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Research Paper

CHALLENGE OF EFFECTIVE TEACHING OF CHEMISTRY IN THE SECONDARY SCHOOLS IN ENUGU STATE

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ABSTRACT **Chemistry education has been identified to be one of the major bedrock for the transformation of our national economy, and hence must be accorded adequate attention. In this study, dy, an attempt was made in ascertaining the the challenges affecting teaching of chemistry in secondary schools *in Oji-River L.G.A. of Enugu State. Specifically, the study ascertains the extent student's attitude towards chemistry and inadequacy of laboratory equipment affect effective teaching of chemistry in secondary schools in Enugu State. The population for this study consists of nineteen secondary schools in Oji-River L.G.A. of Enugu State. A two-stage sampling approach was used to constitute the sample of 180 students spread through SS1-SS3 in the two sampled schools. Data for the study was collected through questionnaire administered to the sampled school students. The collected data were analyzed using mean and standard deviation to answer the research questions, and hypotheses were tested with t-test statistical tool with aid of SPSS version 20. The study found that student's attitude towards chemistry and inadequacy of laboratory equipment is among the challenges influencing the effective teaching of chemistry in secondary schools in Enugu State. The study therefore recommended among others that ggovernment should be monitoring the distributed financial, human and material resources equally to all schools irrespective of location or level for effective utilization. When chemistry teachers are faced with the problem of non-availability of materials/equipment for practical purposes, they should improvise.*

KEYWORDS :Chemistry; Laboratory and Students attitude

INTRODUCTION

The acquisition of relevant skills, the development of mental and physical competences as equipment for individuals to live in and contribute to the growth of the society are some of the purposes of education in Nigeria (Federal Government of Nigeria 2014). According to Asiriuwa (2005), science and technology education is primarily and inevitably concerned with teaching individuals how to gain systematic skills, knowledge, and attitudes, as well as how to apply them to society. It is self-evident that science and technology play a significant role in nation-building. Education, particularly Science and Technical education, is the 'factory' for the production of the needed technologists, technicians and craftsmen as well as skilled artisans who are required to turn the nation's economy around and usher in the desired technological advancement which is very much required for the elevation of Nigeria from a 'consumer nation' to a 'producer nation'; from a 'developing nation' to a 'developed nation' (Avaa, 2007).

Several studies have looked into chemistry learning achievement at the senior secondary school level over the years. Students' understanding of concepts such as writing chemical formulae and equations and performing calculations from them, concepts of chemical reaction equilibrium, and mole concepts, among others, was revealed by the findings of these studies (Achor & Ukwuru, 2014; Lati, Supasorn, & Promarak, 2012; Supasorn & Waengchin, 2014). The chemistry was taken as an intricate and complicated subject leading the students to develop a misconception in some concepts such as electrolysis, redox reaction, acid and bases, state of matter, and organic compounds (Johnstone, 2006). However, chemistry is of great importance to recognize the problematic areas and some misconceptions that students may encounter within chemistry concepts and propose the strategies to be adopted to address them.

One of the science subjects that has a big impact on society is chemistry. Chemical engineering, medicine, pharmacy, food science, and environmental studies are examples of career options that prepare students for the real world of work (Mahdi, 2014). These provide up job prospects in a variety of industries, including petroleum, metallurgy, ceramics, glass, plastics, cement, pharmaceuticals, food and beverages, fertilizers, transportation, and education.

According to Okeke (2007), science and technology serve as the key to modernizing and developing nations in the world today have achieved greatness due to the special attention given to science and technology. One strategy for enhancing the growth of science and technology in a nation is to pay attention to the training of children at the foundation level (Jacobson, 2010). This indicates that science and technology should receive more attention at the basic and secondary levels of our educational system. Chemistry is the study of material compounds found on Earth and in other parts of the cosmos. It is concerned with the use of natural compounds as well as the production of synthetic ones (Holman, 1995). Chemistry has been highlighted as a very important school topic in the context of science education, and its importance in the scientific and technical growth of any nation has been widely reported (Adesoji and Olatunbosun, 2008). Chemistry was declared a key topic among the natural sciences and other science-related courses in the Nigerian educational system as a result of the recognition given to it in the development of the individual and the nation.

