DOI: 10.20472/IAC.2015.018.013

CLARA AKUNNA ANIH

School of Science Education, Enugu State College of Education (Technical) Enugu, Enugu State Nigeria, Nigeria

JOY JOHNBEST EGBO

School of Science EAbakaliki Road GRA, Enugu, Enugu State Nigeria, Nigeria

THE INFLUENCE OF GENDER ON SCIENCE STUDENTS ACHIEVEMENT USING PRATICAL ACTIVITIES IN SENIOR SECONDARY SCHOOLS IN ENUGU EDUCATION ZONE OF ENUGU STATE, NIGERIA

Abstract:

The annual performance of students in the senior secondary school certificate examination (SSCE) conducted by the West African Examination Council (WAEC) and National Examination Council (NECO) is unsatisfactory. Among the factors responsible for this problem are lack of practical activities and the problem of gender effect in achievement of science concepts. Three research questions were used for the study and two null hypotheses were posed to guide the study. The research design was a quasi- experimental design. Population for the study was one thousand six hundred (1600) SS II science students. A sample of one hundred and twenty students was used for the study. The instrument for data collection was Science Achievement Test (SAT) developed by the researchers. Mean and standard deviation were used to answer the research questions. The reliability coefficient of the instrument was estimated to be 0.75 using Spearman's Rank Order Correlation Coefficient (P). The study showed that: the impact of practical activities on achievement of science concepts is high. Students taught using practical activities had a higher mean score than those taught with lecture method; male science students achieved higher than female science students in Science Achievement Test (SAT); there is significant difference in favour of the practical activities than the lecture method. It was recommended among others that well equipped laboratories should be provided for the schools by government.

Keywords:

Gender, Practical activities, Achievement, Science.

JEL Classification: I29

INTRODUCTION

For any nation to attain sustainable development; there is need to recognize science education as a priority area of education for her citizens. Research evidence indicates that science education helps to develop creativity, improve scientific and technological literacy of citizens, prepare citizens for an active contribution towards their culture, and inculcate the spirit of scientific thinking in the citizens (Nnorom, 2012). Scienceinvolves regular hands on practical and activity work for learners to develop scientific literacy to face global challenges.

Science and technology are the two dominating forces behind modern civilization. Science is an attitude of inquiry, of observation and reasoning with respect to the world (Edward, 2007). It can be developed, not by memorizing facts or juggling formulae to get an answer; but only by actual practice of scientific observation and reasoning. David (2007) viewed science as a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe.

Fafunwa (2000) pointed out that “in the world of today, science and technology have become a dominant cultural factors and any nation that is not alive to this fact is either dead or dying”. He was of the view that man needed to know enough science for the sake of self- preservation and survival. Science and technology can play important roles in our societyOtukpo (2002) in Nnorom(2012)

> We are living in a world where science and technology have become an integral part of world’s culture, and any country that over looksthis significant truism does so at the risk of remaining back ward in a technologically fast moving world

Science and technology have become an integral part of the world culture. The combined influence of science and technology result in structural changes and unequal modernization process which give rise to great increase in production capacity and specialization in the environment. The contribution of science and technology to overall development of all nations cannot be over emphasized.

But the rate of scientific and technological development in Nigeria is still low. Edeh (2005) reported that a major defect in our science education is that

science is presented dogmatically in most schools as a series of disjointed facts and concepts which students find difficult to relate to the real world. He further reported that most of our secondary school laboratories are ill-equipped and as a result students are denied that feeling of participation and reality which practical classes and demonstration offer and this contributes to the poor state of science education instructions in Nigeria schools. Edeh (2005) observed that "a great majority of the currently serving science teachers are not qualified to teach at secondary school level. This against the development of science education and affects the development of science education and our country's realization of technological improvement". Eze (2001) opined that "science is an over-expanding dynamic subject involving the study of natural phenomenon, matter and so on. Science is distinguished from other fields because it relies more on the hypothetical-deductive, experiment realm".

