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QUESTIONING ABILITIES AS DETERMINANTS OF SECONDARY SCHOOL STUDENTS' RETENTION IN BIOLOGY

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ABSTRACT

The purpose of this study was to ascertain whether or not questioning abilities can determine secondary school students' retention in the topic the vertebral column in biology in Udi Local Government Area of Enugu state. The design adopted for the study was descriptive survey design. The population of the study consists of 1517 senior secondary school students' offering biology in 20 co-educational senior secondary schools in Udi Local Government Area of Enugu state. A sample of 196 students made up of 102 male students and 94 female students was drawn from the population of 1517 biology students using purposive random sampling technique from four senior co-educational secondary schools in Udi Local Government Area. Two research questions and one hypothesis guided the study. An adapted questionnaire named Vertebral Column Questioning Ability Test (VCQAT) was developed by the researcher and used for data collection. The VCQAT consists of 10 life specimens that were given to students. It was designed by the researcher to assess SS II biology students questioning ability on the vertebral column of rabbit. The reliability of the instrument was ascertained by administering the test to 20 senior secondary biology students in (Enugu South) Local Government Area. The scores obtained from the test were subjected to analysis with Kendall's coefficient of concordance which was used to determine the inter-rater-reliability of (VCQAT). 0.82 reliability coefficient was obtained which indicated that the instrument was reliable. The same VCQAT was used for biology retention test but the items were reshuffled. The data generated from the study were analyzed with mean and standard deviation for answering the research questions while t-test statistic was used to test the hypotheses at 0.05 level of significant. The findings of the study revealed that the mean retention score of students with high questioning ability was higher than that of students with lower questioning abilities. Secondly, there is a significant difference in the mean retention scores of male and female biology students' questioning abilities while studying the vertebral column of rabbit. In HO_1 the t (291) =.339, p=.001, a=.05. since the p<.05, the hypothesis is rejected, Based on these findings, the researcher recommended that Government agencies and professional associations whose responsibility is to design and revise the curriculum for secondary schools should incorporate and emphasize the use of teaching methods like engages students in questioning such as inquiry-based learning approach in teaching and learning of biology in senior secondary schools.

Keywords: Questioning abilities, Retention, Biology, Senior Secondary School Students

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Introduction

The five main national goals of Nigeria are to build: a free and democratic society; a just and egalitarian society; a united, strong and self-reliant nation; a great and dynamic economy; and a land full of bright opportunities for all citizens. Consequently, Nigeria's philosophy of education is based on; the development of the individual into a sound and effective citizen; the full integration of the individual into the community; and the provision of equal access to educational opportunities for all citizens of the country at the primary, secondary and tertiary levels both inside and outside the formal school system (Federal Republic of Nigeria (FRN). 2013). From the forgoing, it is clear that the Nigerian nation believes that education is an instrument ''par excellence'' for achieving national development as education fosters the worth and development of the individual, for each individual's sake and for the general development of the society. Although education may be seen as the processes of giving intellectual, moral and social instructions or a process involving training or giving information on a particular subject. Education definitely does more than these. Ojim and Nyim (2018) submitted that, education prepares the recipients for a long valuable life through the values, knowledge, attitudes, competences and skills imparted on the recipients. The rapid socio-economic development of a nation has a strong positive relationship with the caliber of human capital, developed through functional education, in that country.

Little wonder, the Federal Republic of Nigeria through the National Policy in Education (2013) seeks to inculcate national consciousness and national unity: the right type of values and attitudes for the survival of the individual and the Nigerian society; the training of the mind in understanding of the world around; and the acquisition of appropriate skills, abilities and competence both mental and physical as equipment for the individual to live in and contribute to development of his society. To achieve these, the Federal Republic instituted lower and upper (primary), secondary and tertiary educational levels. Interestingly, the broad goals of secondary education in Nigeria are to prepare the individual foe useful living within the society and higher education. Specifically, secondary education among other things, is expected to provide trained manpower in the applied sciences, technology and commerce at sub-professional graves; foster national unity with an emphasis on the common ties that unite us in our diversity, raise a generation of people who can think for themselves, respect the views and feelings of others, respect the dignity of labor, appreciate those values specified under the broad national goals and live as good citizens and provides technical knowledge and vocational skills necessary for agricultural, industrial, commercial and economic development. (Federal Republic of Nigeria, FRN.2013).

