SCHOOL LOCATION AND TEACHING METHODS AS DETERMINANTS OF STUDENTS' PERFORMANCE AND RETENTION IN BIOLOGY IN IKOT EKPENE LOCAL GOVERNMENT AREA.

BY

DR ANIEKAN UDEME-OBONG
DEPARTMENT OF BIOLOGY AND MICROBIOLOGY,
SCHOOL OF NATURAL AND APPLIED SCIENCE,
AKWA IBOM STATE COLLEGE OF SCIENCE AND TECHNOLOGY,
NUNG UKIM, IKONO.

ABSTRACT

This study investigated the school location and teaching methods as determinants of students' performance and retention in biology in Ikot Ekpene Local Government Area. The population of this study consisted of six hundred and fifty-six (656) Senior Secondary Two (SS2) Biology Students in all the seven (7) Senior Secondary Schools in the Local Government Area during 2013/2014 school year. The study adopted a quasi-experimental, employing the pre-test, post-test non-equivalent control group design. The data obtained from pre-test and retention test instruments were analysis of covariance (ANCOVA), with pre-test as covariates while all the hypotheses were tested at.05 alpha. It was observed that there is no significant influence of school location on the performances of students on the concept of carbohydrate nutrients when taught using Demonstration, Computer-Assisted Instruction and Guided-Inquiry teaching approaches. It was also observed that there is significant influence of school location on the retention of students on the concept of carbohydrate nutrients when taught with Demonstration, Computer-Assisted Instruction and Guided-Inquiry teaching approaches. From the findings it was concluded Computer Assisted Instructional approach followed by Demonstration have better enhancing effects on both the students' performance and retention in the concept of carbohydrate nutrients; school location is not a significant predictor of students' academic performance except in retention. One of the recommendations was that schools in the rural areas should also be given attention with respect to provision of adequate infrastructures and learning materials in order to enhance their performances and compete favorably with their counterparts in the rural areas..

KEY WORDS: Performances, retention, students, carbohydrates, demonstration approach, computer-assisted instruction approach, guided-inquiry approach, school location.

Background of the study

Many contribute to the performance of students on the concept of carbohydrates in biology. Among the factors is school location, which has a great effect on students' achievement and retention (Yilwa and Olarinoye, 2007). The learning environment is a strong determinant of scholastic performance. This is because there is interplay between the learning process and the learning environment which is directly related to the location of the school. The environment can either

improve or hinder students' performance. Differences in achievement between urban and rural students are due to differential environment stimulation (Inomiesa, IMDM).

There is a general inadequate supply of laboratory, studio and workshop facilities; a situation being more acute in rural schools (Ekpo, IMMM). Learning is more effective and maximized if learning environment has adequate facilities (Gbamaja, IMMI). However, it was established that there is no significant relationship between environment and cognitive development. The result showed that the performance of rural subjects on Biology Achievement Test (Fakunle, IMDL).

On students' performance and gender in West African Senior School Certificate Examination (WASSCE), for the years under review by Onwioduokit (IIOIII), male students performed consistently better than their female counterparts (Appendix I). Sex differences in education and performance assume new and mere focus for researches. Ukwugwu (IIOOII) observed no gender superiority in academic performance of student in science. Adigwe (IMMII) observed girls as having a predominantly literacy bent or at least, and anti-technology bent. In other words, boys are seen to be more practically, more scientifically and more technologically oriented than girls. Shaibu and Mari (IMMC) showed no sex barrier in acquisition of science process skills.

The effect of ability level on academic achievement of student relates to the effect of class size on the achievement of students. Salu (IMML) also opined that when students are grouped into high achievers, average achievers and low achievement (Salau, IMML).

Statement of the problem

The aim of science education and indeed, biology education, is to promote the understanding of the concepts being taught with a view to applying the knowledge of such understanding to solve real life problems. But most times it is pathetic to notice a big gap between the performances of students as regards their place of location.

It is pitiable to observe at several times the performance of students in rural areas identified with poorer academic performance in biology irrespective of the method of teaching adopted by the teachers. For instance, it has been observed that whether the teachers use Demonstration, Computer-Assisted Instruction or Guided-Inquiry in teaching the students the performances of the students in the urban area still stand out. Many people speculate that the disparity in the performance of these two classes of student is informed by level of proximity to light and other infrastructures. These infrastructures among others are said to contribute to the academic performance of students and their retention in the concept of carbohydrates in biology Therefore, this study is an attempt to find out answers to these questions.

