ISSN: 2541-2846
Volume 15, Number 2, 2025
International Journal of Research in Education

EFFECT OF MASTERY LEARNING STRATEGY ON SENIOR SECONDARY TWO STUDENTS' ACHIEVEMENT IN GENETICS IN JOS NORTH, PLATEAU STATE, NIGERIA

[1]Inedu Regina Onyoche, [2]Prof. Comfort N. Piwuna and [3]Prof. Bernadette E. Ozoji
[1,2&3]Department of Science and Technology Education, Faculty of Eduction, University of Jos, Plateau State, Nigeria
Email: inedureginaonyoche2@gmail.com, piwunacomfort@gmail.com, mbozorji@yahoo.com,

ABSTRACT
This study investigated the effect of Mastery Learning Strategy (MLS) on senior secondary two students' achievement in Genetics in Jos North, Plateau State, Nigeria. The study adopted the Quasi-Experimental Non-randomized Pre-test Post-test Control Group Design. The population was of 1,052 SSII students. Simple random sampling technique was used to select the sample of 57 SII biology students from two co-educational schools. Two research questions and two null hypotheses guided the study. The instrument for data collection was Genetics Achievement Formative Test (GAFT). The GAFT was validated by experts and pilot tested; with reliability index of 0.95 established using Kuder-Richardson-KR-21. Data were analyzed using mean and standard deviation to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance. The results revealed significant difference between the achievement mean scores of students taught using mastery learning strategy and those taught using the lecture method; ($F(1,54) = 58.40$, $p < 0.05$). There was no significant difference between the achievement mean scores of male and female students taught Genetics using mastery learning strategy ($F(1,24) = .177$, $p < 0.05$). Based on the findings, it was concluded that mastery learning strategy has significantly improved the achievement of students in Genetics. It was recommended that Biology teachers should always adopt Mastery Learning Strategy in teaching and always ensure gender friendly classroom for improvement of students' achievement in Genetics /biology.

Key words: Mastery Learning Strategy, Achievement, Genetics, Gender.

INTRODUCTION
Biology is a life science which deals with the study of living and non-living things and their interaction with one another and the environment. It is one of the basic science subjects studied in the senior secondary school level in Nigeria. It encompasses other science alliance such as; agriculture science, medicine, pharmacy, microbiology, biotechnology and Environmental studies. Biology education is the foundation for any meaningful scientific endeavour and any nation that must develop in science and technology must have a strong biology foundation for its teaming youths. It is one of the branches of science involved in teaching and learning of the skills, ideas and principles produced by the sciences and stand to be one of the major means of growth, progress and development of any society (Agbo, 2015). It include the development of new ways of thinking, reacting and behaving a development that demonstrates itself in increased knowledge, skills and potentials to tackle problems of life. The study of Biology provides body of knowledge for use in addressing various forms of human, material and environmental problems such as climate change, health, pollution, human population growth, food security among others. Many concepts in biology such as ecology, evolution, eco-system, respiration, reproduction and Genetics provide the students with in-depth understanding about organisms' existence on earth.

Genetics a branch of Biology, deals with the transmission and variation of inherited characteristics, in a particular chromosomes and DNA. It examines the origin, structure, function, growth, evolution of a cell or organism's pattern of inheritance from parents to offspring. There had been worldwide recognition of importance of Genetics to human capital development. The importance of Genetics to human capital development and nation building cannot be over emphasized; understanding

generics can help us to identify Genetics disorders, develop new treatment, and even shed light on our ancestry. The knowledge of Genetics is necessary for counseling intending couples on issues of heredity-related diseases, such as, sickle cell anaemia hemophilia, and diabetes before conducting marriages. In recognition of the role of Genetics to national wellbeing, the Nigeria educational system have allocated 10% of WAEC and NECO Examination questions to Genetics to ensure that every student studying Biology is taught Genetics and must be examined in it in both practical and theory Agbo (2015) as such, the understanding of Genetics concepts, became necessary in order to improve students' academic achievement.

Academic achievement has been acknowledged as a very crucial aspect of educational outcome. It is the accomplishment of specific goals that were the focus of activities in an instructional environment. The achievement of students in Biology in public examinations such as Senior School Certification Examination (SSCE) and National Examination Council (NECO) in Nigeria revealed that the overall achievement of candidates in biology did not show any noticeable improvement over those other years.