Secondary education is unarguably a very challenging educational level; secondary education is the education students receive after lower basic education before proceeding to tertiary education. Prospects for most careers are formed and harnessed at secondary education level. As a matter of fact, in Nigeria educational system, one needs at least credit passes in relevant secondary school subjects as prerequisite for progressing in study in any

tertiary institution. Consequently, secondary school students need to develop good questioning abilities for coping with the challenges of secondary education. Moreover, the stage these secondary school students are (adolescence) is characterized by creativity and inquisitiveness, it is only the abilities to ask questions that will help

them to be directed and guided aright especially with regards to achieving high and retaining more in core science subjects such as biology.

Questioning/asking questions is one of the scientific skills which if properly acquired by students will facilitate learning in science, ensure active participation, and increase permanence learning among others. Chinn and Malhotra (2012) however, noted that students lack the ability to ask questions in biology classes. A student who asks question is seeking for information clarity and wishes to know more. Such a student is thus in a better position to learn and be able to solve both present and future problems based on gathered experiences.

Questioning is an expression of inquiry that invites or calls for a reply. Images (2013) opined that questioning is a way of teaching that actively invites students to convey what they are thinking. As a scientist, asking question is a fundamental part of finding information. A question is any sentence which has an interrogative form or functions knowing how to ask the cogent question and provide good answers is the foundation of all learning. According to Enebechi and Nzewi (2019), we learn better by asking questions, due to the limited amount of time with students, teachers cannot possibly teach them everything about their field, so teachers should give students the tools they need to pursue their own interest in their chosen field through questioning. One of the ways to effectively do this is to teach the student questioning skills. Questioning skills is the ability to ask relevant questions in order to obtain information or an idea about an issue or situation. Questions can be of a higher order or lower order. Question level is the measure of how the extent the question asked reflects critical thinking. It requires answers to go beyond simple information and as such both the language and thinking behind them is more complex, for example why do you want to use the same amount of liquid for both tests. Higher order thinking is thinking on a level that is higher than memorizing. For example, how is an atlas vertebra different from an axis vertebra? Question type determines whether the questions asked are closed or open-ended questions, open ended questions elicit a wide range of possible responses. While the closed ended questions are framed to elicit yes/no answers. Example of an open-ended question: could you tell us more about the mammalian skeleton? Example of a closed ended question - How long does it take the rabbit carcass to cook?

The content of a question can indicate the level of thinking of the person who raised the question. To foster critical thinking skills in your students, encourage using key question words like what, how, why, who, when, where, it, to construct questions helps to show students how questions move from simple yes/no questions (less powerful) to 'why and what of' questions (more powerful) that stimulate more reflective thinking and more creative response Sure Jackson, (2013), for example, which of these bones, thoracic or scapula is a vertebra? (less powerful), what is the name of the first bone of the cervical vertebrae (less powerful),

how does the atlas vertebra differ from an axis vertebra (more powerful), if questioning skills are appropriately acquired by students, the students are able to develop high order thinking skills (Katrina, 2012). However, Chinn and Malhotra, (2012) noted that questioning skills are poorly acquired by biology students. A lot of hands-on, minds-on activities in teaching and learning of biology topics such as skeleton can generate so many questions, hence the need to explore the topic - the mammalian skeleton. It becomes necessary therefore to explore possible ways of enhancing the acquisition of questioning skills among senior secondary school students through effective instructional approaches.

