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Influence of Scientific Attitudes on Students' Academic Performance in Chemistry in Bekwarra Local Government Area of Cross River State

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Abstract
This study investigated the influence of scientific attitudes on students' academic performance in Chemistry in some selected secondary schools in Bekwarra Local Government Area of Cross River State. Two hypotheses where formulated to guide the study. The research adopted survey design. The study population was one thousand (1000) SS2 Chemistry students, while the sample size was two hundred (200) SS2 chemistry students selected from ten (10) secondary schools. The first hypothesis was tested using Pearson's Product Moment Correlation analysis and the second was tested using the independent t-test analytical technique. The first hypothesis was significant which implies that student's scientific attitude had influence on the academic performance of students in chemistry, while the hypothesis with regard to gender was not significant. This means that gender difference is not a determining factor in academic performance in chemistry. It was therefore recommended that students should be exposed to the relevance of science at the junior secondary school level to help them inculcate scientific attitude early in life. Educational needs should be provided equally for both males and females.
Keywords: scientific, attitudes, academic, performance, Chemistry

Introduction
The scientific study of the interaction of chemical substances that are comprised of molecules is named Chemistry. Chemistry, and in fact scientists, are connected to everything on earth as suitably caught in a motto: "What in the world isn't Chemistry?"

Chemistry acts like a springboard to usher students into callings like Engineering, Medicine, Pharmacy, and a host of others. In clear terms, there is no zone of human enterprise which Chemistry is not useful. It is conspicuously seen in the territories of oil and gas, water supply, strong minerals, health, farming, material, mash and paper, cosmetics, environment and sterilization, wrongdoing recognition and a large group of others (Zuru, 2009).

Chemistry is one of the science subjects that play a significant role in society. It prepares students for the real world of work through career opportunities such as chemical engineering, medicine, pharmacy, food science, and environmental studies (Mahdi, 2014). According to Gray and Cheung (2009), the relevance of Chemistry to human existence and to many field of studies in school environment cannot be over-emphasized, but the academic performance of students at the foundation level keep growing poorer. Despite the relevance of Chemistry, the failure rate has remained very high (Kenni, 2020). According to Boyd and Landford (2008), poor academic performance of students is mainly due to lack of motivation from teachers, poor infrastructural facilities, attitude of students towards learning, and lack of opportunities for professional developments of science teachers.

Intelligence, cognitive styles and personalities are individual characteristics that play important role in teaching and learning. Other variables such as motivational orientation, self-esteem and learning approaches are important factors that influence academic achievements. Motivation has gained more popularity among educational psychologists in leading other variables that could be manipulated to improve academic gain. Okemakind, Alabi and Adewuyi (2003) observed that teachers have an important role to play to adequately prepare the young for their role in the society in order to achieve their educational objectives. They added that the quality of academic achievement depends to a great extent on the quality of teacher in terms of academic and professional qualification and experience. Teachers' level of competency in terms of content matter and their level of dedication to their teaching is very important.

Dinah (2013) concluded that availability of textbooks, laboratory apparatus and other learning resources contributes significantly to the performance of students in Chemistry. He added that students with positive attitude towards the subject register better performance than those who have negative attitude; those with positive attitude are motivated to work hard and this is reflected in the good marks scored in examination. Ajayi (2010) concluded that educational qualification of the parents and health status of students are significant factors that affect the academic achievement of students. Studies have shown that the poor academic performances of students are caused by parents. Etsey (2005) identified insufficient parental income and family type as causes of poor academic performance. Moreover, other causes of mass failure of

students in public examinations that could be traced to the parents include lack of proper guidance by the parents, failure of parents to provide necessary materials for their children to work with in school and family background (Ajayi, 2010). Bakare (2013) found out that the students factors of poor academic performance were poor study habits, psychological adjustment problems, lack of interest in school programme, less retention, association with wrong peers, low achievement motivation and emotional problems. Other studies such as that of Etsey (2005), Ong and Chandron (2010), have shown that students' lack of financial support, absenteeism, truancy, use of local language in the classroom, lack of interest and joy in teacher's lessons and learning disability cause poor academic performance of students. Other causes include low cognitive ability, gender, prematurity, medical problems and inability of students to understand examination questions.

Science education is facing a challenge of students who are losing interest in learning science subjects including Chemistry. The factors affecting secondary school students' attitudes toward Chemistry: Gender, instructional methods, and grade level were found to be the most common factors positively affecting students' attitudes toward Chemistry. However, students' interest, classroom environment, the relevance of curriculum, teachers' behaviour, perceived difficulty and self-directed effort in the science subjects were also studied to check if there is any relation to the attitude of students while learning Chemistry. The findings indicated that these factors have to be controlled to enrich positive attitudes toward Chemistry among secondary school students and to improve their performance in Chemistry (Musengimana, Kampire & Ntawiha, 2021).

