JOURNAL OF SCIENCE EDUCATION AND RESEARCH

(JSER), 8 (3); 2026

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ISSN Online: 3092-9253

Published in May, 2026.

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Printed in Nigeria in the year 2026 by:
Love Isaac Consultancy Services (Publication Unit)
No 1 Etolue Street, Ifite Awka, Anambra State, Nigeria
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EDITORIAL

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

Prof. Patrick C. Igbojinwaekwu
Editor-in-Chief

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PREDICTIVE POWERS OF SELF-EFFICACY AND GOAL-SETTING SKILLS ON STUDENTS'ACADEMIC ACHIEVEMENT IN ANAMBRA STATE.

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Abstract

The study investigated the predictive powers of goal-setting skill and self-efficacy skill on students' academic achievement in Biology in Anambra State. Two research questions guided the study, and two null hypotheses were tested at the 0.05 level of significance. A predictive correlational research design was adopted for the study. The population comprised 23,709 Senior Secondary II students offering Biology in public secondary schools in Anambra State. A sample of 393 students was selected using a multi-stage sampling procedure. The instrument used for data collection was the Self-Regulatory Learning Skill Questionnaire (SRLSQ), adapted from Broadbent, Panadero and Fuller (2023). Students' achievement scores in Biology were obtained from teachers' cumulative assessment booklets using a proforma. The SRLSQ was validated by three experts, comprising two from Science Education and one from Measurement and Evaluation, all from Nnamdi Azikiwe University, Awka. The reliability of the SRLSQ was established using Cronbach's Alpha, yielding a coefficient of 0.707. Data were analysed using simple linear regression. The findings revealed that goal-setting skill had a low positive predictive value and was not a significant predictor of students' academic achievement in Biology. The study further established that self-efficacy skill significantly predicted students' academic achievement in Biology. Based on the findings, it was concluded that goal-setting skill and self-efficacy skill have predictive relationships with students' academic achievement in Biology in Anambra State. It was recommended that Biology teachers should deliberately incorporate self-regulatory learning practices into classroom instruction by helping students set realistic academic goals and develop confidence in their ability to accomplish Biology learning tasks.

Keywords: Goal-setting skill, Self-efficacy skill, Self-regulatory learning skills, Academic achievement

Introduction

Science plays a central role in human development and societal advancement. It provides the foundation for technological innovations and contributes to progress in areas such as medicine, agriculture, engineering, and commerce. Otuaka and Uzondu (2019) and Ezeudu (2019) affirmed that science is no longer a specialized pursuit but a central force in daily living, influencing human survival and quality of life. Science education therefore has an important role in developing learners' critical thinking, problem-solving, inquiry, and scientific reasoning skills. Science Education refers to the process of teaching and learning science with the goal of promoting scientific literacy and understanding among students (National Research council, 2021). It also encompasses the development of critical thinking, problem-solving and inquiry skills (Hodson, 2023).

Biology is an important component of science education because it provides learners with knowledge about living organisms, their structures, functions, interactions, and relationships with the environment. Biology is the study of life and its processes, extending from the molecular level to complex ecosystems (Michael, 2019; Okoye, 2019). Chukwuma and Abba (2020) noted that Biology is not only concerned with understanding life but also with applying such understanding to address pressing human needs in agriculture, medicine, and industry. Adeyoyin (2019) viewed Biology as the science of life that studies living matter, structure, function and behaviours of organisms and is also concerned with the evolution, distribution and taxonomy of life. Thus, effective learning of Biology at the secondary school level is important because it provides students with foundational knowledge of biological systems and supports

their understanding of human physiology, ecological balance, health, and other areas of life.

One important indicator of effective learning is academic achievement. Academic achievement is defined as the extent to which learners meet curriculum objectives and remains an important measure of educational success (Efedayemi, 2019). It is commonly assessed through tests, grades, and examinations, which reflect the knowledge and skills acquired by learners. Christian-Ike and Okoli (2021) described academic achievement as the extent to which a student, teacher or institution has attained short- or long-term educational goals. Eze-Odurukwe (2017) asserted that tests are designed to determine students' level of accomplishment in a specified subject area. Academic achievement in this study therefore refers to students' measured learning outcomes in Biology as demonstrated through their performance on an achievement test.