We live in a fast-changing world, and producing more of the same knowledge and skills will not suffice to address the challenges of the future. A generation ago, teachers could expect that what they taught would last their students a lifetime. Today, because of rapid economic and social change, schools have to prepare students for jobs that have not yet been created, technologies that have not yet been invented and problems that we don't yet know will arise. For biology students to thrive in the face of these new challenges, developing good questioning abilities is needed. Thus, the main challenge of this study is to bridge the gap by investigating whether or not good questioning abilities can determine secondary school biology students' retention in the vertebral column of a rabbit.

The ribs and vertebral column of a rabbit is one of the major topics in secondary school biology which yields itself to both theory and practicals. The vertebrae bone is a series of bones that makes up the backbone of all vertebrates. They include the cervical vertebrae (7), thoracic vertebrae (12), lumbar vertebrae (7), sacral vertebrae (4), caudal vertebrae (16) in number. Almost every year in both WAEC and NECO examinations, there are question both from theory and practical on the vertebrae column. According to WAEC chief examiners report (2018) candidates generally performed poorly in the science subjects. Chief examiners reported that the performance of candidates was poor in biology, general science, physical education, chemistry and agricultural science although there was some improvement in the practical components of these subjects. Students however performed poorly in questions on the vertebral column of rabbit in the objective questions. The importance attached to this topic cannot be over-emphasized: it protects the spinal cord, it supports the head, it serves as an attachment for the ribs, it provides support and place of attachment for the pectoral and pelvic girdle, it provides movement for the human skeleton, it helps in walking and standing erect, correct posture. In view of this, teachers should all students to generate questions during practical class in this topic. Questions can come up among themselves such as: Ask meaningful questions among themselves in order to find out the parts of the body where each vertebra come from and the number of bones that make up each region of the vertebral column, for example cervical- neck region, what part of rabbits does these bones come from, what are the names of parts of the vertebral, where are they located and how many of each do we have in rabbit, what are their biological importance etc.

This study was therefore aimed at finding out ways to help students retained more in this very important topic in biology.

Retention is an individual's ability to remember and recall information, materials and experiences learned over time. This acquired materials in the mind need to be preserved in form of images for knowledge to develop. When a stimulating situation occurs, retained images are revived or reproduced to make memorization possible (Morris, 2004). Biology concepts therefore, need to be presented to the learners in a way or method that touches their sub consciousness, which can trigger quick recalling of the concepts being taught or learnt. Enebechi, (2021) stated that teachers could improve retention of concepts and information by explicitly creating memorable events involving visual or auditory images with inquiry- based learning and other forms of active learning, to boost student's retention of the concept. Enebechi (2021) further stated that whatever students have retained for about 12 to 24weeks after instruction, they might retain forever.

Retention in this study; thus refers to the students' ability to absorb and hold the knowledge from the vertebral column of a rabbit studied. Thus retention was measured by reshuffling the items of the VCQAT. With this instrument, the students' was expected to provide a replica of the knowledge of their questioning abilities which was shown by the mastery of the concept taught. The retention scores obtained through these instruments was compared with their knowledge before engaging the students on questioning. This is to ascertain if there is any relationship.

The study equally investigated the influence of gender on the mean retention scores of students with both high and low questioning ability scores of students while studying the vertebral column of rabbit. According to Enebechi and Nzewi (2019), gender roles are roles which society assigns to a man or woman in accordance with the culture and tradition of that society. It is not like sex, which is biologically determined and universal too. The issue of closing gender gap in sciences has remained elusive. In recent times, gender related issues in science education have continued to receive serious attention judging from the number of studies done to that effect Babajide (2010) opined that science subjects which include physics and chemistry are given masculine outlook by educational practitioners. In addition to this, studies by Ogunleye (2002), Ezirim (2006), Okwo and Otuba (2007), show that achievement in science subjects depends on gender. However, Nwosu (2015) found out that students' acquisition of science process skills is not gender specific. In addition, studies by Ogunleye and Babajide (2011) and Agomuoh and Nzewi (2003) lend credence to significant gender differences in science achievement. Madu(2004) and Agomuoh (2010) found out that gender influences students' conceptual shift in favour of male students.

