Unizik Journal of
STM Education Volume 8 Issue 2
(Maiden Conference Edition) ISSN: 1597 - 8249

STUDENT'S SELF-REGULATORY SKILLS AS CORRELATE OF THEIR ACADEMIC ACHIEVEMENT IN BIOLOGY IN PUBLIC SECONDARY SCHOOLS IN ANAMBRA STATE

Prof. Nnorom Nneka Rita [1] Okafor, Chinyere F (Ph. D)[2] Nnalue, Obioma Henrieta[3]
nr.nnorom@coou.edu.ng[1] cf.okafor@coou.edu.ng[2] oh.nnalue@coou.edu.ng [3]
[1,2&3] Department Of Science Education Chukwuemeka Odumegwu Ojukwu University Igbariam

*Corresponding author: oh.nnalue@coou.edu.ng

Abstract

Students need for self-regulatory skills for academic success, personal growth and future career has been underscored. Various studies focus on different aspect of self-regulation but the applicability, implementation and nexus with self-efficacy and motivation, as integral skills for success in biology remain pertinent. Therefore, the study examined self-regulatory skills (self – efficacy and motivation) as correlate of students' academic achievement in Biology in public secondary schools in Anambra State. Two research questions and Two Hypotheses tested at 0.05 level of significance guided the study. Correlational research design was adopted for the study. The population of the study comprise 8,019 SS2 students drawn from 94 Public secondary schools in Awka and Otuocha education zone in Anambra State Post Primary school service commission Awka. A total of 637 SS2 Biology students formed the respondents for the study and were drawn using simple random sampling technique. Students' self-regulatory skills scale (SSRSS) and Student's Biology Interest Scale (SBIS) validated at a reliability coefficient of 0.86 and 0.79 respectively served as instruments. Cronbach Alpha was used to test for the consistency of the reliability of the instruments. Pearson's Product Moment correlation coefficient was used to answer the research questions. t-Test correlation was used to test hypotheses 1 and 2. The findings of the study revealed that there was low positive correlation between self – efficacy skill on academic achievement. There was low positive correlation between motivation skill on academic achievement. The relationships were not statistically significant. Students should practice self-reflection to identify their area of strength and weakness in biology subject to promote self-regulatory skills. The study recommended among others that teachers should incorporate activities that promote self-efficacy and problem -solving skills such as setting achievable goals and providing feedback. Students should inculcate the mindset of achieving a set goal for learning biological concepts in order to boost their interests and achievement.

Keywords: Academic Achievement, Biology, Science Education, Students' Self-Regulatory Skills

Introduction

Science education plays crucial roles towards economic development, scientific and technological advancement of the society. It also stimulates the curiosity that drives students to gain a better understanding of how things function around them. Samuel and Ukpoh (2021) noted science education is an instrument for producing resources necessary for socio-

economic, scientific and technological development needed for advancement of any nation. At secondary education, one of the science-related subjects offered to equip students with scientific skills and knowledge is Biology.

Biology is one of the science subjects in secondary school which deals with the scientific study of life or living things. According to Mahmud et al (2022:197) "Biology as a science of life is concerned with the characteristics of living things, their forms, functions and relationship with one another and with their environment among others". Biology is the organized and logical study of interaction of living things in their environment. Similarly, Onu et al (2020) defined biology as a natural science which studies the existence (evolution, morphology and physiology) of living things as well as their interactions with non-living components of the earth. Biology is a science subject taught at the senior secondary school level to equip students with fundamental knowledge for further studies of science related courses in tertiary institutions of learning. To buttress this, Ejeh, et al (2021) noted that Biology is a very important science subject and a requirement for higher learning in a number of science- related professional courses like Medicine, Agriculture, and Pharmacy among others. Operationally, Biology is one of the science subjects which deal with scientific study of living organisms and the interaction with their environment. Biology concepts should be taught effectively in the classroom for a maximize learning outcome from the students. Thus, students' academic achievement is a viable instrument to be used to assess the progress of an effective teaching of biology in secondary schools.

