STEM JOURNAL OF ANAMBRA STATE(STEMJAS) VOLUME 5(1);2025

EDITOR-IN-CHIEF: PROF. EBELE C. OKIGBO

STEMJAS

STEM JOURNAL OF ANAMBRA STAN

Volume 5(1);2025
ISSN:2705-1579

EDITOR-IN-CHIEF
PROF. EBELE C. OKIGBO

STEM JOURNAL

OF ANAMBRA STATE

(STEMJAS), 5(1); 2025

ISSN: 2705-1579
Published & Printed by:
FAB ANIEH NIGERIA LIMITED
Fab Anieh House
Opposite COFI Premium Lounge
Okpuno, Awka
Tel: 08035619395
G-mail: fabprezz82@gmail.com

EDITORIAL BOARD

Officers of Science Teachers Association of Nigeria, Anambra State Chapter

Dr. Bibiana C. Okoli	-	Chairman
Mr. JohnBosco O.C. Okekeokosisi	-	Vice Chairman
Dr. Nkiru N.C. Samuel	-	Secretary
Mr. Arinze Enekwechi	-	Assistant Secretary
Mr. Clement Okpala	-	Financial Secretary
Dr. Blessing I. Okafor	-	Treasurer
Mr. Friday Peter Usang	-	Science Fair Coordinator
Mr. Solomon C. Okoli	-	Assistant Science Fair Coordinator
Mrs. Grace N. Okpata	-	PRO I
Mrs. Ndidamaka P. Okafor	-	PRO II
Dr. Christiana U. Ezenduka	-	Immediate Past Chairman
Prof. E.O. Akuezilo	-	Member Board of Trustee
Prof. Edwin Akusoba	-	Patron

EDITORIAL

STEM Journal of Anambra STAN (STEMJAS) is a publication of **Science Teachers Association of Nigeria, Anambra State Chapter.** STEMJAS is developed to disseminate information on Science, Technology, Engineering and Mathematics (STEM) to teachers, teacher-trainers, researchers and other interested persons. Articles that are of relevance to STEM education are published in this journal.

We are grateful to the contributors and hope that our readers will enjoy reading these contributions.

Prof. Ebele C. Okigbo

Editor-in-Chief

TABLE OF CONTENTS

STUDY SKILLS AS DETERMINANTS OF SENIOR SECONDARY SCHOOL STUDENTS' ACADEMIC ACHIEVEMENT IN BIOLOGY IN ANAMBRA STATE, NIGERIA

[1]Ebele C. Okigbo, [2]Nneka I. Nduka, [3]Esther E. Akachukwu
[1]ec.okigbo@unizik.edu.ng, [2]nnekanduka@gmail.com, [3]ee.akachukwu@unizik.edu.ng
[1,2,3]Department of Science Education
[1,2,3]Faculty of Education
[1,2,3]Nnamdi Azikiwe University, Awka, Anambra State, Nigeria

Abstract
The study skills as determinants of secondary school students' achievement in Biology in Anambra State of Nigeria was investigated. The research was guided by three research questions and three hypotheses tested at .05 alpha level. A correlation research design was adopted for the research. A sample size of 400 senior secondary school two (SS2) students offering Biology was drawn from the population of 2,927 SS2 students in the 49 coeducational public secondary schools in Nnewi Education zone of Anambra State using multi-stage sampling procedure. The instruments for data collection were Study Skills Questionnaire" (SSQ) and a proforma for recording the students' first term result on Biology for 2023/2024 session which represent their achievement scores in Biology. The SSQ was validated by three experts from Faculty of Education in Nnamdi Azikiwe University. The reliability of SSQ was determined using Cronbach's alpha technique, with coefficient of 0.89. Data collection involved the direct administration of the questionnaire to respondents by the researchers and four research assistants (SS2 Biology teachers). The collected data were analyzed using simple and multiple regressions with the aid of SPSS, version 26. The findings revealed that; study skills are not significant determinants of secondary school students' academic achievement in Biology, study skills do not significantly predict male or female students' achievement in Biology. It was concluded that other factors beyond study skills may have a more substantial impact on students' academic achievement in Biology. The study recommends that group guidance should be organized in schools by professional counsellors in order to create awareness on how students can develop effective study skills and other skills which can lead to a better academic achievement in Biology.