Although, many studies have been carried out to determine how best to address gender related issues in the classroom, the results are not yet conclusive. Also, there is a gross scarcity of literature on the status of male and female students' questioning ability during biology lessons. Hence this present study will among others determine the influence of gender on students questioning ability when studying the vertebral column of rabbit.

Statement of Problem

Biology is a popular science subject offered by both science-oriented and art-based

students in S.S.C.E. There is an increasing yearly enrolment in SSCE biology, but each year students achieve poorly in the examination. Teachers as well as parents have expressed concern about the poor performance of students in biology. This has created an educational gap of students not continuing their studies in biology at tertiary institution not minding that this subject stands as the bedrock to the learning of other science courses like Medicine, Pharmacy, Nursing, Biochemistry, Genetics etc that are of great economic importance to the nation. This gap can be filled by devising a more effective approach for improving the situation in order to meet the needs of the students and the society at large. It is therefore certain that better ways to help students retain in a long-term memory what they have learnt be sort for. In view of this, the problem of this study was to determine whether or not questioning abilities of students can determine their retention of some biology concepts like the vertebral column of a rabbit.

Purpose of the study

The purpose of the study was to determine whether or not questioning abilities of students can determine their retention of some biology concepts like the vertebral column of a rabbit. Specifically, the study determined:

1) Mean retention scores of biology students with high questioning abilities when studying the vertebral column of a rabbit and those with low questioning ability
2) Mean retention scores of male and female biology students questioning abilities when studying the vertebral column of a rabbit.

Research Questions

The following research questions guided the study

1) What are the mean retention scores of biology students with high questioning abilities when studying the vertebral column of a rabbit and those with low questioning ability?
2) What are the mean retention scores of male and female biology students questioning abilities when studying the vertebral column of a rabbit?

Research Hypotheses

The following null hypotheses (Ho) guided the study and were tested at 0.05 levels of significance.

Ho_1: There is no significant difference in the mean retention scores of male and female biology students' questioning abilities while studying the vertebral column of rabbit

Research Method

Descriptive survey research design was adopted for the study. According to Kreks (2016). Descriptive survey is most useful in the description of conditions as they exist in their natural setting. Kreks further explained secondary that in descriptive survey design, a group of people, items or things are studied by collecting and analyzing data from all or only a few people, items or things considered to be representative of the entire population. This design was considered most suitable for this study because the researcher collected and analyzed data from some students in senior secondary schools in Udi Local Government area of Enugu state. The population of the study comprises 1517 senior secondary class two (SS2) Biology students in the government

owned coeducational secondary schools in Udi Local Government area of Enugu state (Planning, Research and Statistics Department, Post Primary Schools Management Board (PPSMB) 2020. The sample size for the study was 196 students from two co-educational senior secondary schools from the study area. This was drawn through purposive sample random sampling technique. The sample consists of 102 male students and 94 female students.

The instrument for data collection was vertebral column questioning abilities test (VCQAT). The instrument was subjected to face validity by two biology education teachers and one measurement and evaluation experts. The VCQAT consists of 10 life specimens that were given to students. It was designed by the researcher to assess SS II biology students questioning ability on the vertebral column of rabbit. During the VCQAT, the students were instructed to observe, identify, and raise as many questions as possible on every bone given to them. They were required to submit the questions at the end of the test. The number of questions each student presents were defined according to the criteria: Question level, Question type, Appropriateness of wordings and clarity of questions. This serves as a scoring guide in assessing the students' questioning ability. This was in conformity with questioning skills and not as cognitive. The reliability of the instrument was ascertained by administering the test to 20 senior secondary biology students in (Enugu South) Local Government Area. The scores obtained from the test were subjected to analysis with Kendall's coefficient of concordance which was used to determine the inter-rater-reliability of (VCQAT). 0.82 reliability coefficient was obtained which indicated that the instrument was reliable. The same VCQAT was used for biology retention test but the items were reshuffled. Before administering the instrument, VCQAT was first given to the students to enable the researcher use their scores to categorize them into high questioning ability students and low questioning ability students, students that scored above sixty percent was placed under the high questioning ability students (HQAS) and those that score below sixty percent was placed under low questioning ability students (LQAS). The VCQAT consists of 10 life specimens that were given to students. It was designed by the researcher to assess SS II biology students questioning ability on the vertebral column of rabbit.