Chemistry instruction is supposed to be outcome-oriented and student-centered, and this can only be accomplished when students are eager to learn and teachers are willing to use appropriate methods and resources in their instruction (Adesoji & Olatunbosun, 2008). Students are curious by nature, and they must be actively involved in the learning process, constantly equipping, testing, speculating, and constructing their own particular construct and knowledge. Personalizing such knowledge is the only way for it to become valid, relevant, and valuable to individuals. Students must actively develop their own unique consciousness and significance in chemistry (Usman, 2000). To substantiate the argument, Usman (2006) remarked that the brain is not a passive consumer of information and to learn with understanding, a learner must actively construct meaning of what to be learned.

Despite chemistry's prominent role in our educational system and researchers' efforts to improve performance, students' performance in chemistry and sciences in general remains low. Laboratory inadequacy, instructor attitude, examination malpractice, time constraint for practice, non-coverage of syllabus, class size, non-professionalism, and atmosphere are some of the reasons for this failure.

According to several authors, poor chemistry performance is due to a negative attitude toward studying and teaching chemistry, as well as insufficient instructional strategies and teaching aids (Cheung, 2009b; Khan & Ali, 2012). Cheung (2009a), who conducted the study in Hong Kong, backed up this allegation, claiming that pupils dislike chemistry because of the traditional teaching methods of chalk and talk, which are often utilized by teachers while answering easy problems on the boards. They stated that their teachers merely prepare them for public exams, in which they are given stuff to memorize. Only a few chances are given to them to conduct experiments in the laboratory. This study therefore examine the challenges affecting teaching of chemistry in secondary schools in Oji-River L.G.A. of Enugu State

1. To ascertain the extent students attitude towards chemistry affect effective teaching of chemistry in secondary schools in Enugu State.
2. To determine how inadequacy of laboratory equipment affect effective teaching of chemistry in secondary schools in Enugu State.

Review of Related Literature

One of the most important aspects of science education is the development of students' attitudes toward chemistry, as students' attitudes have a substantial impact on how teachers teach (Lovelace & Brickman, 2013). Positive attitudes regarding science commitment, according to Oh and Yager (2004), promote lifetime learning and interest in science. Cheung (2009a), Khan and Ali (2012), Najdi (2018), and Salta and Tzougraki (2004) investigated the importance of developing a positive attitude toward chemistry learning among secondary school students, and their findings revealed that attitude is directly linked to academic achievement and is a predictor of behavior.

In comparison to students with a negative attitude, it has also been noted that students with a good attitude strive to achieve in the subject being taught (Brandriet, Xu, Bretz, & Lewis, 2011; Heng & Karpudewan, 2015; Lerman, 2014). This is reinforced by research by Mushinzimana, Sinaruguliye, and de la (2016), as well as Ngila and Makewa (2014), who found a link between student achievement and their attitude toward science subjects. According to Morabe (2004), having a negative attitude toward a subject makes learning harder because there is a lack of enthusiasm and trust in the subject. Factors that may disrupt the propecia process, according to Zden (2008) The contents should also be well designed to inculcate the desirable attitude and values among the students. These help shape their attitude, behaviors, and motivation, influencing their cognitive skills and active participation in the teaching and learning process. **Studies on Students' Attitudes Toward Chemistry**

One of the benefits of science education is that it aids in the development of a good attitude toward science in various individuals (Hacieminoglu, 2016). However, it has been reported that pupils' interest in science courses is dwindling at the secondary level (Awan & Sarwar, 2011). As a result of the latter, the number of students choosing science-related careers is quite low. Furthermore, students' sentiments about biology are the most favorable, while attitudes toward chemistry and physics are the least favorable (Awan & Sarwar, 2011; Cheung, 2009b). One factor for the decline in students' positive attitudes about science and science-related occupations was their illiteracy (Osborne et al., 2003). Further studies and reports carried out in the U.S. and in Europe attributed these factors to the lack of relevant content and pedagogical approaches at school levels (Hofstein & Mamlok-Naaman, 2011).