According to Bellow (2008), one sure way of teaching Science subject is through effective and efficient practical work. Good practical work in science helps to:

- Arouse curiosity among students.
- Develop critical thinking.
- Understand more the teaching of science

Aniodoh (2000) observed that science subject and its proper teaching and learning facilitates students' enrolment, interest and performance in medicine, pharmacy, nursing, engineering, agriculture, biochemistry brewery, etc. all these disciplines are practical oriented. Hence the need for early exposure of ourscience students to practical activities to enhance in Nigeria secondary school curriculum has been plagued by the serious problem of poor academic achievement. Science educators reported that poor use of instructional materials in teaching of science cause loss of interest by students. They observed that students exposed to laboratory method showed more favorable attitude towards science than those exposed to lecture method. According to Ugwu (2004), he observed that there is significant difference in achievement between students taught using theory and using practical activities. Hence it is important to provide effective practical activities to students in order to enhance better learning and understanding of science.

Anyadiegwu (2010), found out that gender was not a significant factor in understanding of science concepts. The important of laboratory facilities in teaching and learning science cannot be over emphasized (Ugwu 2004)

define laboratory as any environment outside the class room that provide practical work to give first hand experience to the learner. Practical activities avails students the opportunity to think logically, ask reasonable questions, seek appropriate answers and solve problems. The rationale for using the practical activities in science teaching lies in the fact that if children are fully involved in activities and challenged to come out with result, they are more likely to learn than if they were simply told (theory). Thus emphasis is on knowledge and skill acquisition through practical activities under the guidance of science teachers. Students are provided with the opportunity to interact with materials within the environment through observing, classifying, measuring, questioning, hypothesizing, collecting and interpreting data, accurate reporting among others. Practical activities help students to understand the theory more and also provide continuous experience in process skill development. Examples of such topics are: **Kinetic theory**:the teacher is expected to provide chart of molecular structure of solid, liquid and gasses, guides students in carrying out activities on evaporation and boiling and deduce the factor that affect evaporation. The Students activities are to discover molecular spacing, use water for activities on evaporation. **Change of Matter**: the students are expected to carry out experiment to demonstrate the process of change (temporary and permanent) with the help of Science teacher.

Digestive System: the teacher is to use models or preserve specimen to describe alimentary system for student observation (Nnorom 2012).

The challenges facing practical activities in Nigeria today is having access to these laboratory facilities as well as being skilled and knowledgeable in the use of these laboratory facilities in teaching. Therefore there is need to investigate the influence of gender on science students achievement using practical activities in senior secondary schools in Enugu Education Zone.

Statement of the problem

There is consistence low enrolment, interest and poor achievement of science students in the senior secondary school level. Science is practical oriented and

Eze (2001), observed that in most senior secondary schools, science lessons are taught and completely without practical work. He further observed that some science students never experience any form of practical. As a result of this, achievement of science students continues to be low over the years.

Therefore the study of science should be the use of practical activities as the most important for the effective understanding of concepts.

Purpose of the study

The research is aimed at determining the influence of gender on science students' achievement using practical activities. Specifically, intended to:

1. determine the impact of practical activities on student's achievement of science concepts.

2determine the mean achievement scores of science students taught with practical activities and those taught with lecture method.

3 ascertain whether gender is a factor in science students' achievement when practical activities are used.

Research Questions

The following research questions were formulated to guide the study:

1. What is the impact of practical activities on students' achievement of science concepts?
2. What is the mean achievement scores of science students taught with practical activities and those taught with lecture method?
3. What is the effect of gender in science students' achievement when practical activities are used?

Hypotheses

The following null hypotheses are formulated and they will be tested at 0.05 level of significance.

$H0_1$: there is no significant difference between the mean achievement scores of students taught with practical activities and those taught with lecture method.