The study lasted for three weeks. It took place during the normal school lesson periods. The normal time-table of the two schools sampled for the study were followed. The regular biology teachers in each of the schools were used in directing the students to make proper use of the specimens. Each school was taught once a week and each contact lasted for 80 minutes (one double period). The students were tested on a practical test on mammalian skeleton (rabbit). They were provided with practical biology textbooks and charts on mammalian skeleton. They were asked to use them as a guide and answer the following questions: Carefully observe specimens 1-10 taking note of their structural details and features of biological interest, raise and generate as many questions as possible on every bone, submit the questions by the end of the test.

Prior to the commencement of the experiment, pretest was administered to all the

students in the two groups. At the end of the treatment, post-test was administered to the students but the items were reshuffled. The answer scripts of the students in the two groups for pre-tests and post-tests were marked by the research assistants using the score Rubric for VCQAT.Data collected from the two groups were recorded and used for analysis according to the demands of the research questions and hypotheses. The scores obtained from pre-test and post-test were analyzed using mean and standard deviation to answer the research questions while z-test statistic was used to test the hypotheses at 0.05 level of significant.

Presentation and Analysis of Data

Research question one: What are the mean retention scores of biology students with high questioning abilities when studying the vertebral column of a rabbit and those with low questioning ability?

Table 1: Mean and standard deviation of students mean retention Scores in biology

		Pretest		Posttest		
Group	N	Mean	S	Mean	S	Mean gain
HQA	100	13.70	2.809	18.00	1.421	4.3
LQA	96	12.40	3.564	15.04	2.393	2.64

Key: HQA (high questioning abilities), LQA (low questioning Abilities)

Result in **table 1** shows that the mean retention scores of students with high questioning ability is higher than that of students with lower questioning abilities. The mean gain in retention of students with HQA is 4.3 which are higher than the retention of students in LQA group which is 2.64. The result therefore, indicates that students with high questioning abilities retain what they learn more than those students with low questioning abilities.

Research question 2: What are the mean retention scores of male and female biology students questioning abilities when studying the vertebral column of a rabbit?

Table 2: Mean retention scores of male and female biology students questioning abilities in the Vertebral column of a rabbit

		Pretest		Posttest		
Gender	N	Mean	S	Mean	S	Mean Gain
Male	102	12.67	3.157	13.15	2.266	0.48
Female	94	14.37	2.977	16.17	2.667	1.80
Mean Diff		1.7	3.02	3.02		

Table 2 showed that mean retention scores of male students are lower than that of the female students questioning abilities in vertebral column of rabbit. The mean gain for the female gender is 1.8 which is higher than that of the male gender which is 0.48.

Hypothesis 1: Ho_1: There is no significant difference in the mean retention scores of male and female biology students' questioning abilities while studying the vertebral column of rabbit

Table 3: t-test result of male and female students' questioning abilities in biology.