Purpose of the study

The purpose of this study is to examine the influence of school location and teaching methods on students' performance and retention in biology in Ikot Ekpene Local Government Area. Specifically, the study is designed to achieve the following objectives:

i. To determine the influence of school location on students' performances on the concept of carbohydrates in biology when taught with Demonstration, Computer Assisted Instruction and Inquiry approaches.
ii. To determine the influence of school location on students' retention of the concept of carbohydrates in biology when taught with Demonstration, Computer Assisted Instruction and Inquiry approaches.

Research Questions

In order to achieve the above stated objectives, this study will attempt to provide answers to the following research questions:

i. What difference exits in the performances of students on the concept of carbohydrates when taught with Demonstration, Computer-Assisted Instruction and Guided-inquiry approaches based on school location?
ii. How does school location influence students' retention of the concept of carbohydrates when taught with Demonstration, Computer-Assisted Instruction and Guided-Inquiry approaches?

Research Hypotheses

The following null hypotheses were formulated to guide the study:

i. There is no significant influence of school location on the performance of students on the concept of carbohydrates when taught using Demonstration, Computer Assisted Instruction and Inquiry approaches.
ii. There is no significant influence of school location on the mean retention of student on the concept of carbohydrates when taught with Demonstration, Computer-Assisted Instruction and Guided-inquiry teaching approaches

Review of Related Literature

Retention

Retention of knowledge means recalling or remembering pieces of knowledge, processes, or skill that were learned earlier in time (Semb and Ellis, 1994). Retention, according to Coffey (2000) is a term used to denote how much learning of a particular concept has been maintained over time. According to Herron (1977), retention is the act of keeping something rather than losing it; the ability to remember things. In academic the term, retention refers to learners' ability to recall information or materials learnt after a given time lag. The antonym of retention is forgetting, which is defined as the loss of information overtime.

It is obvious that memory has a significant role in the knowledge retention. It is suggested that students gain memory systems as they carry out their classroom experiences by internalizing structures of classroom activities (Nuhall, 2001).

Activities in classroom can be used as stimulant for memorization (Engelbrecht, Harding + Du Preez, 2006). Chauhan (2000) averred that every teacher is confronted with the problem of how to improve the retention ability of his students. Chauhan suggested six ways of improving retention which include: over learning, meaningfulness, and organization of subject matter, use of more manic device, self recitation, formation of clean concept and the use of the principles of learning by doing. In these factors, the teachers' role is very crucial in enhancing retention ability of the child. This can only be done through meaningful and effective presentation of the instructional content in an interactive way that will encourage effective participation of the learner in the teaching/learning process.

According to interactive inference theory (Lehman + Malmberg, 2006), when you are learning a great deal of information at one time, you tend to remember best what is read or presented first and last. The key to avoiding this problem is to look for connection and relationship between ideas so that they can be filed together or at least combined, without having any problem. Lehman and Malmberg (2006) also, stated that human memory works on two different levels which are short and long term memory and this includes what you focus on in the moment, what holds you attention. To learn information so that you can retain and recall it, you must transfer it from short term to long term memory. Long term memory includes all the information that you know and can recall and you will have access to it for a long time. Knowledge retention is a significant goal of education (St. Clair, 2006). In line with work of Semb; and Ellis (2004), the school exists to apply the effective teaching strategies that enhance ability of learners to recall biological facts taught in school.

School Location and Academic Achievement and Retention

This is the place or position where someone or something is or where something happens (Macmillan English Dictionary, 2002). Okebukola, (1984) views a location as a learning environment. According to him, the environment stimulates the child to respond, and in some cases, the response modifies the environment. Urban or Rural Location of schools refers to the state classification of areas (Jegede, 1984). According to Jegede, urban areas are mainly the towns while the rural areas are the villages. Ehindera (1981) believe that the interaction of individual with their habitats influences the rate of intellectual development in relation to academic performance and retention. The attainment of a high development level is not determined by differential geographical environment but by maturity and experience (Fakunle, 1981). The understanding of a biology concept is not determined by school location.