$H0_2$: There is no significant difference between the mean achievement scores of male and female science students

Research method

The research design used for the study was quasi-experiment. The design entails pretest posttest non-randomization of the subjects. The design was adopted

because it is not possible to randomize the subject of the study without disrupting the school setting. The population for the study comprised all senior secondary class two (SSII) students who were offering chemistry in all the senior secondary schools in Enugu education zone. A sample of one hundred and twenty science students are used. Intact classes of the senior secondary class two (SSII) students in 2013/2014 academic session were used. The number of students was drawn using stratified sampling random technique. The instrument for data collection was Science Achievement Test (SAT). The instrument consists of twenty (20) multiple choice questions developed by the researchers based on test blue print. The instrument was validated by three experts: one in measurement and evaluation and two from science education. The valuators were all from Enugu State College of Education (Technical) Enugu, in affiliation with NnamdiAzikiwe University Awka. A reliability coefficient of 0.75 was obtained using Spearman's Rank Order Correlation Coefficient formula. Method of data Analysis was that the responses of the respondents were analyzed according to the research question using mean and standard deviations to answer the research questions.

Data Presentation and Results

Research Question1: What is the impact of practical activities on students' achievement of science concepts?

Table 1: Mean and standard deviation of pre-test and post-test scores of experimental and control group in the Science achievement (SAT)

Group	N	Pre- test		Post-test	
		X	SD	X	SD
Experimental	60	5.95	1.98	14.37	2.53
Control	60	5.78	1.88	7.02	1.22

In the pre-test and a mean of 7.02 and a standard deviation of 1.22 in the post-test with a pre-test post-test gain of 1.24. this implies that the experimental group performs, in achievement test, better than control group.

Research Questions2: What are the mean achievement scores of science students taught with practical activities and those taught with lecture method?

Table 2: Mean and standard deviation of practical activities method and lecture method on students' achievement of science concepts

Method		N	Pre- test		Post-test	
			- X	SD	- X	SD
Practical	60	5.95	1.98		14.37	2.53
Lecture	60	5.78	1.88		7.02	1.22

the data presented on the table 2 Showed that the practical activities method had a mean score of 5.95 and a standard deviation of 1.98 in the pre-test and a mean score of 14.37 and standard deviation of 2.53 in the post-test making a pre-test post-test gain in practical activities method to be 8.42. the lecture method had a mean score of 5.78 and a standard deviation of 1.88 in the pre-test and a mean of

7.02 and standard deviation of 1.22 in the post- test with a pre-test post-test gain of 1.24 in lecture. With the gain of 7.35 in post-test between practical activities and lecture, this shows that practical activities method performs better than lecture method.

Question3: What is the effect of gender on students' achievement in science when practical activities are used?

Table 3: Mean and standard deviation of pre-test and post-test scores of male and female taught science concepts using practical activities.

Gender		N	Pre- test		Post-test	
			- X	SD	- X	SD
Male	30	5.90	1.83		15.37	1.50
Female	30	6.00	2.10		13.47	3.02

the data presented on table 3 indicated that male gender had a mean score of 5.90 and a standard deviation of 1.83 in the pre-test and a mean score of

15.27 and standard deviation of 1.50 in the post-test making a pre-test post-test gain in male gender to be 9.37. the female gender had a mean score of 6.00 and a standard of 2.10 in the pre-test and a mean score of 13.47 and standard deviation of 3.02 in the post test with a pre-test post-test gain in female gender of 7.47. with gain of 1.8 in post-test between male and female, this shows that male gender performed better than female gender using practical activities method.

Hypotheses

Ho_1: There is no significant different between the achievement scores of students

with practical activities and those taught with lecture method

Table 4: Analysis of Z- test of the mean achievement scores of students taught with practical activities and those taught with lecture method.

Practical Activities			lecture method				
N	- X	SD	N	- x	SD	Z-cal	Z-crit
60	14.37	2.53	60	7.02	1.22	15.93	1.96

Since Z- calculates (cal) > Z- critical (crit), the null hypothesis that there is no significant difference between the mean scores of the students taught with the practical activities and those taught with lecture method in the achievement test is rejected at 0.05 level of significance. This implies that there is a significant difference between the mean scores of practical activities method and lecture method in the achievement test in favour of practical activities method.