From the foregoing, it is evidence that the problems are enormous. Attitude, especially when it is scientific, may affect the academic performance of students. Oskmpa and Schultz (2005) define scientific attitude as a way of viewing things, a curiosity to know how and why things happened with an opened mind and governed by fact. Scientific attitude is characterized by intellectual honesty, open mindedness, persistence, flexibility, humility, creativity and so on.

Scientific attitude towards Chemistry denotes interest or feelings towards studying science. It is the student's disposition towards like or dislike for science (Oskmpa & Schultz, 2005). Science has been playing a tremendous role in developing civilization of mankind. Human being is the most intelligent creature of nature. Ability of humans to utilize this intellect can help developing countries to get developed. Only scientific attitude could help human beings in developing nations to reach their desired level of development (Mishra, 2020).

According to Yara (2009), attitude of students can be influenced by the attitude of the teacher and his methods of teaching. He further showed in his work that teacher's methods of teaching Chemistry and his personality greatly account for the students' positive scientific attitude towards the subject and that without interest and personal effort in learning by the students, they can hardly perform well in the subject. Olatoye (2011) found that students' scientific attitude towards Chemistry have direct significant effect on students' achievement in the subject. Adesokan (2002) asserted that in spite of the recognition given to Chemistry among the science subjects, it is evident that students still show negative attitude towards the subject thereby leading to poor performance and low enrollment. Adesokan (2002) posited that students' beliefs and scientific attitude have the potential to either facilitate or inhibit the learning of Chemistry. Students' scientific attitude about the value of learning chemistry may be considered as both input and output variables because their attitude towards the subject can be related to educational achievement in the subject in the ways that reinforce higher or lower performance. This implies that students who perform well in Chemistry are those who have more positive scientific attitude towards the subject.

Various theories have shown that the key to higher academic achievement is the desire and interest indicated by the student. Motivation may be rooted in the basic need to minimize physical pain and maximize pleasure, or it may include specific needs. Students' attitude towards the learning of science and science is one of the paramount goals of science teaching and learning. The inculcation of scientific attitude during the learning of science and students' attitudes toward science is very crucial in a science class (Hofstein & Mamlok-Naaman, 2012; Can & Boz, 2012). From the various literature cited, it indicates that students' scientific attitude towards Chemistry to some extent have a significant influence on their study habits. This is because a positive scientific attitude is associated with better understanding which accompanied effective study habit on the part of the students in the area of Chemistry.

In a research by Mari and Shauba (2012), they revealed that female students had better understanding of science process skill when compared to the male students. They suggested that the view that seems to have established itself that boys are better than girls in science education need to be approached and interpreted with great caution. Godpower and Amadi (2013), in a research work involving four hundred (400) senior secondary SS2 chemistry students, found out that there was a positive correlation between gender and students' achievement in chemistry. Females tend to perform better in area of standardized science assessment that addresses the human application of science such as life science (Ingels & Dalten, 2008).

Contrary to the findings reported, Babalola and Fayombo (2009) found out that there was no statistically significant difference in the students' Chemistry achievement based on gender. Hofstein and Mamlok-Naaman's (2011) study showed males had interest in topics such as explosive chemicals, how it feels to be weightless in space, how the atom bomb functions, biological and chemical weapons and what they do to the human body. In contrast, females showed interest in why we dream when we are sleeping and what the dreams might mean, cancer – what we know and how we can treat it, how to perform first aid and use basic medical equipment, and how to exercise the body to keep fit and strong.

However, not all previous studies documented that female students have more positive scientific attitude towards Chemistry than their male counterpart. Salta and Tzougraki (2004), for example, surveyed 576 high school students in Greece using an attitude scale with four subscales; the difficulty of Chemistry courses, the interest on Chemistry courses, the usefulness of Chemistry for students' future career and importance of Chemistry for students life; they found no gender differences in students' attitude regarding interest, usefulness and importance of Chemistry.

The purpose of the study

The purpose of the study was to investigate the influence of scientific attitude on student's academic performance in Chemistry in Bekwrra Local Government Area of Cross River State.

The objectives of this study were:

1. To investigate the relationship between students scientific attitude towards chemistry and academic performance in chemistry.
2. To investigate the influence of students' gender on academic performance in Chemistry.

Hypotheses

The following hypotheses were formulated to guide this study:

Ho1: There is no significant relationship between student's scientific attitude towards chemistry and academic performance in Chemistry.

Ho2: There is no significant difference in students' academic performance in Chemistry based on gender.

Methodology

The research design adopted for this study was survey design This is so as the design systematically collects data about a group of individuals who have the same characteristics, through the use of written or oral data collection instruments, interview, questionnaires, telephone interview, mails and the internet concerning participants' responses on facts, opinions, attitudes etc that enable the researcher to

study as a group. From the forgoing assertion, the factors associated with poor academic performance of secondary school students in Bekwarra Local Government Area fall within the realm of the above design.