The performance of student in biology could be largely attributed to the location of the school: whether the school is in rural or an urban area. In this way, Jegede and Okebukola (1984) demonstrated that much of the reliable variance to students' performance could be attributable to the learner's environment of location of learning. According to Jegede and Okebukola, urban school students are said to be exposed to the good learning environment, appropriate methods of teaching and consequently, perform better in solving biological problems than those in the rural schools. Ajwole and Okebukola (2000) in their study of school location and its influence on students' achievement and retention, found put that the educational process is a cultural and human activity which involves the transmission of the cultural heritage of the people which directly affects students' academic performance and retention.

The system of philosophical and religion beliefs which is rooted in the African Community, is deeply rooted in causality, the role of a deity and the existence of socio-cultural beliefs, taboos and superstitions (Oguniyi, 1984). These values and learn biology by students, their understanding of it and their ability to apply it within and outside school (Jegede and Okebukola, 1984).

Omolewa (1982) indicated the influence of school location on the achievement of student in biology as he repoted the introduction of biology to schools in Nigeria by the colonial masters witnessed a resistance as it offended the Moslem susceptibility in the Northern provinces. According to OMolewa, when it was finally introduced the reaction of the people was hostility which has a direct effect on the achievement of biology students.

Effective biology knowledge can be acquired in an environment with human resources and workable and available material resources (Ajaja, 2000). Ige (2000) noted that science teaching and learning could only be meaningful and effective when backed by the necessary resources to enrich instruction. According to Lorsback and Tabin (2000), science can be taught and learnt through seeing, hearing, touching, smelling and testing which permit a learner to interact with the environment capable of promoting high academic performance in the learner.

Modern technological impact can be felt more strongly in the urban than in the rural environment (Jegede 1984). It is expected that the urban home subjects excel more than the rural ones in their understanding of biology because of their exposure to an environment rich in scientific devices.

Gender and Academic Achievement

Keller (1981) defines gender as a culture construction that distinguishes the roles, behavior, mental and emotional characteristics between females and males developed by a society. Gender can be looked at in terms of a psychological term used to describe the basic of being born of either female or male (Basow, 1981). Basow sees genders' roles as not being inherited or biological but as rather man-made. In A B C of Women's Right and Gender Equality (Okele, 2000), gender is defined as the social differences and relationship between men and women which are learned and varied widely among societies and culture, and change over time. Okeke noted that gender deals with roles, responsibilities, constraints and opportunities the society grants for men and women.

Ukwungwu (2000) observed no gender superiority in academic performance. Popoola (2010) maintained that if both groups learn that same thing, they are likely to achieve the habit the same way. Adigwe (1981) also saw girls as having a predominantly low interest in science and technologically oriented. Such reports together with culture expectations and stereotype held about sex roles have caused tremendous damage to women's education. In many developing countries, women education has only been taken seriously within the last decade. In Nigeria, the campaign for women education has only recently received government approval. Nigeria culture expectations and stereotypes held about sex roles have significant effects on female performance. Such feminine roles include the fact that a woman's place is in the kitchen

Ogunleye (1999), observed that male and female students perform equally on acquisition of science process skill tests. Onwioduokit (1995) on effect of gender difference among undergraduate students' academic achievement in science concluded that women's performance in science was not significantly different from that of their male counterparts. Shaibu and Mari (1998), revealed that female students performed significantly better than male students in their understanding of science process skill, while males performed better than female in the ability to solve problems in science

Erinosho (1997) and Nsofor (2001) seem to concur that both males and females could do well in science if exposed to similar learning conditions. Archibong (1998) reported no significant difference in the achievement of female and male student exposed to certain chemical concepts. Anagbogu (2003) compared the performance of boys and girls using training manual. The study showed that a new approach to teaching of science will improve scientific performance of girls in the study of science. In the result, girls performed better than boys using strategies that were human oriented.

METHODS

Research Design

The study was quasi-experimental, employing the pre-test, post-test non-equivalent control group design. There was no randomization of subjects in the study. Intact classes were assigned to the three experimental groups, demonstration, computer-assisted instruction and guided-inquiry approaches.

Area of the Study

The research area for this study was Ikot Ekpene Local Government of Akwa Ibom State. Ikot Ekpene Local Government is made up of 11 local government areas with head quarters at Ikot Ekpene town.

Population of the Study

The population of this study comprised all the six hundred and fifty-six (656) Senior Secondary Two (SSII) Biology Students in all the seven (7) Senior Secondary Schools in the Local Government Area during 2003/2004 school year (Ikot Ekpene LEC Report, 2004).