Despite the importance of Genetics and biology to national development, Genetics has been described as the difficult aspect of Biology to learn. The WAEC chief examiner's report (2013- 2019) and (2021- 2025) pointed out that Genetics questions were avoided by candidates, but the few who attempted them achieved poorly in them. Candidates could not adequately explain the biological terminologies such as; co-dominance, sex-linked characters, genetic engineering, diploid, polygenic test cross, monohybrid cross. autosomal linkage, prokaryotic, eukaryotic, DNA, RNA, agglutination. The inability of the students to comprehend Genetics concepts had led to poor academic achievement in Genetics aspect of Biology over the years. Moreover, reports from (Nnorom & Uchegbu, 2017; Awodun, Adekunle & Femi-Adeoye, 2019 and Ugwu, 2023) revealed that the achievement of students in biology have consistently remained poor. The poor achievement of students in biology according to Ihejiamaizu and Ochai (2016); Cheta and Ochiama (2018); Awodun, Adekunle and Femi-Adeoye (2019); and Ugwu, 2023); has been attributed to different factors which include students' factors, the abstract and difficult nature of biology concepts and the use of teacher-centered method.

The use of teacher-centered method in teaching biology in general and Genetics concepts in particular do not encouraged group participation neither did it facilitate the understanding of difficult Genetics concepts nor foster critical thinking skills among students In this method of teaching, students are passive listeners to the teacher's instruction instead of taking active role in the teaching and learning processes. This implies that the teaching-learning of biology might not fully achieve its objectives without the use of appropriate instructional strategy that will engage the students in meaningful learning. Ozoji (2020) maintained that students learned better and retained information vividly when active and innovative strategies were used in science instruction.

One of the goals of science education with biology inclusive is to produce scientists for national development (FRN, 2014) among others. In view of that, the federal government of Nigeria emphasized the teaching of biology to activity-based to Promote critical thinking skills, creativity and problem-solving skills in secondary school students in the country as contained in (FRN, 2014) to enable the individual study Biology-related courses in the nation's institution of higher learning in order to produce formidable workforce to drive the science and technology sector of the economy. Knowledge of Genetics is crucial and important for building sustainable interactions between nature and human society. Thus, education in Genetics serves both individual and social roles by inculcating knowledge and right types of attitudes for the survival of both the individual and the society at large. The relevance of Genetics to human capital development and its contribution to national well-being is so profound that a good understanding of Genetics concepts among biology students should be given adequate attention.

In an effort to reduce the menace of poor achievement in Genetics in particular and in biology in general, has necessitated the search for innovative student-centered strategy for effective teaching and learning of Genetics concepts which could enhance students' achievement in biology. Therefore,

the recognition that mastery learning strategy (MLS) is one of the leading innovative strategies of teaching that could enhance students' academic achievement in biology (Nnorom & Uchegbu, 2017; Cheta & Ochiama 2018). Mastery learning strategy is an innovative student-centered strategy that engages the student in various instructional methods, learning levels and different cognitive thinking types.

In MLS, instructional strategies and learning time varied, based on the result from each formative assessment. Varieties of learning activities and instructional strategies like individualistic learning, peer tutoring, cooperative learning, concrete mapping, inquire-based learning among others, and innovative learning style. It is a process which requires knowledge to be discovered by student and transformed into concepts which students can relate. In MLS class, additional time is provided for students to study and master the topic at hand before moving ahead to learn other subsequent topics. MLS engage the students in active learning process by varying activities, individualized instruction and creating in the students' critical thinking skills and the potentials to be a problem solver as a result, serve as an antidote to difficult and abstract genetic concepts so that both gender can achieve equally.

Gender issue is an important one in science education especially with increasing emphasis on ways of enhancing the enrolment of females in science and technology fields and manpower for technological development. Gender refers to the roles and characteristics that are socially and culturally developed to be identified with males and females in any given society. Research findings revealed other factors which constitute poor achievement in biology, among which is gender imbalance in Science Technology Engineer and Mathematics (STEM) (Nnorom & Uchegbu, 2017; Ababneh & Samad, 2018). Reasons for such imbalance include early marriage among girls, lack of female opportunity cost of education, poor self-concept inherent, gender stereotyping among student and teachers. The girl's gender is not also committed, active and open-minded like their male counterparts in biology class when topics such as reproduction and sex hormones are taught. Girls are generally shy whenever reproduction terminologies such as penis, virginal, sperm, ovum, different courtship behaviours, menstruation, ovulation and conception are used in the class (Ekineh & Adolphus, 2019). Reproduction is the base of all organism existence. The teaching regards reproduction ought to be given fully without reservation.