Despite the importance of Biology, students' academic achievement in the subject has remained a concern. Successive West African Examinations Council (WAEC) Chief Examiners' reports from 2021–2025 highlighted weaknesses in students' performance in Biology. As extracted and summarized by the Anambra State Ministry of Education, between 2021 and 2025, out of 56,342, 58,236, 61,178, 63,204 and 64,101 students who registered and sat for Biology in the West African Examination Council in the State, only 22,465, 26,204, 24,703, 28,102 and 28,604 respectively, representing 39.9%, 45.0%, 40.4%, 44.4% and 44.7%, scored between credit grade and above. Conversely, 33,877, 32,032, 36,475, 35,102 and 35,497 students, representing 60.1%, 55.0%, 59.7%, 55.5% and 55.4%, obtained below 50% in Biology. The reports

consistently reveal weaknesses in conceptual understanding, poor application of knowledge, and inadequate performance in practical components. Previous studies have largely focused on curriculum reforms, teaching methods, and instructional innovations to improve Biology achievement. Although these efforts have contributed to some improvements, overall performance remains unsatisfactory. This suggests that greater attention may need to be directed toward learner-related factors, particularly students' ability to regulate their own learning.

Several factors have been associated with students' unsatisfactory academic performance in Biology. These include teaching methods and teaching resources (Swe and Khine, 2020), students' attitudes and emotional engagement (Khan and Zeb, 2023), as well as lack of self-confidence, academic stress and self-concept (Brata, Susanto and Zubaidah, 2025). Mbaegbu, Awosika, Akachukwu, and Ikusika (2020) also reported that students' inability to demonstrate self-confidence and employ innovative strategies to enhance classroom learning contributes to their low achievement in Biology in secondary schools in Anambra State. These findings indicate that, beyond instructional and curriculum-related factors, learner-related characteristics may be important in explaining variations in students' academic achievement in Biology.

One learner-related framework that provides a basis for understanding students' learning behaviours is self-regulatory learning. Self-regulatory learning skills refer to the active processes through which learners take deliberate responsibility for directing and managing their learning. These processes include establishing learning objectives, selecting and applying strategies, regulating motivation and behaviour, monitoring progress and evaluating outcomes. Olumorin, Onojah and Onojah (2022) defined Self-

regulatory learning skill as a method of learning in which a student sets specific academic goals, actively controls and manages their own learning processes, and evaluates their own performance against established standard. Self-regulatory learning is therefore an active process through which learners monitor, regulate, and control their cognition, motivation, and behaviours in pursuit of personal learning goals.

The construct of self-regulated learning is broad and multidimensional, encompassing metacognitive, motivational, and behavioural processes through which learners actively regulate their learning. Broadbent, Panadero and Fuller (2023) noted that Self-Regulatory Learning comprised both motivational beliefs and learning strategies for learning online. They identified dimensions including self-efficacy, motivation, planning and time management, metacognition, effort regulation, and task strategies among others. Uesaka, Suzuki, and Ichikawa (2022), drawing on Zimmerman's conceptualization, identified learning processes such as goal-setting, planning, learning-strategy use, self-reinforcement, self-recording, and self-instruction as important aspects of self-regulated learning. In the present study, goal-setting and self-efficacy are examined as two learner-related dimensions of self-regulatory learning in relation to students' academic achievement in Biology.

Goal-setting skill refers to students' capacity to formulate clear, specific, realistic, and measurable academic objectives and to deliberately regulate their thoughts, behaviours, and strategies toward attaining those objectives. Goal-setting constitutes the forethought phase, during which learners analyse tasks, set performance standards, anticipate challenges, and strategically plan for successful outcomes (Panadero, 2017; Zimmerman and Moylan, 2017). Goal-setting therefore provides direction for self-

regulated learning by enabling students to identify what they intend to accomplish and organise their learning behaviour around specific targets. A student who establishes an academic goal can determine the concepts to be mastered, the amount of effort required, and the expected level of performance. For the purpose of this study, goal-setting skill refers to students' ability to establish clear and attainable Biology learning objectives, determine appropriate steps towards achieving those objectives, and regulate their learning activities in accordance with the goals established.