Sample and Sampling Techniques

The sample for this study was two hundred and sixty-four (264) Senior Secondary Two (SSII) Biology Students representing 40.24% of the target population in six intact Biology classes of the six (6) co-educational Senior Secondary schools in Ikot Ekpene

Government Area. Stratified random sampling technique was used in selecting the sampled schools. Simple random sampling method (paper balloting) was used to assign each of the three school to each of the experimental groups (Demonstration ,computer-Assisted Instruction and Guided-Inquiry)This assignment of schools took place in both urban and rural areas of the Local Government Area.

Instrumentation

The following researcher developed instruments were used to collect data for the study

i. Cognitive Ability(CAT)
ii. Biology Achievement Test on Carbohydrate ,BATC

Cognitive Ability Test (CAT): The cognitive Ability Test (CAT) was designed to measure the respondents understanding of basic biological concepts studied in their earlier lessons . It consisted of twenty-five (xx) multiple choice objective test items.

Biology Achievement Test on Carbohydrate: The biology Achievement Test on Carbohydrate (BATC) was a twenty five (xx) items, v options multiple choice objective test was developed to measure the students understanding of the concept investigated.

Validation of the Instruments

The two research instruments (cognitive Ability Test (CAT) and Biology Achievement Test (BAT) were subjected to both content and face validity Validation copies of the instrument were sent to experts in educational measurement and evaluation, specialists in science education and experienced biology teachers.

Reliability of the Instrument

Field Trial: Biology-Achievement Test on carbohydrate (BATC) was used for the field-trial. The Biology Achievement Test on carbohydrate (BATC) was administered to thirty (xxx boys and ix girls) senior secondary biology two (SSii) students form one senior secondary school in Essien Udim Local Government Area that did not form part of the sample for the study. Their responses to the package and indeed their scores were determined. The test score was used to establish the reliability, difficulty and discrimination indices of the research instrument. Such responses were subjected to an internal consistency reliability test using Kuder Richardson Kr-xx formula (Ali, xxxl).

Method of Data Analysis

The data obtained from pre-test and retention test instruments were analysis of covariance (ANCOVA), with pre-test as covariates. All the hypotheses were tested at.ox alpha.

RESULTS AND DISCUSSIONS

Results

Answering the Research Questions

Research Questions

What difference exists in the performances of students on the concept of carbohydrate when taught with Demonstration, Computer-Assisted Instrument and Guided-Inquiry approaches based on school location?

Table 1

Mean and Standard Deviation of Students' pre-test and post-test scores classified by treatment groups and school location

Treatment Groups	School Location	Sample Size (n)	Pre test		Post-test		Mean Difference
			$\bar{X}$	SD	$\bar{X}$	SD	
Demonstration	Urban	VI	IIV. XM	X. OIII	XD. VV	D. IIIL	IIIIII. DX
	Rural	VX	IIX. LM	X. CV	LO. IIII	C. DII	IIIV. LII
Computer-Assisted Instruction	Urban	XO	IIX. III	L. LX	XM. ML	D. MII	IIIV. DV
	Rural	IIIC	IIV. MII	L. ML	XC. DM	C. DO	IIIII. MC
Guided-Inquiry	Urban	XIII	IIL. II	L. IL	XL. MI	C. DC	IIIO. DO
	Rural	IIID	IIX. LD	X. VC	XII. DV	X. DD	IIC. IL

In table I, the post-test, pre-test mean difference displayed IIIIII. DX and IIIV. LII respectively, for the urban and rural students taught using demonstration method, that of the urban and rural students in Computer Assisted Instruction Group are IIIV. DV and IIIII. MC respectively, while the scores of their counterparts taught with Guided Inquiry approach in urban and rural schools are IIIO. DO and IIC. IL respectively. A comparison of these results proved that Computer Assisted Instrument had the best enhancing effect on the performances of the urban students while the rural students benefited most from the Demonstration method.

Research Question Two: How does school location influence students' retention of the concept of carbohydrate when taught with Demonstration, Computer-Assisted Instruction and Guided-Inquiry Approaches?