Keywords: Study skills, Biology achievement

Introduction

Science is studied in primary, secondary and tertiary levels of education. The secondary school education system in Nigeria consists of two levels: upper basic, which encompasses the junior secondary level, and senior secondary level. The senior secondary level offers a range of subjects, including those in the fields of science, arts, and commerce. Science is a systematic and methodical approach to investigating natural phenomena, utilizing logical processes to solve problems and acquire knowledge by seeking answers to questions. It involves rigorous observation, experimentation, and analysis to understand the intricacies of the natural world, contributing to the advancement of human understanding and potential applications in various fields (Silva, 2022). These subjects when taught very well at this level, forms the bedrock for the study of science courses in tertiary level and technological advancement of any nation. Considering Nigeria's strong emphasis on science education as evident in its educational policies across various fields of study, it becomes evident that science education plays a crucial role in the sharing of science content, social science, and the process of teaching science pedagogy.

In pursuit of goals of “Science for all” current reforms in science education lay emphasis on scientific literacy and the need to achieve equity and excellence in science education (Tankersley, 2021). In Nigeria, the situation is not different. The government through official policies and actions has demonstrated commitment to the inculcation of scientific literacy among all Nigerians and not only those pursuing scientific careers or science professions but also for those in non-science related courses. One obvious example of government action in this regard is making science subjects compulsory and/or core subjects in the Primary and Upper Basic Schools. In line with this notion, it is widely acknowledged that science educators have the important task of creating an environment that maximizes opportunities for students to excel in science subjects such as Chemistry, Physics, Mathematics, and Biology.

Biology which is one of the science subjects offered at the senior secondary school levels in Nigeria is a very important science subject and a requirement for higher learning in a number of sciences related professional courses like Medicine, Agriculture, Pharmacy. Biology as a science subject deals with the study of variety of living organisms, their interaction with one another and with their environment. It entails what life is, what life needs to survive and how life forms interrelate with each other. Biology, according to Udegbe and Okoli (2022) deals with the study of living organisms and the interaction between them and their environment. The knowledge of Biology prepares students to apply basic scientific concepts in dealing with numerous issues encountered on daily basis and comprehend the natural world. There are three main divisions of Biology; botany, zoology and microbiology. The knowledge of Biology plays a vital role in national development because it benefits individual citizens and other corporate organizations in many ways.

In the past, Biology as a school subject was popular among science and non-science students. The state of poor achievement among students who enroll for Biology at external examination such as West African Senior School Certificate Examination (WASSCE) has continued to deter students from the subject. Based on the Chief Examiner's report, it was observed that the percentage of students who passed at the credit level in Biology, the most popular science subject in secondary schools, ranged from 33.37% to 35.66% between 2007 - 2012. However, from 2013 to 2016, despite an increase in the student population (1,648,363 in 2013, 1,365,384 in 2014, and 1,200,367 in 2016), no more than 61.68% of the students were able to achieve a credit level in Biology. These findings highlight the need for further investigation and interventions to improve the achievement of students in Biology. The period between 2013 to 2019, also witnessed a significant rise in the percentage of students who achieved a credit level in the examination.

However, when considering the specific focus on the student population enrolled for the examination, there were no significant differences observed between each year. In 2020, there was a significant increase in achievement of Biology students, this was due to the fact that students were not in schools for a good period of time due to the covid-19 virus, it could be that WAEC was lenient in marking or the questions were quite simple than usual. In 2021 the performance of students returned as previous years which was not too excellent. Notwithstanding the importance of Biology to human life, its nature as a school subject and the popularity among students, the achievement of students in the subject has not appreciated as expected since Biology is one of the science subjects preferred by both arts and science students.

Several factors have been identified as contributors to the declining academic achievement in Biology. These factors encompass the insufficient number of teachers and the students' lack of interest and attitude towards science in general including Biology. (Umewereaku, Obi & *Ogbunude,* 2021) pointed out that students' inadequate achievement in Biology can be attributed to their lack of consistent study skills. Hassan, Latiff, Muhamad, and Abdullah (2021) have shown that studying plays a crucial role in the cognitive, behavioral, and attitudinal development of learners. Individuals engage in studying for various reasons, including knowledge development, recreation, enjoyment, and relaxation. Studying refers to the purposeful and focused engagement in learning activities with the aim of acquiring knowledge, understanding concepts, developing skills, and enhancing one's academic or intellectual abilities. Mirza, Pathan, Khatoon, and Hassan (2021) viewed studying as an active part of life that is not just about pleasure when needed. Palani in Abid, Mohd, Mohd, and Rajiv (2023) distinguished that studying is an instrument used to exchange information, skills as well as ideas. This skill, as described in educational research, encompasses a range of activities that aid in the learning process, problem-solving, and the retention of information. It involves acquiring knowledge about a particular topic, engaging in problem-solving tasks, and memorizing the presented materials, whether partially or in their entirety.