Academic achievement is the learning outcomes of students exposed to tests and examinations. Uchechukwu and Okigbo (2022) defined academic achievement as the level of understanding and knowledge of the students which is commonly measured by continuous assessment, tests and examinations. Academic achievement is the learning outcomes which indicate retention level, knowledge, ideas and skills acquired in learning institution which is usually assessed through their grades or scores in continuous assessment and examination. Kenni (2020) defined academic achievement as the learning outcome which is generally used to determine how well an individual is able to assimilate, retain, recall and communicate his knowledge of what has been learnt. Kenni (2020) added that it is results which show the ability to express what has been learnt in a written, oral or practical form. It is grade obtained by students exposed to learning experience, continuous assessment and examinations. For Mishra and Sharma (2021) academic achievement means the knowledge gained and skills developed by students which is usually evaluated by standardized tests and expressed in grades based on

their performance in examinations. Contextually, academic achievement is the results attained by learners through application of knowledge and skills in tests and examinations.

The academic achievement of senior secondary school students in Biology is not poor but below expectations. Nwuba et al (2022) noted that the academic achievement of students in Biology in external examinations over the years has remained unsatisfactory and inconsistent as seen in the statistic report of WAEC from 2019-2023. The authors added that in 2019, for aggregate of A1-C6, a percentage pass of 57.42 was recorded, 61.68% in 2020, 55.57% in 2021, 55.10% in 2022 and 55.63% in 2023 showing that students' performance in the subject over the years has remained slightly above average. Similarly, Tambaya et al (2023) noted that the yearly report of WAEC chief examiner in 2020, 2021, 2022 and 2023 consistently showed that the number of students that obtained grades between A1 to C6 in Biology were slightly below 60%. Also, Osuafor and Chukwuemeka (2023) noted that information from Post Primary Schools Service Commission, Anambra State showed that the academic achievement of students in biology in WAEC in the state from 2020 to 2023 revealed that only 47% passed the subject in 2020, 48% in 2021, 49% in 2022 and 49.2% in 2023. Statistics from West African Examination Council (WAEC, 2023) revealed that academic achievement in biology was below average as 52.7% of students failed to obtain grades at least credit level in the subject. (Chief Examiner's Report, 2023). This implies that students' academic achievement in Biology is consistently below expectations. Thus, it is pertinent that self- regulatory skills such as self-efficacy and motivation skills be emphasized for effective knowledge of biological concepts.

The students' acquisition of requisite skills and knowledge for the scientific and technological advancement rests heavily on the self-regulatory skills. There are several components of self-regulatory skills for motivating and controlling the behaviour of learners in the classroom. Etiubon et al (2022) noted that a wide range of self-regulatory skills such as self-efficacy and motivational competencies is required by students to achieve the goals of lesson objectives in biology. Opara and Eze-Odurukwe (2011) listed the components of students' self-regulatory skills to include: motivational skill, metacognitive skill, problem-solving skill, self-efficacy skill, volition control skill and decision-making skill. The interest of this study is on self-efficacy skill, and motivational skill, which are core competencies for learning Biology.

Self-efficacy is the belief of one's ability to effectively perform professional tasks. According to Ahmed,et al (2021:59) "Self-efficacy is the set of belief that student's' hold

regarding their abilities and competencies to learn and influence their learning outcome regardless of outside influence or obstacle". It is not only the actual abilities of someone to perform certain tasks but also to their self-perception of being able to perform certain tasks under given conditions. Self-efficacy skill is the belief in one's capabilities to initiate and successfully perform a task. According to Okoro,et al (2022:162) "Self-efficacy is the personal belief of possessing the ability to perform professional tasks with mastery". The way that students feel and get motivated to act is influenced by their self-efficiency skills. Students with high self-efficacy have the capacity to persist in the face of obstacles, accept more challenging learning tasks and exhibit flexibility in the classroom Nnalue obioma Henrietta. To buttress this, Oviawe1 and Omoh (2021) noted that students with high self-efficacy skill often take on more efforts, persist in the face of difficulty, and use strategies to make learning meaningful, while students with low self-efficacy skill easily give up when they encounter obstacles and are more frustrated in learning or classroom activities. On the contrary, students who possess low self-efficacy tend to exhibit poor confidence and make little efforts to improve in their learning tasks in the classroom. Students who possess low self-efficacy may also find it difficult to be motivated.