Table 2

Mean and Standard Deviation of students' pre-test and retention scores classified by treatment groups and school location

Treatment Groups	School Location	Sample Size (n)	Pre test		Post-test		Mean Difference
			$\bar{X}$	SD	$\bar{X}$	SD	
Demonstration	Urban	VI	IIV. XM	X. OIII	XO. OX	L. XO	IIX. VL
	Rural	VX	IIX. LM	X. CV	XI. LO	X. CI	IIX. MI
Computer-Assisted Instruction	Urban	XO	IIX. III	L. LX	XX. IIV	D. IIIIII	IIIO. III
	Rural	IIIC	IIV. MII	L. ML	XI. IIIX	D. IV	IIL. VIII
Guided-Inquiry	Urban	XIII	IIL. II	L. IL	XO. OV	C. IIIO	IIIII. MIII
	Rural	IIID	IIX. LD	X. VC	XL. LIII	L. XO	IIO. MX

In Table II, the retention, pre-test mean differences displayed are IIX. VL and IIX. MI respectively, for the urban and rural students taught using Demonstration method;

that of the urban and rural students in **C**omputer **A**ssisted **I**nstrument group IIIO.III and IIL.VIII respectively; while the scores of their counterparts taught with **G**uided **I**nquiry **A**pproach in the urban and rural schools are IIIII.MIII and IIO.MX respectively. **A** comparison of these results that proved that **C**omputer **A**ssisted **I**nstrument had the best enhancing effect on the retention of both the urban and rural; followed by **D**emonstration **M**ethod.

Hypotheses Testing

Hypotheses One

There is no significant influence of school location on the performance of students on the concept of carbohydrate when taught using **D**emonstration, **C**omputer-**A**ssisted **I**nstrument and **G**uided-**I**nquiry teaching approaches.

Table 3

Summary of Analysis of Covariance (ANCOVA) of student's post-test scores classified by treated groups and school location with pre-test as covariate

Source of Variation	Sum of Square	df	Mean Square	F-cal	Sig.	Decision at p<.OX
Covariate: *Pre-test*	IOXM. VO	I	IOXM. VO	ID. IV	.OO	S
Main Effects: *Instructional Methods*	MVO. DX	II	VCO. VIII	D. OX	.OO	S
School Location	IIII. IIII	I	IIII. IIII	II. OC	.IX	ns
Interaction Effects:						
Instructional Methods School Location*	VLD. MM	II	IIIIV. XO	V. OI	.OII	S
Error	IXOIIII. VI	IIXC	XD. VII			
Total	ICXDII. XIII	IILX				

R Squared = .IVL (Adjusted R Square = .IIIL)

Table III, shows a calculated F-ratio for the main effect of school location, given instructional methods, at df I, IIXC as II.OC, while its corresponding significant level is .IX alpha for school location. This significant level is greater than .OX, indicating that school location had no significant influence on the performances of the students in carbohydrate nutrients when taught with Demonstration method, Computer Assisted Instruction and Guided-Inquiry Approach. Hence, the null hypothesis which assumed that "There is no significant influence of school location on the performances of students on the concept of carbohydrate nutrients when taught using Demonstration, Computer-Assisted Instruction and Guided-Inquiry teaching approaches" was upheld with respect to school location.

Hypotheses Two

There is no significant influence of school location on the mean retention of students on the concept of carbohydrate when taught with Demonstration, Computer-Assisted Instruction and Guided-Inquiry teaching Approaches.

Table 4

Summary of Analysis and Covariance (ANCOVA) of students' retention scores classified by treatment groups and school location with pre-test as covariate

Source of Variation	Sum of Square	df	Mean Square	F-cal	Sig.	Decision at p<.0X
Covariate: *Pre-test*	VL0. ML	I	VL0. ML	M. VII	. 00	S
Main Effects: *Instructional Methods*	MDII. III	II	VMI. II	I0. 0V	. 00	S
School Location	IIIIM. 0II	I	IIIIM. 0II	V. LD	. 0III	S
Interaction Effects:						
Instructional Methods School Location*	VIIIL. III	II	IIID. I0	V. VL	. 0I	S
Error	IIIXCL. 0L	IIXC	VD. MIII			
Total	IVCLC. MV	IILIII				

R Squared = .IVD (Adjusted R Square = .IIIL)

Table V, showed a given calculated F-radio for the main effect of school location on student" retention, given instructional methods, at df I, IIXC as V.LD, while its corresponding significant level is .0III alpha. This significant level is less than .0X, indicating that school location had a significant influence on the retention of the students in carbohydrate nutrients when taught with Demonstration method, Computer Assisted Instruction and Guided-Inquiry approach. Hence, the null hypothesis which assumed that "There is no significant influence of school location on the retention of students on the concept of carbohydrate nutrients when taught with Demonstration, Computer-Assisted Instruction and Guided-Inquiry teaching approaches" was rejected.