Many researchers have investigated the influence of gender on academic achievement, notable among these are Sahin and Abdelsamea, (2015); Afuwapa and Oludipo, (2017) reported that male students achieved better than their female counterparts in sciences and mathematics concepts. This report is in contrast with the reports of Igbudu (2015); Tambaya, Sabitu and Matazu (2016) who reported that female student achieves better than male. However, other studies show that there is no significant difference in the achievement of male and female students in Biology Olatunji and Olusola (2016) Nnorom and Uchegbu (2017); Ezeobi, Obilor and Aluko (2020). Hence studies on gender and students' achievement in biology are conflicting and inconclusive. The use of Mastery learning strategy to teaching and learning of biological concepts might give both male and female students equal opportunity to study and learn through formative evaluation, feedback and remedial lessons that the strategy will provide thus, enhancing student's achievement in Biology.

Purpose of the study

This study was carried out to investigate the effect of mastery learning strategy on senior secondary two students' achievement in Genetics. The study was guided by the following research questions and hypotheses.

Research Questions

1. What are the pre-test and post-test achievement mean scores of SSII students in Genetics the experimental and control groups?
2. What are the prêt-test and post-test achievement mean scores of SSII male and female students in Genetics in the experimental group?

Hypotheses

1. There is no significant difference between the post-test achievement mean scores of SSII students in the experimental and control groups.
2. There is no significant difference between the achievement mean scores of SSII male and female students in the experimental group.

METHODOLOGY

The study employed the non-randomized pre-test, post-test quasi- experimental control group research design. A sample of 57 senior secondary two students from two public schools was taken from the student population of 1,052 using simple random sampling techniques. Researchers' developed instrument namely, Genetics Achievement Formative Test (GAFT) was used to collect data from the students. The instrument was validated by three experts from the University of Jos (two from Biology unit of the Department of Science and Technology Education and one from Research, Measurement and Evaluation unit of the Department of Educational Foundations. The instrument was pilot tested using Kuder Richardson (K-R21) which yielded a coefficient of 0.93. Mastery learning strategy was used to teach the experimental group for eight weeks while the lecture method was used to teach the control group the concepts of Genetics. Data was collected after the teaching periods and analyzed using statistical package for Social Services (SPSS). Mean and standard deviation were used to answer research questions while Analyses of Covariance (ANCOVA) was used to test the two hypotheses at 0.05 level of significance.

RESULTS

Research Question one

What are the pre-test and post-test achievement mean scores of SSII students in Genetics the experimental and control groups? The analysis is presented on Table 1.

Table 1

Pre-test and post-test Achievement Mean Scores of SSII Students in Genetics in the Experimental and Control Groups

Group		Pre-test		Post-test			
	N	Mean	SD	Mean	SD	Mean Gain	$\bar{x}$- difference
Experimental	27	30.00	7.62	65.56	9.96	35.56	25.96
Control	30	33.33	8.70	42.93	12.09	9.6	

Table 1 reveals the pre-test and post-test achievement mean scores of students in the experimental and control groups. In the experimental group the post-test achievement mean score was 65.56 and standard deviation of 9.96, higher than the pre-test mean score of 30.00 and standard deviation of 7.62 with a mean gain of 35.56, indicating that there was improvement in the achievement of students after treatment. For the control group, the mean score was 33.33 and a standard deviation of 8.70 at the pretest. The post-test mean score of students was 42.93 and a standard deviation of 12.09. The findings show that students in the experimental group had a higher mean score (65.56) after treatment using mastery learning strategy than those in the control group (42.93) who were not given treatment with a mean difference of 25.96. This means that at the pre-test the students in both groups had almost same achievement, but after the intervention, the experimental group performed better than the control group.

Research Question Two

What are the prêt-test and post-test achievement mean scores of SSII male and female students in Genetics in the experimental group? The analysis is presented on Table 2.

Table 2
Pre-test and Post-test Achievement Mean Scores of SSII Male and Female Students in Genetics in the Experimental Group

Gender	N	Mean	SD	$\bar{x}$- difference
Male	13	64.77	9.95	
				1.52
Female	14	66.29	10.29	

Table 2 presents the post-test achievement mean score of male and female students in the experimental group. From the result, the post-test achievement mean score of male is 64.77 and a standard deviation of 9.95, while the female have an achievement mean score of 66.29 and a standard deviation of 10.29 with a mean difference of 1.52, indicating that there was an improvement in the achievement mean score of male and female students after treatment with female having a slightly higher achievement mean score than the male after exposure to mastery learning strategy.

