationship between attitude and academic performance of senior secondary school Chemistry students in North-Central, Nigeria. Hence, null hypothesis was rejected. From this result, it could be concluded that attitude was a good predictor of the academic performance of senior school Chemistry students because attitude correlated positively with their performance inof Chemistry.

Summary of the Findings

The summary of the findings of the study are as follows:

(i) The overall attitude of the respondents towards the learning of Chemistry was positive.

(ii) There was a significant correlation between attitude and academic performance of senior secondary school Chemistry students in North-Central, Nigeria.

Discussion

The significant relationship established between attitude and academic performance of senior secondary school Chemistry students in North-Central, Nigeria is an indication that students' attitude to learn Chemistry could be a predictor of what their performance will be in Chemistry examinations. This finding is similar to that of Papanastasiou (2001) who reported that individuals who had positive attitude towards science subjects tend to perform better in the subject because their affective behaviours are strongly related to performance.

Also, this finding is also in agreement with that of Escalona (2005) who determined the correlation between attitude toward Chemistry and Chemistry performance of second year regular students enrolled in Chemistry at John B. Lacson Colleges Foundation in Bacolod. The result showed a positive and significant relationship between the students' attitude towards Chemistry and their performance in the subject.

The finding is also in agreement with that of Oyedokun (2005) who found a significant relationship between students' attitude and school academic performance in Biology. Furthermore, findings of the present study agree with those of Oluwatelure and Oloruntegbe (2010) who examined the attitude of students towards Biology and Chemistry. Their results revealed that performance of students in science, particularly Chemistry, were partly a function of their attitudes to the subject.

This finding however contradicts that of Ma and Kishor (1997) in which no significant relationship was clearly established between students' attitudes and their academic performance Mathematics. For most of the related studies available in the literature however, more studies seemed to have established significant relationship between students' attitudes and academic performance than otherwise.

Conclusion

The major conclusion from this study is that the attitude of Chemistry students in North-Central Nigeria towards the learning of Chemistry was positive, and this could serve as one of the predictors of their performance in Chemistry.

Recommendations

Based on the results of the findings in this study, the following recommendations are advanced:

(i) Chemistry teachers should device appropriate instructional methods that would sustain and even improve the attitude of the students towards the learning of Chemistry, as a way of improving their performance in the subject.

(ii) Teachers should endeavour to always emphasise the importance of Chemistry knowledge to their students as a way of motivating better attitudes towards the subject.

(iii) Adequate facilities for teaching Chemistry should be provided in schools so as to prevent students from developing negative attitudes towards the subject, as this will lower their performance in the subject.

(iv) Parents should provide their wards with necessary incentives (e.g. modern textbooks) that would enhance the sustenance of positive attitude towards the subject.

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