Conclusion

Based on the observations made in this study it is concluded that: Computer Assisted Instructional approach followed by Demonstration have better enhancing effects on both the students' performance and retention in the concept of carbohydrate nutrients; school location is not a significant predictor of students' academic performance except in retention.

Recommendation

Based on the finding and the conclusions reached, the following recommendations were made:

I. Schools in the rural areas should also be given attention with respect to provision of adequate infrastructures and learning materials in order to enhance their performances and compete favorably with their counterparts in the rural areas.
II. Effective use of Computer Assisted instructional approach and Demonstration method require availability of relevant facilities. It is therefore recommended that school proprietors should ensure that schools are adequately equipped with

functional computers and computer software, as well as laboratory facilities for effective implementation of the methods in classroom situation.

iii. Government, school authorities and private sectors of the economy should mount and sponsor biology teachers to relevant workshops, seminars and conferences such as those organized annually by science Teachers Association of Nigeria (STAN), to broaden the horizon of the affected teachers on the effective use of computer-assisted instructional and demonstration approaches.

REFERENCES

Adigwe, J. C. (1999) General Difference in Solving Chemical Problems among Nigerian Students. *Research in Science and Technology Education,* 10 (2):110–1111.

Ajaja, T. E. (2002) . Assessment of Biology Study Support Environment on our Schools. STAN Annual Conference proceedings, p. 11x

Ajwole, F. S. + Okebukola, D. S. (2000). Improving Socio-cultural Aspects of classroom learning Environment in Enhancing students' performance in Biology. STAN Annual conference proceedings, pp. 111C–111D

Anagbogu, M. C. (2003). Developing new Strategies for Teaching Girl-Child Science and Technology in the next millennium. *Benin journal of educational studies,* 1C(1+2): 110–1111.

Archibong, Z. S. (1997). The Relative Effectiveness of Activity-Based Approached and Lecture method on the cognitive achievement of integrated science students. *Journal of science teacher's association of Nigeria,* 1111 (1+2)11C–V11

Basow, Q. (1991), Gender Role and Achievement in Science. *Journal of technical Education,* 1(2):2LX–2LD

Chauhan, S. S. (2000). *Advance Educational Psychology.* New Delhi: Vikes Publishing House, pp. CI–CIII

Coffey, J. W. (2000). LEO: A Learning Environment Organizer to Accompany Constructive Knowledge Models. Unpublished Thesis, University of West Florida Pensacola, FL

Ehindero, O. J. (1982). The Effect of Cultural Factors in Operational though among some Nigerian Adolescents. *Journal of Research in Sceince Teaching,* 1M(L):VXI–VXC

Ekpo, J. U. (1997). Status of Secondary School Science Practical Work in Akwa Ibom State Nigeria. *African Journal in Education and Information.* (*AJEIMA).* 11(1). 111–11M

Engelbrecht, J. Harding A + Du Preez, J. (2005). Long-term Retention of Basic Mathematical Knowledge and Skills with Engineering Students. *European Journal of Engineering Education,* 1111(L):1111X–CVV.

Erinosho, A. D. (1997) Perspective on women in science and technology in Nigeria: *Blue print on women education in Nigeria.* Lagos: NERDC press.

Fakunle, J. A. (1982). Relationship among School Location, Students' Level of Cognitive Development and Achievement in Genetics. *STAN Journal,* 11V(1+2):11C–1111

Fakunle, T. W. (1982). Relationship Among School Location, Students' level of cognitive development and achievement in Genetics. STAN *journal, 24* (1+2):11C–1111

Gbamaja, S. P. T.(1991). *Modern Methods in Science Education in Africa.* Owerri: Totan Publishers, p. DM

Herron, C. A. (1MMV). An Investigation of the Effectiveness of Using Advance Organiser to Introduction Video in a Foreign Language Classroom. *The modern Language Journal,* CD(II):C-II

Ige, G. (IIOOO). Problem-Solving: *A Viable tool for Teaching Ecological Concepts.* Proceedings of STAN Annual conference. Akwa IIIst -IILth August, IIOOO, pp. IVI-IVX.