Study skills encompasses the readers' inclination to effectively comprehend new knowledge through the utilization of various strategies such as organization, highlighting, reviewing, reciting, and employing aids like flashcards and other study tools. Skillsyouneed.com (2023) opined that study skills are the skills you need to enable you to study and learn efficiently; they are an important set of transferable life skills. Study skills are an array of skills which tackle the process of organizing and taking in new information, retaining information, or dealing with assessments. More broadly, any skill which boosts a person's ability to study, retain and recall information which assists in and passing examinations can be termed a study skill, and this could include time management and motivational techniques. Dunlosky (2021) outlined the basic study skills of a student to include; elaborative interrogation, self-explanation, practice testing, distributed practice and interleaved practice.

Michael, Joseph, and Iornyagh (2020) investigated the effect of study skills training on academic achievement and retention of Geography secondary school students in Jalingo metropolis of Taraba State and revealed that the experimental group that was given study skills training performed higher than that of the control group without skill training. More so, Saeid, Mohd, Samsilah, Siti, and Maryam (2021) carried out a study on the effectiveness of study skills training on the qualitative academic achievement of girl high school students in Malaysia. They revealed that there was a significant increase in qualitative academic achievement between pretest with post-test and follow-up among the experimental group exposed to study skills training program. Study skills are associated with a lot of variables such as gender, location, and study habits, among others.

Gender encompasses socially constructed characteristics and norms associated with being male or female. Within the domain of study skills, it is evident that gender exerts a significant influence on individuals' academic achievement. Societal expectations and stereotypes linked to gender roles in education can impact students' study skills and subsequently their academic achievement. Nadia, Anees -ul -Husnain, and Asghar (2020) showed that, there are variations in study skills and study habits between genders, including differences in learning styles, time management strategies and approaches to studying. For example, Stanikzai (2019) have indicated that females tend to engage in more organized study practices, such as note-taking and reviewing, while males may adopt more self-directed and independent study methods. Furthermore, gender-related factors such as self-efficacy, confidence, and motivation can also play a role in shaping study skills. Understanding these multifaceted dynamics is crucial for educators and policymakers to design targeted interventions that promote equitable academic achievement and support students in developing effective study skills regardless of their gender.

Academic achievement is the extent of success or failure attained over a particular academic task and at a specific time. It is the outcome of efforts made by students over a period of time (Itoya, 2021). Itoya continued that academic achievement therefore is the result of a student at the end of a term or session. According to Ballotpedia (2022), academic achievement is the measurement of student achievement across various academic subjects. Teachers and education officials typically measure achievement using classroom achievement, graduation rates, and results from standardized tests. Ballotpedia added that students' achievement can be measured using a variety of benchmarks, including grade point average (GPA), high school graduation rate, annual standardized tests, and college entrance examinations.

Inadequate academic achievement has been shown to elicit feelings of frustration among students. This frustration can arise from the perceived discrepancy between their desired level of achievement and the actual outcomes they attain in their academic pursuits. Furthermore, persistent and significant academic underachievement can negatively impact students' motivation, self-esteem, and overall well-being, further exacerbating their frustration and potentially leading to a range of adverse academic and psychological consequences. It can also lead to students' drop out especially if the poor academic achievement persists for a long time. Considering the fact that many psychological variables have been found in literature as predictors of academic achievement, this study sought to investigate how study skills influence secondary school male and female students' academic achievement in Biology in Nnewi Education Zone of Anambra State, Nigeria.

Purpose of the Study

The purpose of the study was to investigate study skills as determinants of secondary school students' academic achievement in Biology in Nnewi Education Zone. Specifically, the study investigated the;

1. extent to which study skills influence academic achievement of secondary school students in Biology.
2. extent to which study skills determine academic achievement of secondary school male and female students in Biology.
3. joint prediction of secondary school students' academic achievement in Biology by study skills and gender.