Self-efficacy is another important dimension of self-regulatory learning that may be associated with students' academic achievement. Self-efficacy concerns students' beliefs about their capability to organise and perform the actions necessary to accomplish particular tasks. Formella and Ugwuanyi (2024) describe self-efficacy as an individuals' personal assessment of their competence to organize and execute necessary courses of action to handle life challenges and maintain functional resilience. Self-efficacy is therefore an internal evaluation rather than an objective measure of skill and centres on an individual's belief about how capable they feel when facing a task. In an academic context, self-efficacy skill refers to students' belief in their capability to successfully organise and execute the actions required to accomplish specific academic tasks and attain desired learning outcomes.

Students' self-efficacy beliefs can influence their willingness to attempt difficult tasks, persistence when difficulties occur, and the amount of effort invested in learning. Students who perceive themselves as capable of successfully performing academic tasks may be more willing to engage with challenging learning activities and persist when difficulties arise. Consequently, self-efficacy provides a plausible link between

self-regulation and academic achievement. In Biology, where students are expected to understand abstract concepts, apply biological principles, and demonstrate practical knowledge, students' beliefs about their capacity to perform learning tasks may be particularly relevant to their academic outcomes.

The relationship between goal-setting, self-efficacy and academic achievement can be understood within the broader framework of self-regulatory learning. Goal-setting provides learners with direction by specifying the academic outcomes they intend to attain, while self-efficacy provides the confidence necessary to initiate and sustain efforts towards those goals. These processes are complementary aspects of students' regulation of their own learning. Existing studies have established relationships between individual or selected dimensions of self-regulatory learning and Biology outcomes in Anambra State. However, the predictive contribution of goal-setting skill and self-efficacy skill considered together in relation to students' academic achievement in Biology remains insufficiently clarified.

The present study investigates the predictive powers of self-efficacy skill and goal-setting skill on students' academic achievement in Biology in Anambra State. The study is focused on these two dimensions because they represent complementary components of self-regulated learning: goal-setting establishes direction for learning, while self-efficacy reflects students' perceived capability to pursue and accomplish learning tasks. Examining their predictive powers may provide further empirical evidence on the role of learner-related factors in students' academic achievement in Biology.

Statement of the Problem

Biology is an important science subject that equips students with knowledge and skills needed to understand living organisms and their environment. However, students' academic achievement in Biology has remained unsatisfactory. The West African Examinations Council (WAEC) Chief Examiners' reports from 2021–2025 revealed persistent weaknesses in students' performance in Biology, with more than half of the students in Anambra State scoring below 50% in each of the years. This indicates that many students continue to experience difficulties in understanding and applying biological concepts.

Several efforts have been made to improve students' achievement through curriculum reforms and different teaching approaches, yet the problem persists. This suggests that attention should also be given to factors within the learners themselves. One such factor is self-regulatory learning, particularly students' ability to set learning goals and their belief in their capacity to accomplish academic tasks. Although goal-setting and self-efficacy are recognised as important aspects of self-regulated learning, their individual predictive powers on students' academic achievement in Biology in Anambra State have not been sufficiently clarified. Therefore, the study examined the predictive powers of goal-setting skill and self-efficacy skill on students' academic achievement in Biology in Anambra State.

Purpose of the Study

The purpose of the study was to determine the predictive powers of self-efficacy skill and goal-setting skill on secondary school students' academic achievement in Biology in Anambra State. Specifically, the study sought to determine the:

1. Predictive power of goal-setting skill on secondary school students' academic achievement in Biology in Anambra State.
2. Predictive power of self-efficacy skill on secondary school students' academic achievement in Biology in Anambra State.