Inomiesa, E. (1MDM). Sex and School Location as Factors in Primary School Science Achievement. *Journal of Science Teachers Acssociation of Nigeria,* IIL(I)IIO-IIIII

Jegede, O. J. (1MDV). Measuring the Effects of Socio-Cultural Factors in Non-Western Science Classroom. *Educational Research Journal,* D,VO-VC

Keller, J. K. (1MMI). Gender Effect and Career in Science. *Journal of science education,* I(IIC):CLI-CLX

Lehman, M. + Malmberg, K. J. (IIOOM). A Global Theory of Remembering and Forgetting from Multiple Lists. *Journal of Experimental Psychology Learning, Memory and Cognition,* IIIX(V):MCO-MDD

Lorsback, C. A. + Tabin, D. (IIOOII). "*Constructivism as a Refent for Science Teaching:*. San Franciso: Free press IIIII-IIIIII.

Macmillan English Dictionary for Learners. (IInd ed) (IIOOC). Ibadan: Macmillian Publishers Ltd.

Nsofor, N. D. (IIOOI). Cultural Impediments on women in STM education. STAN conference proceedings. Abuja, IIO-IIX, August, pp. IV-IL

Nuthall, G. (IIOOI). The Role of Memory in the Acquisition and Retention of Knowledge in Sceinec and Social Studies. *Cognitive Instruction,* ID:DIII-IIIIM.

Oguniyi, H. J. (1MDD). Adapting Western science to Traditional African. *Journal of science education* CO(II): XV-XC

Ogunleye, W. G. (1MMM). *Science Education in Nigeria.* Lagos: Sunshine International Publication Ltd.

Okebukola, P. A. O. (1MDX). Science Laboratory Behavior Strategies of Students Relative to Performance and Attitude to Work. *Journal of Research in Science Teaching* IX(I):IIIII-IIIO

Okeke, Z. K. (IIOOII), Gender and Science, Technology and Mathematics. *A lead paper presented at the Annual conference of the instutte of education, university of uyo.* July III, IIOOII.

Omolewa, P. O. (1MCC). Some Earlist Problems of Science Education in Nigeria. IDXM-1MIIIII. *Journal of science teachers association of Nigeria, 15(3): 72-84*

Onwioduokit, F. A. (1MML). The Relative Effects of Ausubelian and Gagne Sequences of Instructions on Students' Performance. *Journal of Science and Science Education,* III(I):LX-CX

Onwioduokit, T. I. (۲۰۱۳). The Ordeal of Science Teaching in the Contemporary Society: A need for paradiagm shift for the new general. ۳۳rd *inaugural lecture series, university of Uyo, Uyo.*

Popoola, S. (۲۰۱۰). Opinions of male and Female students of Gender differences in Mathematics Learning in Nigeria. *International journal of research in education,* ۲(۱): ۱۰۶-۱۱۲

Salau, M. O. (۱۹۹۲). The Effect of Class size on the Achievement of Different Ability Groups in Mathematics. *Journal of Science Teachers Association of Nigeria,* ۲۲(۲+۲):۶۶-۷۲

Sem, A. A. + Ellis, J. A. (۲۰۰۷). Knowledge Taught in School: What is Remembered? *Review of Education Research,* ۷۶:۲۶۲-۲۷۸

Shaibu, A. A. + Mari, J. S. (۱۹۹۶). Gender Related Difference in the Understanding of Science Process Skills among Junior Secondary School Students. *Journal of Science Teachers Association of Nigeria (JSTAN), 32(182):22-27*

St. Clair, S. W. (۲۰۰۶). Assessment of the Long-Term Effects of Technology Used in the Engineering Classroom on Learning and Knowledge Retention. Doctoral Thesis, Georgia Institute of Technology .

Ukwugwu, J. O. (۲۰۰۲). Gender Difference Study of Performance in Integrated Science; A Summary of Studies Conducted in Nigeria. *Journal of Science Teachers Association of Nigeria.* (۳۲(۲+۲): ۲۲-۲۲

Yilwa, A. V. + Olarinoye, R. D. (۲۰۰۷). The Influence of Location, Proprietorship Sex and Grade Level on Junior Secondary School Students' Performance in Skills of Observing. *Journal of Curriculum Organization of Nigeria.* ۱۱ (۱) ۷۶-۹۲