The sample for the study comprised two hundred (200) students selected from a total population of one thousand (1000) SS2 students in schools in Bekwarra Local Government Area. The instruments used for data collection were namely; scientific attitude questionnaire (SAQ) and Chemistry achievement test (CAT). SAQ consisted of two parts, section A and B, section A covered the personal data of the respondents while B was a four Likert scale requiring respondents to respond according to how they agreed or disagreed to the statement therein. Strongly agree (SA) represents 4 points, Agree (A) represents 3 points, Disagree (D) represents 2 points and Strongly Disagree (SD) represents 1 point. It had 12 items. The Chemistry Achievement Test (CAT) contains ten (10) multiple objective test items.

The instrument used for data collection was face and content validated by experts in the field of research and subject discipline before administering it to the students sampled for the research. The reliability of the instruments was done by trial testing it using 30 students who were not part of the sample. Cronbach alpha was used to calculate the reliability of SAQ and it gave a coefficient of 0.77. Kuder Richardson formular 20 was used to get the reliability for CAT; it had a reliability of 0.85.

The researchers visited all the sampled schools for the study and sought for permission from the principals of each of the schools sampled; the teachers were approached for assistance. Copies of the questionnaire and the achievement test were administered to the respondents directly. The researchers supervised the filling of the questionnaire items and the achievement test by the students alongside with the assistance of the subject teacher in the classroom. At the end of the exercise, the researcher collected the filled questionnaire for analysis. None of the questionnaire got lost. The data generated was analyzed using t-test and Pearson Product Moment Coefficient.

Presentation of results

Ho1: There is no significant relationship between students' scientific attitude and academic performance in Chemistry.

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Table1: Pearson's product moment correlation statistical analysis of relationship between students' scientific attitude and academic performance of Chemistry students (N=200)

Variable type	$\sum X$ $\sum Y$	$\sum X^2$ $\sum Y^2$	$\sum XY$	r-cal
Scientific attitude	5220	10494	9750.9	0.8517
Academic performance	5021	12490.795		

*Sig at 0.05, df = 198, r-cal = 0.159

This result was significant as the calculated value of 0.8517 was greater than critical value of 0.159 at 0.05 level of significance with 198 degree of freedom. The null hypothesis was therefore rejected. This implies that there was a significant relationship between student's scientific attitude towards Chemistry and academic performance of Chemistry students.

Ho2: There is no significant influence of student's gender on academic performance in chemistry.

Table 2: Independent t-test analysis on students' academic performance in Chemistry based on gender

Gender	N	Mean	Standard deviation	t-cal
Male	121	24.75	8.29	0.456
Female	119	25.65	7.34	

*Sig at 0.05 level, df = 198, t-critical = 0.7789 p-value= 0.6789

This result was not significant as the calculated t-value of 0.456 was less than critical value of 0.7789 at 0.05 level of significance with 198 degree of freedom. The null hypothesis that stated that there is no significant influence of student's gender on academic performance in Chemistry was accepted.

Discussion of finding

The result of hypothesis one revealed that students' scientific attitude is significantly related to academic achievement of students in Chemistry. The study agrees with the study of Yara (2009) that pupils' scientific attitude in Chemistry is associated with their achievement in Chemistry. He further discovered that 25% of variables in achievement could be attributed to pupils' scientific attitudes towards Chemistry.

Corroborating these reports, Olatoye (2011) found that students' scientific attitude towards Chemistry have significant direct influence on student's achievement in the subject. The implication of this finding is that the students with positive scientific attitude towards Chemistry tend to perform better in Chemistry. Adesokan (2002) posited that student's belief and attitude have the potential to either facilitate or inhibit learning.

The result of the second hypothesis revealed that there is no statistically significant difference on academic performance of students in Chemistry based on gender. This finding agrees with the study of Babalola and Fayombo (2009) that found out that there was no statistically significant difference in the students' Chemistry achievement based on gender difference. Also in agreement with the finding is the view of Fredrick (2008) who posited that there is no statistical difference between boys and girls in the ability to manipulate the apparatus and equipment, take observation, report and record result correctly and compute or interpret or analyze result during Chemistry practical, and that both males and females students perceived interpreting or analyzing result to be most difficult skill to perform during Chemistry practical.

Conclusion

The study investigated the influence of scientific attitude on students' academic performance in Chemistry. The result of the finding strongly suggests that scientific attitude towards Chemistry increases their academic performance. Also findings revealed that gender difference has no effect on student's academic achievement.

Recommendations

Based on the findings, the following recommendations are made towards improving student's academic performance in Chemistry:

1) Students should be exposed to the relevance of science at the junior secondary school (JSS I to III) to build their mind towards sciences; this would help to improve scientific attitude of students in Chemistry.
2) Gender has no effect on academic achievement, therefore, parents, teachers, and the society at large should provide basic academic needs equally for both male and female students to enhance their academic achievement.

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