Motivation is anything or force that induces, energizes and directs individuals to make substantial efforts towards achieving set goals. Achufusi and Utaka (2021) noted that motivation is an inner drive that directs a student's behaviour towards the fulfillment of a goal. Motivation stimulates students to participate and successfully complete classroom activities. Saleem,et al (2022) noted that students need motivation, direction, guidance, and counselling to change their behaviour towards their studies. Motivation arouses the interest of students and encourages active involvement in the process of teaching and learning biology in the classroom. Olufunmilayo (2020) asserted that students can be motivated through praise, incentives; counselling and reward of gift items among others. Motivational skill is the ability of one's interest or behaviour to be aroused toward active participation in classroom activities. Ability of the student to be motivated intrinsically would boost their interest in biology concepts and also improve their academic achievement.

The academic achievement of students in Biology over the years in public secondary schools in Anambra State is not poor but below expectations of educational stakeholders, thus it can be referred to as unsatisfactory. The unsatisfactory academic achievement in Biology could be as a result of some psychological variables as shown by other researchers in the literature. These variables include self-regulatory skills which is needed to encourage

motivation and participation of students in classroom activities. The self-regulatory skills of some Biology students in public secondary schools in Anambra State is in serious doubt as they tend to exhibit feeling of inadequacy, self-doubt in their opinions, low expectations and difficulty in trusting own-judgment. The failure of the students to apply self-regulatory skills to exercise control over teaching activities may also contribute below the average academic achievement among Biology students in public secondary schools in Anambra State.

There is also a noticeable poor interest in biology among some students in senior secondary schools in Anambra State, Nigeria. The poor interest appears to be reflected in the drastic reduction in class attendance among some students in secondary schools in the State. Some students who fail to regularly attend Biology lesson probably end up performing below average in public secondary schools in Anambra State. It is on the basis of the problem that the researcher intends to investigate students' self-regulatory skills as correlates of students' academic achievement and interest in Biology in public secondary schools in Anambra State

Purpose of the study

The main purpose of this study is to examine self-regulatory skills as correlate of students' interest and academic achievement in Biology in public secondary schools in Anambra State. Specifically, the study seeks to find out:

1. students' self-efficacy skill as correlates of students' academic achievement in Biology in public secondary schools in Anambra State.
2. students' motivation skill as correlates of students' academic achievement in Biology in public secondary schools in Anambra State.

Research Questions

The following research questions guided the study:

1. What is the relationship between students' self-efficacy skill and students' academic achievement in Biology in public secondary schools in Anambra State?
2. What is the relationship between student motivation skill and students' academic achievement in Biology in public secondary schools in Anambra State?

Hypotheses

The following hypotheses were tested at 0.05 level of significance:

1. There is no significant relationship between students' self-efficacy skill and students' academic achievement in Biology in public secondary schools in Anambra State.
2. There is no significant relationship between students' motivation skill and students' academic achievement in Biology in public secondary schools in Anambra State.

Methods

Correlational research design was adopted for this study. The study was carried out in Anambra State. Specifically, Awka Education and Otuocha Education Zone. The choice of Awka and Otuocha Educatinal Zone is borne out of the fact that there are cases of average academic achievement of students probably due to the rural and urban disparity in learning and failure of students to apply requisite self-regulatory skills. The population of the study comprise 8,019 SS 2 in the 54 public secondary schools in Anambra State. Simple random sampling was used to draw 637 SS2 biology students from the two education zones.

Structured instruments titled ‘‘Students’ Self-Regulatory Skills Scale (SSRSS)’’ was used for data collection. The instruments were developed by the researcher based on insight gained from literature and consultation with experts. SSRSS measures the regulatory skills of biology students. SSRSS has Clusters I, II, which were based on the components of students’ self-regulatory skills. Cluster I contain 10 items on students’ self-efficacy skill, Cluster II has 10 items on students’ motivational skill, SSRS therefore contained 20 items structured on a four-point rating of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) weighted 4, 3, 2 and 1 respectively. The achievement scores were obtained from biology students’ grade book for 2023/2024 academic session from the sampled schools. The average scores from the students’ grades book were used as the achievement test. The results specified students’ achievement and was confirmed and validated by experts from the zones. The instruments were administered by the researcher with the help of five research assistants who are secondary school biology students in Anambra State. Cronbach alpha coefficients was used to establish reliability coefficient, SSRSS was found to be 0.80. Pearson Product Moment Correlation was used to data analysis.