Furthermore, some research have looked into secondary school students' views about chemistry learning. In Chile, for example, study was carried out to determine secondary school pupils' opinions regarding chemistry (Montes et al., 2018). The findings revealed that Chilean students' attitudes regarding chemistry were neutral. In chemistry, they have reasonably pleasant sensations or emotions, although they say their topic is difficult and tough. In addition, when they progressed from the lower to the higher year group, their attitudes seemed to deteriorate. In this investigation, there was no gender difference. Furthermore, the authors discovered a substantial link between chemistry and achievement.

However, this was not the case in a Tanzanian study conducted by Seba, Ndunguru, and Mkoma (2013), which found a difference in boys' and girls' attitudes toward chemistry in terms of fear, enjoyment, and confidence. In physics and chemistry, male students were found to have higher confidence, outstanding performance, and happiness than their female counterparts. As a result, boys have more positive views toward chemistry and physics than girls, and they are more likely to participate in chemical and physics activities.

Similarly, Salta and Tzougraki (2004) investigated secondary students' attitudes toward chemistry in terms of difficulty, interest, usefulness, and chemistry importance. Their results indicated that the attitudes of Greek students were neutral. Though they have acknowledged the importance of chemistry in their lives, they do not realize the usefulness of chemistry courses in their future lives. Their results also revealed that boys' and girls' attitudes in the level of interest, usefulness, and importance given to chemistry were identical.

Laboratory In-adequacy

Experimentation is one of the activities in chemistry. It provides a venue for teachers and learners to put their theoretical knowledge into practice as well as demonstrate their psychomotor skills. It is thought that allowing students to put what they have learned in the classroom into practice will help them achieve more. Farounbi (1998) stated that using laboratories in the teaching and learning of science in general and chemistry in particular helps students grasp and remember what they hear. Experimentation in chemistry is however dependent on the availability of science equipment (Ugwu, 2008). Many authors have reported the issue of inadequate science equipment in educational institution (Ogunmade, 2006 Ugwu 2008; Nwagbe,2008).

Non-availability of science equipment and lack of practical exposure have been identified as barriers to successful science instruction (Rami,2002 and Adeyegbe 2005). Laboratory limitations have been shown to influence students' chemistry performance. Inadequate funding for the education sector is another factor leading to the lack of science equipment in educational institutions. Financial allocation to the education sector has decreased over time, making it unable to get necessary teaching and learning equipment.

Many students find chemistry to be a difficult subject. To make it real and close to the students, the methods used in teaching it matters. Laboratory inadequacies have been reported to affect students' chemistry performance (Rami,2002 and Adeyegbe 2005). The lack of science equipment in educational institutions is also a result of the education sector's inadequate funding. As a result, adequate teaching and learning equipment has become impossible to obtain over time.

Many students find the subject of chemistry to be esoteric. The methods used in teaching it matter in making it real and accessible to students. They include discussion, game playing, project demonstration, discovery, brainstorming, problem solving method and process based approach. These develop in student's critical thinking skills, creativity, open mindedness, intellectual honesty and so on. Another factor that leads poor method of instruction is the

employment of nonprofessional qualified teachers that is teacher who teaches chemistry but has no teaching qualification. Such teachers may not be knowledgeable in teaching methods suitable to learn chemistry effectively not to talk of being abreast with the use of instructional material to teach chemistry.

Methodology

Descriptive survey research design was adopted for the study. Descriptive survey design uses questionnaire to explore the opinions of given population or its representative sample on existing phenomena (Uzoagulu 2011). However, in survey research the focus is on people, their beliefs, opinions, attitudes and behavior. Based on this, the design is appropriate for the study.