	Mean	Score	Standard	Deviation	T	Df.	P	Decision
Gender	Male (102)	Female (94)	Male	Female				
Questioning Abilities	2.4993	1.1909	.52324	.18309	.339	291	0.001	S

Table 3 shows that there is statistically significant difference between the male and female questioning abilities while studying the vertebral column of rabbit. The t (291)=.339, p=.001,a=.05. since the p<.05, the hypothesis is rejected, hence There is a significant difference in the mean retention scores of male and female biology students' questioning abilities while studying the vertebral column of rabbit

Discussion of the Findings

The study established that the mean retention scores of students with high questioning ability is higher than that of students with lower questioning abilities. The mean gain in retention of students with HQA is 4.3 which are higher than the retention of students in LQA group which is 2.64. The result therefore, indicates that students with high questioning abilities retain what they learn more than those students with low questioning abilities. This is in line with Wilen, Ishler and Hutchinson (2000) who found that changing the pattern of classroom question from 'teacher-students' to 'students-teacher' is the key to successful change and can enhance creativity and critical thinking skills which helps students to retain what they have learnt. Katrina (2012) also found that allowing students to raise questions on the course of study was an interesting idea. The author found that the opportunity helped the students to develop high order thinking skills, critical and creative skills that assisted them in making decisions and also think themselves. Therefore the acquisition of higher mean scores in questioning in this study could be examined by the fact that HQA might have provided more opportunity for the students to elicit in-depth information on the topic taught and consequently learnt how to form more productive questions. These findings also support the cognitive theories of Dewey and Brunner that active participation of students lead to higher and more relevant learning outcomes.

In addition, the study equally found out that the mean retention scores of male students are lower than that of the female students questioning abilities in vertebral column of rabbit. The mean gain for the female gender is 1.8 which is higher than that of the male gender which is 0.48. This is at variance with the findings of Ibe and Nwosu (2013) that gender of the subjects did not affect the performance of student in inquiry-based class. The slight high questioning ability mean scores of female students may be attributed to gender equality and that what a man can do, a woman can also do and do better. Days are gone when parents from home, would rather assign duties that are science oriented to boys than girls.

Furthermore, the study equally revealed that there is a significant difference in the mean retention scores of male and female biology students' questioning abilities while studying

the vertebral column of rabbit. This contradicts Ibe and Nwosu (2013). The slight high questioning ability mean scores of male students in table 3 may be attributed to gender stereotyping. For example, from home, parents would rather assign duties that are science oriented to boys than girls. Gender stereotyping has really helped boys in these tasks related to science.

Conclusion

Based on the analyses made above, the following findings were made:

1) The mean retention score of students with high questioning ability was higher than that of students with lower questioning abilities. The mean gain in retention of students with HQA is 4.3 which are higher than the retention of students in LQA group which is 2.64. The result therefore, indicates that students with high questioning abilities retain what they learn more than those students with low questioning abilities.
2) The mean retention scores of male students are lower than that of the female students questioning abilities in vertebral column of rabbit. The mean gain for the female gender is 1.8 which is higher than that of the male gender which is 0.48.
3) There is a significant difference in the mean retention scores of male and female biology students' questioning abilities while studying the vertebral column of rabbit

Recommendations

Based on the conclusions, the researcher recommends that:

1) Biology teachers should allow students enough time to address their questions. Questions give the students in-depth sight to areas they are not clear with in the teaching-learning process. This will enhance students' retention ability in biology.
2) Government agencies and professional associations whose responsibility is to design and revise the curriculum for secondary schools should incorporate and emphasize the use of teaching methods like engages students in questioning such as inquiry-based learning approach in teaching and learning of biology in senior secondary schools.
3) Government in conjunction with other professional associations should organize workshop, seminars; conferences and in-service training on a regular basis to train, retain teachers on

References

Agomouh, P.C. (2010). Effect of prior knowledge, exploration, discussion, dissatisfaction with prior knowledge and applications (PEDDA) and the learning cycle (TLC) constructivist instructional models on students' conceptual change and retention. *An unpublished Ph.D thesis,* Univesity of Nigeria, Nsukka.

Agommoh, P. C. & Nzewi, U. M. (2003) Effects of Video – taped instruction on secondary school students' Achievement in physics, *Journal of the science Teachers Association of Nigeria* J. STAN 38 (132) 88 – 93..