Research Questions

The following research questions guided the study

1. To what extent do study skills influence academic achievement scores of secondary school students in Biology?
2. To what extent do study skills determine academic achievement scores of secondary school male and female students in Biology in Nnewi Education Zone?
3. What is the joint predictive power of study skills and gender on secondary school students' academic achievement scores in Biology?

Hypotheses

The following hypotheses were tested at 0.05 level of significance;

1. Study skills do not significantly influence secondary school students' academic achievement in Biology.
2. Study skills do not significantly determine secondary school male and female students' academic achievement in Biology.
3. Study skills, and gender do not jointly predict secondary school students' academic achievement in Biology.

Method

The study adopted a correlation survey research design. It establishes the nature of relationship between the criterion variable (students' academic achievement) and the predictor variable (students' study skills). The population of the study consisted of 2,927 (1198 males and 1729 females) Senior Secondary School Two (SS2) students in the public secondary (38 Co-educational and 11 single sex) schools in Nnewi Education Zone of Anambra State, Nigeria in 2023/2024 academic session. A sample size of 400 SS2 students offering was drawn from 16 out of the 49 schools was involved in the study. The sample was obtained using multi-stage sampling procedure involving; purposive sampling, simple random sampling and proportionate stratified random sampling techniques.

The Study Skills Questionnaire (SSQ) and a proforma for collection of students achievement scores were used as instruments for data collection. The SSQ has six clusters respectively namely I, II, III, IV V and VI. Five (5) items from reading textbooks, five (5) items from taking notes, five (5) items from studying, five (5) items from memorizing, five (5) items from preparing for a test and five (5) items from managing your time respectively. It was adapted from University of Houston Clear Lake Study Skills Assessment Questionnaire. The instrument contains a total of 30 items for study skill questionnaire (SSQ) structured on three points rating scale of Rarely (R), Sometimes (S) and Often (O) weighted 3, 2 and 1 respectively. The SSQ was validated by three experts from Faculty of Education, Nnamdi Azikiwe University, Awka, Nigeria. The reliability of the instrument was established using Cronbach alpha method determine its internal consistency by administering 40 copies of questionnaire on a sample of 40 SS2 biology students from Onitsha Education Zone once. The choice of Onitsha Education Zone was because Nnewi and Onitsha Education Zones are two major business areas in Anambra state and share similar characteristics. The co-efficient for clusters, I to VI were .86, .89, .87, .90, .82 and .93 respectively and overall coefficient was 0.89. Four hundred copies of the questionnaire were administered directly on the respondents by the researchers together with six research assistants who are secondary school Biology teachers which lasted

for two weeks. All the 400 copies were retrieved and correctly filled. The data collected were analyzed with Ordinary Least Square simple and multiple regressions using Statistical Package for Social Sciences (SPSS) version 26. Specifically, the null hypotheses were tested at 0.05 alpha level using multiple regressions. Decision rule for the research question is that Adjusted R^2 was used to evaluate the strength of relationship and the contribution of the joint variables (study skills and gender) to students' academic achievement. To determine the significance of the relationship in hypotheses testing, the decision rule was follows: If the p-value$\leq$0.05, reject H_o; if otherwise (p-value$\geq$ 0.05), do not reject H_o

Results

Table 1: Regression analysis on study skills as determinants of SS2 students' academic achievement in Biology.

Variable	R	R^2	R^2 Changed	B	BETA	% var. added	df	Cal. F	P-val	Remark
Study skills	0.003	0.000	0.000	-0.001	-0.003	0	398	0.004	.951	NS

NS = not significant

Table 1 shows that there is a very low positive linear relationship between study skills on academic achievement of secondary school students in Biology in Nnewi Education Zone (r=0.003). Study skills have an R-squared change score of 0.000, which shows that study skills do not determine SS2 students' achievement in Biology in Nnewi Education Zone. Table 1 also reveals that at 0.05 alpha level, with 1df numerator, 398df denominator, the calculated F0.004 and a P-value of 0.951, which is greater than 0.05, the hypothesis is not rejected. Hence, study skills do not significantly predict secondary school students' academic achievement in Biology in Nnewi Education Zone.