Population of the Study

The population for this study consists of nineteen secondary schools in Oji-River L.G.A. of Enugu State. A two-stage sampling approach was used to constitute the sample. In the first stage, a purposive sampling approach was used to select two co-educational schools. The second stage sampling approach was used to senior secondary schools. This figure a total of 180 students, hence the sample size for the study was 180 students spread through SS1-SS3 in the sampled schools.

Method of Data Collection

The researcher administered the instrument with the help of the two research assistant, one from each of the sampled school. These research assistants helped in the distribution and retrieval of the instrument. All the copies of the instrument returned which were properly filled were used for analysis.

Method of Data Analysis

The collected data were analyzed using mean and standard deviation to answer the research questions. The mid-point for the likert scale obtained was 2.5 calculated as follows; 4+3+2+1/4 =

10/4 = 2.5. Hence any item with a mean score of 2.5 and above is accepted while an item with mean less than 2.5 is rejected. The hypotheses were tested with t-test statistical tool with aid of SPSS version 20.

Data Analysis

Table 1: Mean responses of the influence of student's attitude towards chemistry affect effective teaching of chemistry in secondary schools in Enugu State

5 They do not realize the usefulness of chemistry courses in their future lives 1.71 3.42 Agree

Data presented in Table 1 shows the item by item analysis of periodic testing on the biology students' academic achievement in secondary schools in Enugu State. The result revealed that all the questions answered scores above the benchmark (2.50), showing that the level respondents rated the item is highly effective. The standard deviation scores ranging from 1.59 – 1.71 means that the mean scores of the respondents are not widely spread apart.

Table 2: Mean responses of the influence of inadequacy of laboratory equipment affect effective teaching of chemistry in secondary schools in Enugu State.

Data presented in Table 2 shows the result from analysis of periodic testing on the biology

students' academic achievement in secondary schools in Enugu State. The result revealed that all the instruments scores above the benchmark (2.50), showing that the level respondents rated the item is highly effective. The standard deviation scores ranging from 1.50 - 1.74 means that the mean scores of the respondents are not widely spread apart.

Test of Hypotheses

Research Hypotheses One

Ho1: Student's attitude towards chemistry has no influence on effective teaching of chemistry in secondary schools in Enugu State.

Table above shows the mean difference of 45.00, and the sig-value (p-value) of the questions raised is above 0.05. This is an indication that student's attitude towards chemistry influenced effective teaching of chemistry. We therefore reject null hypotheses and accept alternate hypothesis which stated that student's attitude towards chemistry has influence effective teaching of chemistry in secondary schools in Enugu State.

Hypothesis Two

Ho2: Inadequacy of laboratory equipment has no influence effective teaching of chemistry in secondary schools in Enugu State.

Table above shows the mean difference of 45.00, and the sig-value (p-value) of the questions raised is above 0.05. The confidence interval of difference shows that there is a significant relationship between inadequacies of laboratory equipment has influence on effective teaching of chemistry in secondary. Therefore we reject null hypotheses and accept alternate hypothesis which stated that inadequacy of laboratory equipment has influence on effective teaching of chemistry in secondary schools in Enugu State.

CONCLUSION

This study found that teacher-related elements and the school environment, such as attitude, time, salary, laboratory adequacy, and others, had a significant impact on students' positive chemical accomplishment. These criteria both directly and indirectly lead to areas that need to be addressed in order to improve students' chemistry learning results. Kids' performance will undoubtedly increase if the government and other stakeholders in the education industry can improve the learning environment for students and inspire teachers who apply the curriculum. Based on the conclusion drawn it is recommended that:

1. Deserving instructors, students, and laboratory assistants/technologists should be suitably rewarded and their remunerations provided promptly so that other laboratory resource workers might mimic their excellent standards in the teaching-learning process.

2. For effective utilization, the government should monitor the distribution of financial, human, and material resources to all schools, regardless of location or level. When chemistry teachers are faced with a lack of resources or equipment for practical applications, they should improvise.