Research Questions

The following research questions guided the study:

1. What is the predictive power of goal-setting skill on secondary school students' academic achievement in Biology in Anambra State?
2. What is the predictive power of self-efficacy skill on secondary school students' academic achievement in Biology in Anambra State?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. Goal-setting skill is not a significant predictor of secondary school students' academic achievement in Biology in Anambra State.

2. Self-efficacy skill is not a significant predictor of secondary school students' academic achievement in Biology in Anambra State.

Methodology

The study adopted a predictive correlational research design**.** Correlational research design is used to ascertain the association between two or more variables of interest to the researcher (Nworgu, 2015). The predictive correlational design was considered appropriate because the study sought to determine the predictive powers of goal-setting skill and self-efficacy skill on students' academic achievement in Biology in Anambra State.

The study was carried out in Anambra State, Nigeria, one of the five states in the South-East geopolitical zone of Nigeria. The state has 21 Local Government Areas and 267 public secondary schools distributed across six Education Zones: Aguata, Awka, Nnewi, Onitsha, Ogidi, and Otuocha (Post Primary Secondary School Service Commission, 2025). The state was selected because of its diverse student population, established educational system, and commitment to academic development and innovative teaching practices.

The population of the study comprised 23,709 SS II students offering Biology in the 267 public secondary schools in Anambra State. The population figure was obtained from the Planning, Research and Statistics Department of the Post Primary School Service Commission, Awka (2025).

A sample of 393 SS II students offering Biology was used for the study. The sample size was determined using Taro Yamene's formula at a 95% confidence level and a 5% margin of error from the population of 23,709 students.

A multi-stage sampling procedure was employed. First, the public secondary schools were stratified according to the six Education Zones in the state. Second, four Education Zones Awka, Aguata, Ogidi, and Nnewi were selected using simple random sampling without replacement. Third, two schools were selected from each of the four Education Zones using simple random sampling without replacement, giving a total of eight schools. Fourth, disproportionate sampling was used to select 40% of the students from each selected school. According to Lohr (2021), sampling proportions such as 20%, 30%, and 40% can be used to obtain adequate subgroup estimates for statistical comparisons. A total of 394 students were initially selected, while 393 completed instruments were retrieved and used for data analysis**.**

The instruments used for the study were the Self-Regulatory Learning Skill Questionnaire (SRLSQ) and a Biology achievement proforma**.**

The Self-Regulatory Learning Skill Questionnaire (SRLSQ) was adapted from the Self-Regulation for Learning Online (SRL-O) developed by Broadbent et al. (2023). The original SRL-O consists of 44 items organised into 10 dimensions, including online academic self-efficacy, motivation, planning and time management (goal-setting), study environment, and effort regulation. It was developed for online and blended learning and is measured on a seven-point scale.

For the present study, the relevant items were adapted to reflect Biology learning among secondary school students. The questionnaire used a four-point response scale ranging from 1 Strongly Agree to 4 Strongly Disagree**.** The two dimensions examined in this study were goal-setting skill**,** measured with eight items, and self-efficacy skill**,** measured with six items.

Students' academic achievement in Biology was obtained from their teachers' cumulative assessment booklets and recorded using a proforma. The scores served as the students' academic achievement scores for the study.

The SRLSQ was subjected to face validation by three experts from Nnamdi Azikiwe University, Awka. Two of the experts were from the Department of Science Education, while one was from the Department of Educational Foundations (Measurement and Evaluation Unit). The validators examined the instrument in terms of content relevance, suitability, clarity, and coverage of the dimensions of the study. Their observations and suggestions were incorporated into the final version of the instrument through the removal, addition, and recasting of items where necessary.

The reliability of the SRLSQ was determined using 30 SS II students offering Biology in Enugu State**.** Cronbach's Alpha was used to establish the internal consistency of the instrument. The SRLSQ yielded a reliability coefficient of 0.707**.**

Data were collected with the assistance of three research assistants**.** Permission was obtained from the principals of the selected public secondary schools before the administration of the instrument. The research assistants were briefed by the researcher on the procedures and guidelines for administering the SRLSQ. The questionnaire was

administered to the respondents, while their Biology achievement scores were obtained from the teachers' cumulative assessment booklets. Data collection lasted for two weeks**,** and the researcher monitored the process through regular communication with the research assistants. A total of 393 completed questionnaires were retrieved and used for the analysis.