Babajide, V.F.T. (2010). Generative and Predict observe-Explain Instructional Strategies as Determinants of Senior Secondary School Students' Achievement and Practical Skills in physics. *Unpublished Ph.D Thesis, University of Ibadan. Nigeria*

Chinn, C. A. and Malhotra, B. A (2012). Epistemologically authentic inquiry in schools. A theoretical framework for evaluating inquiry tasks. *Science Education*,56, 176-218.

Comparative Educational Studies and adaptation centre CESAC (2004). *National curriculum for secondary school biology*. Abuja: Federal Government Press.

Enebechi, R.I. and Nzewi U.M. (2019). The effects of cueing questions as instructional scaffolding on students interest in Biology. *International Journal of Integrated Research in Education (IJIRE). 1(2) 89-99.*

Enebechi, R. I. (2021). Effect of inquiry- based leaning approach on senior secondary school students retention in biology. *British International journal of education and social sciences;*

Ezirim, M.U. (2006) Scaling up girls participation in Science education: Towards a score card on quality education. E. Okeke and M. Opara (Eds) Science Teachers Association of Nigeria. *Gender and STM Education series* (1) 75-80

Federal Republic of Nigeria, (2014). National Policy on Education, Abuja: NERDC Press.

Ibe, E. &Nwosu A.A (2013). Effect of guided-inquiry, demonstration and conventional methods of teaching science process skills among secondary school biology students. *Journal of the science Teachers Association of Nigeria*(STAN)38(1&2).58-63.

Images, O. (2013). Questioning: retrieved 2013 from https://www/images.rbs.org/assessment-/questioning.shtml.

Katrina, A. (2012) For – students – why-the question-is-more. Important than-the-abswerm retruevedm (2013) From https//blogs.kged.org/mind shift/2012/ for students – why – the question-is-more-important-than-the-answer.

Kreks, M. (2016). Research Methodology. Benin City: Iguma Press Ltd.

Morris, K. (2004). Transformative learning in the perspective of a comprehensive learning theory. *Journal of Transformative Education.* www.infibeam.com/Books/info/Jack-R-Fraenkel/How-to-Design-and-Evaluate-Research-in/

Madu, B.C. (2004). Effect of a constructivist.Based instructional model on students' conceptual change and retention in physics. *Unpublished Thesis University of Nigeria Nsukka*.

Nwosu, A.A. (2001). Gender and acquisition of science process skills among secondary school students: Implications for science teaching. *42nd Annual conference proceedings of STAN. Women in science, technology and mathematics education in Nigeria*, 206-209.

Nwosu, A.A. (2015). Science Education For Life in a Dynamic World. 100th Inaugural lecture of the University of Nigeria, Nsukka. 44-49

Ogunleye, B.O. & Babijide, V. F. T. (2011). Commitment to science and gender as determinants of students' achievement and practical skills in physics. *Journal of the Science Teachers association of Nigeria*, 1(46) 125-135.

Ogunleye, B.O. (2002). Evaluation of the Environmental Aspect of the senior Secondary School chemistry curriculum in Ibadan, Nigeria, *Unpublished Ph.D Thesis, University of Ibadan, Nigeria*.

Ojim, D. K & Nyim, S. P. (2018). A Comparative study of the mean interest, achievement and retention scores of public and private schools' student taught algebra. https://www..maths.prg.com./journal 7(2). 409-420

Okwo, F.A & Otuba, S. (2007). Influence of gender and cognitive styles on students achievement in physics essay test. *Journal of Science Teachers Association of Nigeria* 42 (1&2) 133-138.

Sure Jackson (2013). Helping students develop the ability to ask good questions. adapted from Harvey and Daniels, Comprehension and Collaboration: Inquiry Circles in action, Portsmouth; Heinmann, 2009, 247-254.

West African Senior School Certificate Examination WASSCE (2018) Chief examiner's report, Biology 1 & 2b. WAEC Publications.

Willen, W.Ishler, M, & Hutchinsom, J.(2000). Dynamics of teaching. New York: Longman.