Plan

Abstract

Introduction

- Review of Related Literature
- Studies on Students' Attitudes Toward Chemistry Laboratory In-adequacy
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- Method of Data Collection Method of Data Analysis
- Data Analysis
- Test of Hypotheses

Conclusion and Recommendations

References

ref_str

Achor, E. E., & Ukwuru, J. O. (2014). An Examination of the facilitative effect of the computer assisted instruction (C.A.I.) in students' achievement in chemical reaction and equilibrium. *Education*, *4*(1), 7-11. http://doi.org/10.5923/j.edu.20140401.02

Adesoji, F.A & Olarunbosun, M.S (2008). Students, Teacher and School Environment Factors as Determinants of An Achievement In Senior Secondary School Chemistry In Oyo State, Nigeria. *The Journal of International Social Research* 1(2)

Awan, R., & Sarwar, M. (2011). Attitudes toward science among school students of different

nations: A review study. *Journal of College Teaching & Learning*, *8*(2).

http://doi.org/10.19030/tlc.v8i2.3555

Asiriuwa ,O.D.(2005), Education In Science and Technology For National Development *Journal of Research In Education.* Vol(2)10

Avaa A., *Improving performance in the sciences*. A support paper presented at a workshop held

at Federal Government Girls' College Zaria, 2007.

Adesoji F.A., Olatunbosun S., *Student, Teacher and School Environmental factors as Determinants of Achievement in Senior Secondary School Chemistry in Oyo State*, Nigeria. Uluslararası Sosyal Ara_tırmalar Dergisi. The Journal of International Social Research, 2008, 1/2.

Brandriet, A. R., Xu, X., Bretz, S. L., & Lewis, J. E. (2011). Diagnosing changes in attitude in

first-year college chemistry students with a shortened version of Bauer's semantic differential. *Chemistry Education Research and Practice*, *12*(2), 271-278. http://doi.org/10.1039/c1rp90032c Cheung, D. (2009a). Developing a scale to measure students' attitudes toward chemistry lessons.

International Journal of Science Education, *31*(16), 2185-2203.

http://doi.org/10.1080/09500690802189799

Cheung, D. (2009b). Students' attitudes toward chemistry lessons: The interaction effect between grade level and gender. *Research in Science Education*, *39*(1), 75-91. http://doi.org/10.1007/ s11165-007-9075-4

Federal Government of Nigeria.(2014), *National Policy on Education* (Revised), Abuja, Nigeria: Nigeria Education Development Council (NERDC) ijese.2016.288a

Heng, C. K., & Karpudewan, M. (2015). The Interaction effects of gender and grade Level on secondary school students' attitude towards learning chemistry. *Eurasia Journal of Mathematics, Science & Technology Education, 4*(11), 889-898.

Hacieminoglu, E. (2016). Elementary school students' attitude toward science and related

variables. *International Journal of Environmental & Science Education*, *11*(2), 35-52.

http://doi.org/10.12973/ ijese.2016.288a

Hofstein, A., & Mamlok-Naaman, R. (2011). High-school students' attitudes toward and interest

in learning chemistry. *Educacion Quimica*, *22*(2), 90-102. http://doi.org/10.1016/s0187-893x(18)30121-6

Holman, J. (1995), *Chemistry London*: Thomas Nelson And Sons Ltd.

Hong, Z. R., & Lin, H. shyang. (2011). An investigation of students' personality traits and attitudes toward science. *International Journal of Science Education*, *33*(7), 1001-1028. http://doi.org/10.1080/ 09500693.2010.524949

Johnstone, A. H. (2006). Chemical education research in Glasgow in perspective. *Chemistry*
Education Research and Practice, *7*(2), 49-63. http://doi.org/ 10.1039/B5RP90021B

Khan, G. N., & Ali, A. (2012). Higher secondary school students' attitude towards chemistry.