Results

Research Question 1: What is the relationship between students’ self-efficacy skill and students’ academic achievement in Biology in public secondary schools in Anambra State?

1: Pearson correlation coefficient (r) on students’ self- efficacy skills and students’ academic achievement in Biology.

Model	N	R	R^2	Adjusted R^2	Std. Error	Decision
Self - Efficacy Skill Achievement	637	0.002	0.000	-0.0023	0.71674	Low Positive relationship

Table 1 reveals correlation coefficients(r) of **0.002** on students' self- efficacy skill on students' academic achievement. This implies that the relationship between students' self-efficacy skill and students' academic achievement in biology is low and positive.

Research Question 2: What is the relationship between students' motivation skill and students' academic achievement in Biology in public secondary schools in Anambra State?

Table 2: Pearson correlation coefficient (r) on students' motivation skills and students' academic achievement in Biology.

Model	N	R	R^2	Adjusted R^2	Std. Error	Decision
Motivation Skill Achievement	637	0 .020	0.000	-0.0013	0.71048	Low Positive relationship

Table 2 reveals correlation coefficients(r) of **0.020** on students' motivation skill on students' academic achievement. This implies that the relationship between students' motivation skill and students' academic achievement in biology is low and positive.

Hypothesis 1: There is no significant relationship between students' self-efficacy skill and students' academic achievement in Biology in public secondary schools in Anambra State

Table 3: Test of Significance of Correlation between students' self-efficacy skill and students' academic achievement in Biology

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	0.042	1	0.042	0.000	0.995[b]
	Residual	599134.099	635	943.518		
	Total	599134.141	636			

A. Dependent Variable: Achievement

B. Predictors: (Constant), Self-Efficacy Skill

Table 3 shows that students' self- efficacy skill has no significant relationship with the students' academic achievement scores in biology F (1,635) = 0.00, P (0.995)> 0.05. The null hypothesis is not rejected meaning that self - efficacy skill has no significant relationship with students' academic achievement in Biology in public secondary schools in Anambra State.

Hypothesis 2: There is no significant relationship between students' motivation skill and students' academic achievement in Biology in public secondary schools in Anambra State.

Table 4: Test of Significance of Correlation between students' motivation skill and students' achievement in Biology

Model		Sum of Squares	Df	Mean Square	F	Sig.	Decision
1	Regression	244.279	1	244.279	0.259	0.611[b]	Not. Sig
	Residual	598889.863	635	943.134			
	Total	599134.141	636				

a. Dependent Variable: ACHIEVEMENT

b. Predictors: (Constant), MOTIVATIONSKILLS

Table 4 shows that students' motivation skill has no significant relationship with the students' academic achievement scores in biology F (1,635) = 0.259, P (0.611)> 0.05. The null hypothesis is not rejected meaning that motivation skill has no significant relationship with students' achievement in Biology in public secondary schools in Anambra State.

There is a low positive correlation existing between students' self- efficacy skills and students' and academic achievement in biology in Anambra State. There is a low positive correlation existing between students' motivation skills and students' achievement in biology in Anambra State.

Discussion

The findings of the study in table 1 showed a low positive correlation between students' self – efficacy skills and academic achievement in Biology but the relationship was not statistically significant. The study indicates that students' self-efficacy skill could predict students' academic achievement in biology but not with a strong effect. Students that have self -efficacy might likely perform higher than others that don't have but with a slight tendency. This disagrees with the common findings from other scholars who revealed that self-efficacy has a strong positive relationship with students' academic achievement (Akram and Ghazanfer, 2014, Akomolafe and Ogunmakin, 2013) but agrees with the study of Achufusi and Utaka (2021) who revealed a low correlation between self -efficacy and academic achievement. The findings of this study could be as a result of the students 'learning environment in the state. Thus, self-efficacy has a slight tendency to influence students' academic achievement in biology.