$H0_2$: There is no significant difference between the mean achievement scores of

male and female students taught selected sciencepractical.

Table 5: Analysis of Z-test of the mean achievement scores of male and female students taught selected sciencepractical.

Male							
N	- X	SD	N	- x	SD	Z-cal	Z-crit
30	15.27	1.50	30	13.47	3.02	2.92	1.96

The null hypothesis that there is no significant difference between the mean scores of male and female students taught selected sciencepractical's is rejected at 0.05 level of significance, since Z-cal> Z – critical. This implies that there is a significance difference between the mean scores of male and female in achievement test in favour of the male gender

Recommendations

1. Seminar, workshops and conferences should be organized for science teachers on the use of practical activities for students.
2. Government should provide well-equipped laboratories for the students use in all secondary schools in Enugu Education Zone.
3. Frequent and effective supervision should be carried out by the supervising principals and their team to ensure effective use of practical activities in teaching and learning of science.

4. Institutions responsible for the training of science teachers should give the student teachers proper training on the use of practical activities in teaching and learning science at senior secondary school level.

Conclusion

The impact of practical activities on achievement of science concepts in high

Students taught with practical activities had a higher mean score than those taught with lecture method male gender had higher means score than the female in the Science Achievement Test (SAT). There is significant difference in favour of the practical activities than the lecture method. There is significant difference in favour of the male students than the female students than the female students.

References

Akinyele, B.A. (2003). Why our students fail the practical chemistry at the ordinary level. **Journal of Science Teachers Association of Nigeria** 25 (1) 33-34.

Aniodoh, H.C.O. (2000). Stimulating and sustaining interest in chemistry. **Journal of Scienceand Computer Education ESUT**. (1) 236-241.

Anyadiegwu, P. C. (2010). Effects of practical work in understanding Chemistry Concepts: **Unpublished M.Ed thesis** University of Nigeria Nsukka.

Bellow, A. A. (2008). Improving Teaching Methods of Chemistry Practical. Science Teachers Association of Nigeria Chemistry panel 3. Effective methods of Teaching Chemistry Practical.**A Hand Book for Chemistry Teachers**, 120-123, Oluwiwo M. A. and Umoh W. a. (Eds).Ibadan Science Teachers Association of Nigeria.

David C. Lindbery. (2007). **The Beginning of West term Science**: The European Scientific Tradition in Philosophical, Religious, and Institutional context, Seconded. Chieago press ISBN 978-0-226-48205-7.

Educational Research and Review 2 (6) 124 – 132, Available on lone at http:// www.academicjournal.org/ERRISSN1990-3839(C)Academicnuchiyrbaks.

Edward, O.W. (2007). **A History of the Natural Philosophy: from the Ancient World to the Nineteenth century**. Cambridge University press.ISBN978-0-521-6897-1.

Edeh, A. O. (2005). Education and Training of the scientist Defect in our system of Training of the scientist Defect in our system of Training University of Ibadan. **Journal of Science Teachers Association of Nigeria**. 8 (2) 115-120.

Eze, C.U. (2001). Constraints of effective Teaching of Chemistry practical in senior secondary schools.**Journalof science and Computer Education** 1(1) 35-45.

Fafunwa, A.B.(2000). **Science and Mathematics curriculum. New perspective in Africa Education**. Ibadan: Macmillan Education Ltd.

Iloputaife, E. C. (2000). Effects of Analogy Models and conceptual Change Instructional and Girls Taught simple circuit in Enugu State Senior Secondary schools. **Unpublished Ph. D Thesis**, University of Nigeria, Nsukka.

Nnorom, N.R. (2012), Availability and Usability of Basic Science Laboratory Facilities for teaching basic science. **Science Student Association of Nigeria.53rd Annual Conference Proceedings.**

Ugwu, O. J (2004) Effect of practical activities on the achievement in chemistry among senior secondary school students in Enugu State **Unpublished M.Ed** Research Project, University of Nigeria, Nsukka.