Asian Social Science, *8*(6), 165-169. http://doi.org/10.5539/ ass.v8n6p165

Lati, W., Supasorn, S., & Promarak, V. (2012). Enhancement of learning achievement and integrated science process skills using science inquiry learning activities of chemical reaction rates. *Procedia - Social and Behavioral Sciences*, *46*, 4471-4475.

http://doi.org/10.1016/j.sbspro.2012.06.279

Lerman, Z. M. (2014). The challenges for chemistry education in africa. *African Journal of Chemical Education*, *4*(2), 80-90. Mahdi, G. J. (2014). Student attitudes towards chemistry: An examination of choices and preferences. *American Journal of Educational Research*, *2*(6), 351-356. http://doi.org/10.12691/education-2-6-3

Lovelace, M., & Brickman, P. (2013). Best practices for measuring students' attitudes toward learning science. *C.B.E. Life Sciences Education*, *12*(4), 606-617. http://doi.org/10.1187/cbe.12-11-0197

Mushinzimana, X., & Sinaruguliye, J. de la C. (2016). Attitude of physics students towards physics at college of science and technology - university of Rwanda. *The Rwandan*
Journal of Education, *3*(2), 1-10.

Najdi, S. (2018). *Students attitude toward learning chemistry*.

Ngila, W. M., & Makewa, L. N. (2014). Learner attitude towards chemistry, study skills and examination preparedness: A Case of a public school in eastern, Kenya. *American*
Journal of Educational Research, *2*(11A), 8-15.

http://doi.org/10.12691/education-2-11a-2
Oh, P. S., & Yager, R. E. (2004). Development of constructivist science classrooms and changes in student attitudes toward science learning. *Science Education International*, *15*(2), 105-

113.

Osborne, J., Simon, S., & Collins, S. (2003). Attitudes towards science: A review of the literature and its implications. *International Journal of Science Education*, *25*(9), 1049-1079. http://doi.org/10.1080 /0950069032000032199
Özden, M. (2008). An investigation of some factors affecting attitudes toward chemistry in university education. *Essays in Education*, *24*(1), 90-99.

Adesokan C.O., *Students Attitude and gender as Determinants of Performance in JSS Integrated Science*. Unpublished B.Ed Project Department of Chemistry, Universityof Nigeria, Nsukka, 2002.

Raimi S.M., *Problem-solving Techniques and Laboratory skills as supplements to Laboratory*
Teaching in Senior Secondary School Students' Learning of Volumetric Analysis.

Unpublished PhD Thesis University of Ibadan, Ibadan, 2002.

Farounbi M., *Resource concentration, utilization and management correlates of students'*.
Learning outcomes: a study in school quality in Oyo State. Unpublished PhDThesis University of Ibadan, Ibadan, 1998.

Okeke , E.A.C (2007) . Making Science Education Accessible To All. *23rd Inaugural Lecture of*
University of Nigeria. Nsukka.

Usman I.A., *Relationship between Students performance in practical Activities and their Academic Achievement in Integrated Science using NISTEP mode of teaching*, Unpublished and Ph.D Thesis Dept. of Education A.B.U. Zaria, 2000.

Usman I., *Strategies for conducting practical in Science, Technology and Mathematics*. A lead

paper, presented at STAN workshop, at Federal Government Girls' College

Malali, Kaduna, 2006.

Salta, K., & Tzougraki, C. (2004). Attitudes toward chemistry among 11th grade students in high schools in Greece. *Science Education*, *88*(4), 535-547. http://doi.org/10.1002/sce.10134

Seba, J. M., Ndunguru, P. A., & Mkoma, S. L. (2013). Secondary school students' attitudes

towards chemistry and physics subjects in tarime-mara, tanzania. *Research Article*, *4*(2),

642-647.

Supasorn, S., & Waengchin, S. (2014). Development of grade 8 students' learning achievement on chemical reaction by using scientific investigation learning activities. *Procedia - Social and Behavioral Sciences*, *116*, 744-749.

Ugwu, A.N (2008) Current Issue in the Implementation of Senior Secondary Schools Science

Curriculum in Nigeria *Science Teachers Association of Nigeria Annual Conference*, 19-

25.

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