The data were analysed using simple linear regression**.** The R-value was used to determine the strength and direction of the relationship between each predictor and students' academic achievement in Biology, while the R-squared value was used to determine the proportion of variance in academic achievement accounted for by each predictor.

In interpreting the predictive value, the rule posited by Nworgu (2015) was adopted as follows:

Range of Scores	Predictive Decision
±0.80–±1.00	High positive or negative value
±0.31–±0.79	Moderate positive or negative value
±0.00–±0.30	Low positive or negative value

The ANOVA F-statistic was used to test the significance of each regression model, while the t-test was used to determine the significance of the regression weight. The unstandardized beta coefficient was used to estimate the predictive power of each

predictor. The null hypotheses were tested at the 0.05 level of significance**.** Where the calculated p-value was less than or equal to 0.05, the null hypothesis was rejected; otherwise, it was retained.

Results

Research Question 1: What is the predictive value of goal-setting skill on secondary school students' academic achievement in biology in Anambra state?

Table 1: Regression analysis of the predictive value of goal-setting skill on secondary school students' academic achievement in biology

Model	R	R^2	Adjusted r^2	Std. Error of the Estimate	Decision
1	.301[a]	.022	.002	16.84761	low positive prediction

a. Predictors: (Constant), Goal setting skill

Table 1 shows that the predictive value of goal-setting skill on secondary school students' academic achievement in biology is .301. This indicates that there exists a low positive correlation between goal-setting on secondary school students' academic achievement in biology. The data in the table also revealed that the coefficient of determination (r^2) is .022. The coefficient of determination (r^2) indicates that 2.2% variation in students' achievement in biology can be attributed to their goal-setting skill while 97.8% of the variance can be attributed to other factors not considered by this study.

Research Question 2: What is the predictive value of self-efficacy skill on secondary school students' academic achievement in biology in Anambra state?

Table 2: Regression analysis of the predictive value of self-efficacy skill on secondary school students' achievement in biology

Model	R	R^2	Adjusted r^2	Std. Error of the Estimate	Decision
1	.219[a]	.011	.003	16.86164	low positive prediction

a. Predictors: (Constant), Self-efficacy skill

Table 2 shows that the predictive value of self-efficacy skill on secondary school students' academic achievement in biology is .219. This indicates that there exists a low positive correlation between self-efficacy on secondary school students' academic achievement in biology. The data in the table also revealed that the coefficient of determination (r^2) is .011. The coefficient of determination (r^2) indicates that 1.1% variation in students' achievement in biology can be attributed to their self-efficacy while 98.9% of the variance can be attributed to other factors not considered by this study.

$H0_1$: Goal setting skill is not a significant predictor of secondary school students' academic achievement in biology in Anambra State.

Table 3: ANOVA Regression analysis of the predictive value of goal setting skill on secondary school students' academic achievement in biology

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	152.092	1	152.092	.536	.465[b]
	Residual	75218.096	265	283.842		
	Total	75370.187	266			

a. Dependent Variable: Achievement

b. Predictors: (Constant), Goal setting skill

In Table 3, it shows that at .536 F-value the probability value of .465 was obtained which is more than the 0.05 level of significance. Therefore, the null hypothesis was accepted. Hence, the predictive value of goal setting on secondary school students' academic achievement in biology is not significant (P > 0.05). This implies that goal setting do not make a significant contribution on secondary school students' achievement in biology.

H0$_2$: Self- efficacy skill is not a significant predictor of secondary school students' academic achievement in biology in Anambra State.