The findings of the study in table 2 showed a low positive correlation between students' motivation skill and academic achievement in Biology but the relationship was not statistically significant. It is a known fact that motivation improves cognitive processing and influences the processing of information by encouraging students to pay attention and comprehend the material rather than being passive in the classroom. Highly motivated learners

are likely to perform higher in their learning endeavours. Motivation can lead to a higher achievement in biology. From the findings, the relationship is positive which indicates that motivation is needed for an effective learning outcome in biology though it is low which implies that motivation alone is not enough skill to boost academic achievement but rather other academic skills might be employed for a good learning outcome. The study agrees with Udeh-Aloysuis (2024), that revealed that motivation has a positive but weak correlation with academic achievement. Jhoselle (2020) also revealed a no significant relationship between motivation and achievement. In disagreement, Chow and Seng-Yong (2013), revealed a significant positive relationship between motivation and science achievement.

Conclusion

From the findings of the study, it was concluded that students' self -regulatory skills (self- efficacy and motivation skill) are positively related to students' interest and academic achievement though is measured to be very weak. Students that have self-regulatory skills (self-efficacy and motivation skills) tend to perform better academically. Thus, there is a very slight relationship between students' self -regulatory skills (self- efficacy and motivation) and students' interest and academic achievement in biology in Anambra State.

Educational Implications of the Study.

The study is aimed at finding the correlation between self-regulatory skills (self-efficacy and motivation skill) as corelate of students' academic achievement of secondary school students in biology. Based on the findings, the weak positive correlation between self-regulatory skills (self- efficacy and motivation skill) and academic achievements suggests that these skills can improve academic achievement of the students in biology. This implies that these skills should be encouraged as strategies to enhance them and implemented to help students improve in their learning outcomes in Biology.

The findings of the study revealed that there are no significant relationships between students' self-regulatory skills (self- efficacy and motivation skill) and their achievement in biology. This indicates that the dynamics of self-regulatory skills and interests may not be only determinant to predict a good learning outcome. Thus, a holistic approach should be adopted to address the unique needs of students in developing self-regulatory (self- efficacy and motivation, skill) related to their academic achievements.

Finally, it is pertinent to understand that self -regulatory skills (self- efficacy and motivational skill) can improve academic achievement, as such neglecting these skills will have a lasting effect in the educational system in Nigeria making it impossible to achieve the

objectives of biology curriculum. Hence, an intervention programs and teaching methodologies that could be used to build or develop these skills should be adopted and implemented in homes and schools respectively.

Recommendations

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

1. Teachers should incorporate activities that promote self-efficacy such as setting achievable goals and providing feedback.
2. Teachers should teach metacognitive strategies such as monitoring and evaluating the students for deeper understanding of biological concepts.
3. Teachers should introduce activities that promote self-efficacy and motivational skills in students such as experimentation strategies which provide temporary support to students.
4. Students should inculcate the mindset of achieving a set goal for learning biological concepts in order to boost their interests.
5. Students should practice self-reflection to identify their area of strength and weakness in biology subject.

References

Ahmed, M. A., Lawal, A. A., & Ahmed, R. A. (2021). Influence of students' self-efficacy on secondary school students' self-efficacy in biology in Ogbomoso, Nigeria. *Jurnal Pendidikan Biologi Indonesia, 8*(1), 58-64.

Chukwuma, M.O., & Abba, D.N. (2020). Effective teaching and learning of biology at senior secondary school and crises on its curriculum. *STEM Journal of Anambra State*, 3(1), 65-79.

Durowoju, E.O., & Onuka, A.O.U. (2021). Teacher self-efficacy enhancement and school location: Implication for students' achievement in economics in senior secondary school in Ibadan, Oyo State, Nigeria. *Journal of Education and Practice*, 6(11), 109-115.

Duru, D.C., & Okeke, S.O.C. (2021). Self-regulatory skill as a predictor of mathematics achievement: A focus on ability levels. *Malikussaleh Journal of Mathematics Learning*, 4(2), 86-89.

Ejeh, G.U., Adejoh, M.J., Ochu, A.N.O., & Egbe-Okpenge, E.G. (2021). Effects of field trip and discovery methods on senior secondary school students' retention in Biology in Benue State, Nigeria. *Village Math Educational Review, 2*(1), 54-77.

Ekpenyong, B.E., Adediran, V.O., & Adeyemi, B.A. (2019). Influence of self-regulation and social competence on academic achievement of lower primary school pupils in Osun State, Nigeria. *Research Journal of Education*, 5(8), 143-150.