Hypothesis One
There is no significant difference between the pre-test and post-test achievement mean scores of SSII students in Genetics in the experimental and control groups. The analysis is presented on Table 3.

Table 3
ANCOVA Results on Difference Between the Pre-test and Post-test Achievement Mean Scores of SSII Students in Genetics in the Experimental and Control Groups.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7356.094[a]	2	3678.047	29.473	.000	.522
Intercept	8495.034	1	8495.034	68.072	.000	.558
Covariate	83.645	1	83.645	.670	.417	.012
Group	7287.452	1	7287.452	58.396	.000	.520
Error	6738.888	54	124.794			
Total	178154.000	57				
Corrected Total	14094.982	56				

a. R Squared = .522 (Adjusted R Squared = .504)

Analysis of Covariance (ANCOVA) was conducted to determine if a significant difference exists in the posttest achievement mean score of students in the experimental and control groups. Table 3 shows that $F(1,54) = 58.40$, $p < 0.05$, since the p-value of 0.000 is less than 0.05 level of significance. The null hypothesis which stated that there is no significant difference between the pre-test and post-test achievement mean scores of SII students in the experimental and control groups was rejected, indicating that there was a significant effect of mastery learning strategy on achievement of students in Genetics . The result further revealed an adjusted R squared value of .504 which means that 50.4 percent of the variation in the dependent variable which is achievement in Genetics was explained by variation in the treatment of mastery learning strategy, while the remaining is due to other factors not included in this study. Hence, it could be said that mastery learning strategy improved students' achievement in Genetics.

Hypothesis Two
There is no significance difference between the pre-test and post-test achievement mean scores of SSII male and female students in Genetics in the experimental group. The analysis is presented on Table 4.

Table 4
ANCOVA Results on Differences Between the Pre-test and Post-test Achievement Mean Scores of SSII Male and Female Students in Genetics in the Experimental Group

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	129.962[a]	2	64.981	.636	.538	.050
Intercept	5172.062	1	5172.062	50.651	.000	.679
Pre-achievement	114.460	1	114.460	1.121	.300	.045
Gender	18.093	1	18.093	.177	.678	.007
Error	2450.705	24	102.113			
Total	118614.000	27				
Corrected Total	2580.667	26				

a. R Squared = .050 (Adjusted R Squared = -.029)

Analysis of Covariance (ANCOVA) was conducted to determine if there is a significant effect of gender on achievement of students taught Genetics using mastery learning strategy. Table 4 shows that the main effect of gender yielded $F(1,24) = .177$, $p < 0.05$, since the p-value of 0.678 is greater than 0.05 level of significance, the null hypothesis was retained, indicating that there was no significant effect of gender on the achievement of students taught Genetics using mastery learning strategy. It implies that mastery learning strategy can help improve achievement in Genetics for both male and female students.

DISCUSSION

The findings of the study revealed that mastery learning strategy (MLS) is more effective in improving the achievement of SSII students in Genetics. The students in the experimental group who were taught using MLS had a significant achievement in Genetics than the students in the control group irrespective of gender. This indicated that the use of MLS provide opportunity for the student to create, relate, manipulate and construct their own learning thereby facilitates the understanding of concepts hence gain insight into the concepts being taught than the students in the control group. This shows that MLS had significant effect on students' achievement in Genetics. This is due to the fact that MLS offered re-teaching, re-testing, corrective feedback, remediation and additional learning time, that encourages the students to correct their learning difficulties and demonstrate high proficiency level before proceeding to the next topic/concept. This is in line with Bloom (1976) who believes that an essential hypothesis in mastery learning method is that if there is suitable opportunity for education and there is enough time, all learners can learn all educational targets and have mastery over them.

The result in table 3 revealed that the achievement mean scores of students in experimental group was higher than that of students in the control group. This means that there was significant difference between the achievements mean scores of the students in the experimental group than that of the control group. Therefore, the null hypothesis was rejected.

The result further confirmed the finding of Nnorom and Uchegbu (2017) who found that MLS was effective in enhancing the achievement of students in biology and also bridge the gap between high and low ability students.