Table 4: ANOVA Regression analysis of the predictive value of self- efficacy skill on secondary school students' academic achievement in biology

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	26.723	1	26.723	.094	.000[b]
	Residual	75343.464	265	284.315		
	Total	75370.187	266			

a. Dependent Variable: Achievement

b. Predictors: (Constant), Self-efficacy skill

Table 4 reveals that at .094 F-value the probability value of .000 was obtained which is less than the 0.05 level of significance. Therefore, the null hypothesis was rejected. Hence, the predictive value of self-efficacy on secondary school students' academic achievement in biology is significant ($P < 0.05$). This implies that self-efficacy make a significant contribution on secondary school students' academic achievement in biology.

Discussion

The findings of this study revealed that goal-setting skill had a low positive predictive value on secondary school students' academic achievement in Biology in Anambra State. This implies that goal-setting skill demonstrated a slight positive relationship with academic achievement but does not significantly predict students' academic achievement in Biology. If goal-setting skill is to be considered independently, it won't be a determinant for students' academic achievement in Biology.

Consequently, the null hypothesis was not rejected, indicating that goal-setting skill is not a significant predictor of secondary school students' academic achievement in Biology in Anambra State. This finding implies that although setting learning goals is an important component of self-regulated learning skill, it was not sufficiently influential to produce a statistically significant improvement in students' academic achievement in Biology.

The finding of the present study is consistent with the findings of Nnorom, Okafor and Nnalue (2025), who found that self-regulatory skills, had a low positive relationship with students' academic achievement in Biology and that neither relationship was statistically significant

The finding also agrees with Duru, Mba and Ike (2023**)**, who found that holistically, self-regulated learning skills significantly predicted the achievement of male students. However, the present finding contradicts the findings of Akachukwu, Mbaegbu and Anazodo (2023), who found that goal-setting had a significant positive relationship with senior secondary school students' academic achievement in Biology in Onitsha Education Zone of Anambra State.

Furthermore, the findings of this study revealed that self-efficacy skill had a low positive predictive value on secondary school students' academic achievement in Biology in Anambra State**.** This implies that students with higher levels of self-efficacy tend to perform better academically in Biology than those with lower self-efficacy. The findings of this study indicate that although self-efficacy skill exhibited a relatively low predictive strength**,** but it is not a determinant for academic achievement in Biology in Anambra State when considered independently.

The corresponding hypothesis revealed that self-efficacy skill significantly predicted secondary school students' academic achievement in Biology in Anambra State**.** This finding implies that students who believe in their ability to successfully perform Biology learning tasks are more likely to demonstrate better academic performance than those who lack such confidence. The finding underscores the importance of self-efficacy as a psychological factor that influences students' persistence, determination, and willingness to engage with challenging Biology concepts. Although the magnitude of the prediction was low, students' confidence in their academic capabilities significantly influences their achievement in Biology. The finding of the present study is consistent with the findings of Okoro et al. (2022)**,** who in their findings revealed that students taught by teachers with high and moderate levels of self-efficacy achieved significantly better in Biology than those taught by teachers with low self-efficacy. Similarly, the finding is in agreement with Mikhail and Nneka (2021)**,** who reported a significant positive relationship between self-regulation and students' science achievement.

However, the present finding contradicts the findings of Nnorom, Okafor and Nnalue (2025)**,** who reported that self-efficacy had only a low positive relationship with

students' academic achievement in Biology and that the relationship was not statistically significant**.**

Conclusion

In this study, the development of self-regulatory learning skills is essential for improving students' academic performance in Biology. Efforts by teachers, school administrators, parents, curriculum planners, and educational counsellors to promote students' self-regulatory learning skills, goal-setting skill, and self-efficacy skill, will contribute to better academic achievement in Biology among secondary school students in Anambra State.

Recommendations

1. Biology teachers should deliberately teach and reinforce self-regulatory learning skills during classroom instruction by helping students set realistic academic goals, monitor their learning progress, and evaluate their performance.
2. School principals should organize seminars, workshops, and orientation programmes that will expose students to effective self-regulatory learning strategies, particularly goal-setting skill, self-efficacy skill, self-motivation skill, and self-reinforcement skill.
3. Guidance and counsellors should design intervention programmes that help students develop positive self-beliefs, confidence, persistence, and independent learning habit.

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