Table 2: The prediction of male and female SS2 students' academic achievement in Biology by their study skills.

Variable		R	R^2	R^2 Changed	B	BETA	%Var added	df	Cal. F	P-value	Remark
Study skills	Male	0.012	0.000	0.000	-0.005	-0.012	0	398	0.004	.846	NS
	Female	0.007	0.000	0.000	0.003	0.007	0		0.008	.930	NS

NS=not significant

Table 2 shows that there is a very low positive linear relationship between study skills and academic achievement of male and female SS2 students in Biology in Nnewi Education Zone (r=0.012, 0.007). Study skills have an R-squared change score of 0.000 for both gender (Male and female), which shows that study skills have 0 percent contribution to Biology achievement of male and female SS2 students. Table 2 further revealed that at 0.05 alpha level, with 1df numerator, 398df denominator, the calculated F0.004 for male and F0.008 for female SS2 students and a P-value of 0.846 for male and 0.930 for female students, which is greater than 0.05, the hypothesis is not rejected. Hence, study skills do not significantly determine male and female SS2 students' academic achievement in Biology in Nnewi Education Zone.

Table 3: The predictive value of study skills and gender on academic achievement of SS2 students in Biology in Nnewi Education Zone.

Variable	R	R^2	R^2 Changed	B	BETA	%var. added	Df	Cal. F	P-value	Remark
Study skills				-0.001	0.002					
	0.079	0.006	0.006	68.669		0.6	398	0.821	0.048	Sig
Gender				-0.013	-0.001					

Table 3 shows that a low positive linear relationship exists between study skills and gender on SS2 students' academic achievement in Biology. (r=0.079). Also, study skills and gender have R^2 value of 0.006, this implies 0.6 percent predictive power on secondary school students' academic achievement in Biology in Nnewi Education Zone. Table 3 also revealed that at 0.05 alpha level, with 3df numerator, 398df denominator, the calculated F 0.821 and a P-value of 0.048, which is greater than 0.05, the null hypothesis is rejected. Hence, study skills and gender jointly predict SS2 students' academic achievement in Biology in Nnewi Education Zone.

Discussion

The study reveals a very low positive linear relationship between study skills on academic achievement of secondary school students in Biology in Nnewi Education Zone. In the same vein, there is a very low positive linear relationship between study skills on academic achievement of male and female secondary school students in Biology in Nnewi Education Zone. This aligns with the findings of Naqvi, Chikwa, Menon and Al Kharusi (2018), which showed a mixed picture with a considerable majority of students thinking that they do possess most of the study skills that were assessed, whilst acknowledging a lack of some of the skills such as test preparation and critical thinking skills. The study further conforms with Michael, Joseph, and Iornyagh (2020), who found that the experimental group that was given study skills training performed higher than that of the control group.

The findings of this study revealed that study skills do not significantly determine secondary school students' academic achievement in Biology in Nnewi Education Zone. It was also found that study skills do not significantly predict male and female secondary school students' academic achievement in Biology in Nnewi Education Zone. This finding conforms to the finding of Saeid, Mohd, Samsilah, and Siti (2021)

who found that there was a significant increase in qualitative academic achievement between pretest with post-test and follow-up among the experimental group.

The findings of this study show that there is a low positive linear relationship between study skills and gender on secondary school students' academic achievement in Biology in Nnewi Education Zone. This is in accordance with the finding of Abisola and Kudirat (2017), which showed that there is significance relationship between note taking, students' use of library, time allocation for study and students' academic achievement in mathematics. More so, Jhoselle, Francis, Reymark and Mark (2020) found that the findings showed among others that the respondents' study habits are at a relatively average level.

Similarly, study skills, and gender jointly predict SS2 students' academic achievement in Biology in Nnewi Education Zone. This conforms to Naqvi, *et al.* (2018) study which shows a mixed picture with

a considerable majority of students thinking that they do possess most of the study skills that were assessed, whilst acknowledging a lack of some of the skills such as test preparation and critical thinking skills. It further complies with the findings of Michael, *et al.* (2020), who found that the experimental group that was given study skills training performed higher than that of the control group.

Conclusion

Based on the findings of this study it was concluded that a very low positive linear relationship existed between study skills and academic achievement of secondary school students in Biology in Nnewi Education Zone. This was discovered irrespective of gender. More so, study skill was not found to be a significant determinant of secondary school students' academic achievement in Biology in Nnewi Education Zone regardless of gender.