The findings also supports Cheta and Ochiama (2018) who investigated the impact of two leaching approaches, mastery learning and constructivist-based learning approach on senior secondary school students' academic achievement in biology and found that students exposed to mastery learning approach had higher academic achievements in biology than those exposed to constructivist-based learning approach. This result concurs with the report of Iserameiya and Ibeneme (2018) who submitted that students taught BTE using MLS differ significantly in their post-test academic achievement compared to those taught using DIS. The finding agrees with Adeyemo and Babajide (2014), who reported that MLS has positive effect on students' academic achievement.

This finding also agrees with the findings of Hussain and Suleman (2016); Adeniji, Ameen, Dambatta and Orilonise (2018); Mehar and Kanwar (2019). Jack (2020); Ogbonna and Ismaila (2021); Oginnii, Akinola, Fadeji and Amole (2021) which revealed that students taught using mastery learning strategy, achieved higher than the students taught using conventional lecture method in different subjects. The analysis on table 4 result indicated that there was no significant effects of gender on the achievement mean scores of SS2 students in the experimental group. The result further revealed that the achievement mean score of SSII male and female biology students in the experimental group did not differ significantly. The findings coincide with those other researchers Tambaya, Sabitu and Matazu (2016); Ezeobi, Obilor and Aluko (2020); Ozoji (2020); Jack (2020), and Gisoi and Mugwiria (2024) which reported no gender disparities between the achievement of male and female students when active and innovative strategies are used in science instruction. The authors' further maintained that when effective instructional strategies are used in the teaching-learning process it give rooms for both gender to achieve equally. However, the result of this study opposes the reports of Igbudu (2015), Eze (2016), and Ugwu (2023) who revealed that the achievement mean score of female students was higher than that of male students in biology. This reports contrast the of John (2023) which revealed significant achievement mean scores in favour of the male students than their female counterparts in Biology. This then, means that the relevance of science teaching classroom is engaging the students in interactive and innovative activities that will guaranteed critical thinking skills to ensure meaningful learning as such, provision of extra time, testing after teaching, corrective feedback, remediation and re-testing, is key.

CONCLUSION

Based on the findings of the study, the researcher concluded that the use of mastery learning strategy is an effective student-centered strategy that significantly enhanced students' achievement in Genetics irrespective of gender.

The implication of the study

1. It implies that if biology teachers adopt mastery learning strategy in their classroom instruction, it could promote effective participation of all students and remove the phobia of difficult concepts.
2. If biology teacher implement the basic elements of mastery learning strategy such as provision of extra time, testing after teaching, corrective feedback, remediation and re-testing, to help students manage their learning difficulties and learn meaningfully.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made.

1. The government of Nigeria should make the use of mastery learning strategy compulsory especially in the secondary school curriculum.
2. Biology teachers should incorporate mastery learning strategy which provide opportunity for the student to discover ideas in biology classrooms
3. Teachers should be trained on the use of mastery learning strategy to reduce the menace of poor achievement among students.
4. Mastery learning strategy should be use to enhance the achievement of male and female in Genetics and other biological concepts.

REFERENCES

Ababneh, E., & Samad, M., (2018).Gender gap in Science Achievement for students in PISA 2015 Europeaan *journal* of *Educational Research* , 7(4), 963-972.

Adeniji, S.M., Ameen, S.K., Dambatta, B.U. & Orilonise, R. (2018). Effect of mastery learning

approach on senior school students' academic performance and retention in circle geometry. *International Journal of Instruction, 11*(4), 951-962. Retrieved from www.e-iji.net

Adeyemo, S.A. & Babajide, V.F.T. (2014). Effects of mastery learning approach on students' achievement in Physics. *International Journal of Scientific & Engineering Research, 5*(2), 910-920

Afuwape, M.O. & Oludipe, D.I. (2011). Gender difference in integrated science achievement among pre-service teachers in Nigeria. *Educational Research and review, 3*(7),242-245.

Agbo, F.O., (2015). Effect of individualized, collaborative fieldwork and expository learning on Biology students' ability to solve problems. *International Journal of Research in Science, Technology and Mathematics Education, 1*(2), 82-89..

Awodun, A.O., Adekunle, R.F. & Femi-Adeoye, K.O. (2016). Students attitude and interest as correlates of students' academic performance in biology in Senior Secondary School. *International Journal of Innovation Education and research.*4 (3). 200 – 216. Retrieved on 3 Oct., 2018 from http://www.Ijier. Net.