Etiubon, R.U., Etiubon, A.H., & Okon, I.K (2022) carried out a study on teacher self-regulatory skills and science students' practical achievement on rate of chemical reaction in senior secondary school, Uyo, Nigeria. *European Journal of Education and Pedagogy, 3*(3), 233-241.

Gunjita, J. (2018). Factors affecting the academic achievement: A study of elementary school students of District Nainital, Uttarakhand, India. *International Journal of Advanced Educational Research*, 3(2), 531-534.

Ifejika, P.I., Umewereaku, C.M., & Obi, C.H. (2021). Effect of continuous assessment scores onacademic achievement of National Certificate in Education (NCE) biology: Implications for school administration. *Journal of Educational Research and Development*, 4(2), 287-313.

Khaled, A., Riyad, T., & Omar, J. (2017). Relationship between self-regulatory skills and academic achievement for a sample of community college students at King Saudi *University. Education Journal*, 6(1), 28-37.

Khurram, S., & Sajida, N. (2017). Impact of teacher self-efficacy on secondary school students' academic achievement. *Journal of Education and Educational Development*, 4(1), 11-23.

Mahmud, A., Muhammad, I., & Ibrahim, S. (2022). Impact of field trip on the retention and academic performance in ecology, among secondary school students in Zaria Local Government Area, Kaduna State. *Communication in Physical Sciences, 8*(2), 196-204.

Nasiru, I. (2021). Influence of teachers' self-efficacy on academic performance of senior secondary school students in Jigawa State, Nigeria. Kano. *Journal of Educational Psychology*, 3(1), 19-25.

Nnorom, S.U., Ezenwagu, S., & Nwankwo, B.C. (2020). Home environmental factors influence on academic performance of secondary school students in Owerri Zone II, Imo State, Nigeria. *Asian Journal of Advances in Research*, 3(4), 34-41.

Nwuba, I.S., Egwu, S.O., & Osuafor, A.M. (2022). Enhancing academic achievement of secondary school students in biology using mnemonic integrated instruction. *Journal Plus Education, 30*(1), 254-265.

Oghenevwede, O.E. (2019). Enhancing biology students' academic achievement and attitude through self-regulated learning strategy in senior secondary schools in Delta Central Senatorial District. *Journal of Educational and Social Research*, 9(4), 149-156.

Okoro, A.U., Nwagbo, C.R., Ugwuanyi, C.S., & Ugwu, B.E. (2022). Evaluating the impact of teachers' self-efficacy on students' academic achievement in biology In Enugu State, Nigeria. Webology, 19(3), 162-176.

Onu, W.O., Anyaegbunam , N.J. & Uzoigwe, A.U. (2020). Improving biology students' interest and achievement through collaborative instructional strategy. *British Journal of Education Society and Behavioural Science, 33*(2), 9-20.

Opara, M.F., & Eze-Odurukwe, I.P. (2011). Students' self-regulatory skills as correlates of students' achievement in Integrated Science. *Journal of the Science Students' Association of Nigeria, 46*(1), 113-124.

Olufunmilayo, D.C. (2020). Teacher's motivation techniques as determinants of students' academic performance in English Language in selected government secondary schools in Oyo State. *International Journal of Secondary Education, 8*(2), 36-46.

Osuafor, A., & Chukwuemeka, C.V. (2023). Parental socio-economic status as a predictor of secondary school students' academic achievement in biology in Anambra State. *Unizik Journal of Educational Research and Policy Studies, 15*(1), 155-162.

Oviawe, J.I., & Omoh, D. (2021). Technical students' self-efficacy and qualifications as correlate on students' academic performance in basic technology. *Jurnal Pendidikan Teknologi dan Kejuruan, 27*(2), 91-101.

Saleem, A., Shah, M.A. & Hussain, M. (2022). Effectiveness of motivational techniques as perceived by secondary school students and students. *Pakistan Social Sciences Review, 6*(2), 891-903.

Tambaya, I.S., Isah, S.A., & Onize, G. (2023). Effects of differentiated instruction on academic achievement in Biology among public senior secondary school students in Dutsin-Ma, Katsina State, Nigeria. *Afropolitan Journals, 10*(1), 212-221.