Recommendations

Based on the findings of the study, it was recommended that;

1. Group guidance should be organized in schools by professional counsellors in order to create awareness on how students can develop good study skills which could lead to a better academic achievement in Biology.
2. Teachers, parents, guardians and the school management should collaboratively guide students on how to develop good study skills. Teaching of study skills to secondary school students can play an important role in the improvement of students' academic achievement in biology.
3. Students should be provided with support by school administrators to ensure the development of effective study skills as they go through different levels of study.

References

Abid, H., Mohd, J., Mohd, A., & Rajiv, S. (2023). Understanding the role of digital technologies in education: A review. *Journal of Sustainable Operations and Computers, 3,* 275-285.

Abisola, O. S. & Kudirat, B. S. (2017). Study habits and academic achievement of secondary school students in mathematics: A case study of selected secondary schools in Uyo Local Education Council. *Research in Pedagogy, 7(2),* 283-297.

Ballotpedia (2022). Academic achievement. Retrieved from https://ballotpedia.org/Academic_achievement

Dunlosky, J. (2021). Strengthening the student toolbox: Study strategies to boost learning. Retrieved from *https://files.eric.ed.gov/fulltext/EJ1021069.pdf*

Hassan, I., Latiff Azmi, M. N., Muhamad, S. N., & Abdullah, A. T. H. (2021). Reading habits and their correlation with reading achievement among ESL learners in selected Malaysian secondary schools. *Arab World Eng. Journal (AWEJ), 12,* 385–399.

Itoya, A. B. (2021). Improving marketing students' reading comprehension with the sq3r method. *Journal of Marketing Education, 30(2),* 130-137

Jhoselle, T., Francis, R., Reymark, L. & Mark, A. C. C. (2020). The learners' study habits and its relation on their academic achievement. *International Journal of All Research Writings (IJARW), 2(6),* 1-19.

Michael, H. L., Joseph, J. & Iornyagh, P. (2020). Effect of study skills training on academic achievement & retention of secondary schools Geography students in Jalingo Metropolis. *International Journal of Advanced Academic Research, 6(10),* 29-40.

Mirza, Q., Pathan, H., Khatoon, S., & Hassan, A. (2021). Digital age and reading habits: Empirical evidence from Pakistani Engineering University. *TESOL International Journal, 16,* 210–231.

Nadia, S. Anees -ul -Husnain, M. S. & Asghar, A. (2020). Gender based differences of study habits among university students. *Journal of the Research Society of Pakistan, 57(1),* 588

Naqvi, S. Chikwa, G. Menon, U. & Al Kharusi, D. (2018) Study skills assessment among undergraduate students at a private university college in Oman. *Mediterranean Journal of Social Sciences, 9 (2),* 139-147.

Saeid, M., Mohd, S. G. H., Samsilah, R., Siti, R. H. & Maryam, G. G. (2021). The effects of study skills training on qualitative academic achievement among students. *Asian Journal of University Education (AJUE), 17 (3),* 130-141.

Silva, J.G.C. (2022). Science and scientific method. *International Journal of Science and Research (IJSR). 11,* 621-633.

Skillsyouneed.com (2023). *Study skills.* Retrieved from *https://www.skillsyouneed.com/learn/study-skills.html*

Stanikzai, M. (2019). Self-regulated learning: an exploratory study (Level and gender difference). *Journal Multidiscipline. 4,* 76–81.

Tankersley, A. (2021). The Role of the next generation science standards in teachers' curricular choices in the life science classroom. Theses, student research, and creative activity: Department of Teaching, Learning and Teacher Education. 133. https://digitalcommons.unl.edu/teachlearnstudent/133

Udegbe, S. I. & Okoli, J.N. (2022). Self-efficacy, study habits and attribution style as predictors of senior secondary school students' achievement in Biology in Ogidi education zone. *African Journal of Science, Technology and Mathematics Education, 8(1),* 91-98.

Umewereaku, C. M., Obi, C. H. & Ogbunude, I. M. (2021). Effect of study habits on the academic achievement of Biology students in Onitsha education zone of Anambra state. *Journal of Educational Research & Development, 4*(2), 11-19.