Cheta, W. & Ochiama, A.C. (2018). Mastery learning approach versus Constructivist-Based Learning Approach on senor secondary school students' Academic Achievement in Biology. *International Journal of Quantitative and Qualitative Research Methods 6(1)1-10.*

Ebahi, E.C. (2021). Effects of gender on the academic performance of public school biology students participation in school organized extra- mural classes. *Sapientia foundation Journal of education sciences and gender studies* 3(1), 337-349.

Ekineh, D.R. & Adolphus, T. (2019). Influence of gender on students' performance in biology what taught reproduction using collaborative strategy in secondary schools in River State. *Rivers State University Journal of education* 22(1&2) 62-73.

Eze, I.P. (2016). Effects of two modes f advanced organizers and cognitive style on students' achievement in Christian religion knowledge in secondary schools in Ebonyi State, Nigeria. Unpublished Ph.D thesis, University of Nigeria, Nsukka

Ezeobi, G.O., Obialor, C.O. & Aluko, O.F. (2020). Influence of Gender on Senior Secondary School Students Achievement in Biology in Awka South Local Government Area of Anambra State (OWSDEFIJOSAT)! 1(1). 2020.

Federal Ministry of Education (FME, 2014). *Senior secondary education curriculum Biology for SS1-3. Abuja: Nigerian Educational Research and Development Council* (NERDC).

Hussain, I. & Suleman, Q. (2016). Effects of bloom's mastery learning approach on students' academic achievement in English at secondary level. *Journal of Literature. Languages and Linguistics* 2, 35-43.

Ihejiamaizu, C.C. & Ochai, I.O. (2016). Students' academic performance in Cross River State, Nigeria *British Journal of Education. 4(9), 55 – 63.*

Igbudu, U. (2015). Influence of gender on students' academic achievement in government area of Edo State, Nigeria. *Journal of Educational and Social Research*. MCSER Rome-Italy 5 (2), 101-105.

Iserameiya, F.E. & Ibeneme, O.T. (2018). Effect of mastery learning strategy on junior secondary school students' academic achievement in basic technology in Edo State, Nigeria. *International Journal of New Technology and Research* (IJNTR) 4(3), 95-101.

Jack, G.U. (2020). Effects of mastery learning instructional strategy on secondary school students' achievement and retention of Chemistry concepts Jalingo .*Journal of Education in Developing Areas,* 27(2),

Matawal, D.B. (2013). Effects of scaffolding instructional method. *International journal of Research in Science, Technology and Mathematics Education 1 (2)117-125*.

Mehar, R. & Kanwar, S. (2019). Effect of online mastery learning strategy on achievement in English in relation to cognitive ability. Aligarh, New Delhi International *Journal of Science and Technology Research,* 8(08), 1-9

Nnorom, N.R. & Uchegbu, J.C. (2017). Effect of mastery learning approach on senior secondary school students' achievement in Biology in Imo. *African Journal of Education, Science and Technology.* 3 (3), 100-105.

Ogbonna, G.N. & Ismaila, S. (2021). Effects of mastery learning strategy on academic achievement and interest of metalwork technology students in universities in South East Nigeria. *Journal of 'CUDIMAC (J-CUDIMAC)* 9 (1)2651-6063'.

Oginni, O.I., Akinola, A.S., Fadiji, A.E. & Amole, P.A. (2021). Effects of mastery learning strategy on secondary school students performance in mathematics. *European Journal of Education and Pedagogy* www.ej-edu.org (V2)5.

Olatunji, O.P. & Olusola, A.R. (2016). Students' attitude and gender as correlates of students' academic performance in biology in senior secondary schools Ikere. 3(3), 2349-5138 Retrieved from http://ijrar.com/

Ozoji, B.E.(2020). Effects of concept mapping techniques on Nigerian junior secondary school students' congnitive development and achievement in basic science and technology (Integrated science). In T.W. Teo, A. Tang & Y.S. Ong. (Eds.), Science education in the 21st Century: *researching issues that matter from different lenses* (pp.95-111). Singapore: Springer Nature.

Ugwu, C.B.A. (2023). Enhancing Students' Interest and Achievement in Senior Secondary School Biology Through Field Trip Teaching Approach in Nsuka Local Government Area. *Sapietia Foundation Journal of Education, Sciences and Gender Studies (SFJESGS)*, 1(4), 2522-273.