



**RELATIONSHIP BETWEEN SELF-REGULATION SKILLS AND ACADEMIC
ACHIEVEMENT OF SECONDARY SCHOOL STUDENTS IN PHYSICS IN AWKA
EDUCATION ZONE**

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Abstract

This study examined the relationship between self-regulation skills and academic achievement of secondary school students in Physics in Awka Education Zone of Anambra State. The study was guided by two research questions and two null hypotheses were tested at 0.05 level of significance. The study adopted a correlation research design. The population of the study consisted of 2532 secondary school two (SS 2) students offering Physics from all the public secondary schools in the zone. Multi-stage sampling procedure was used to draw 345 secondary school two (SS 2) students from the population. The instruments used for data collection included; Physics Self-Regulation Questionnaire (PSRQ) and average scores of students for 2024/2025 academic session. The instruments PSRQ was validated by three experts, two from the Department of Science Education and one from Department of Educational Foundations (Measurement and Evaluation unit), all in Nnamdi Azikiwe University, Awka. The reliability of the instrument was established using Cronbach's alpha method, with coefficient of 0.86 for PSRQ, indicating satisfactory internal consistency. Data collection was done through direct administration of the questionnaire to respondents by the researcher and research assistants who are secondary school Physics teachers. Pearson product moment correlation was employed for the analysis of the data collected using Statistical Package for Social Sciences (SPSS, vs 27). The findings of the study revealed that there is a moderate positive and significant relationship between self-regulation skills scores and academic achievement scores of secondary school students in Physics. In addition, the study showed that there is moderate positive and significant relationship between self-regulation skills scores and academic achievement scores for both male and female secondary school students in Physics in Awka Education Zone. Based on the findings, the study concluded that self-regulation skills play a crucial role in enhancing students' academic achievement in Physics. It was recommended amongst others that Physics teachers should deliberately incorporate strategies such as goal setting, self-planning, self-monitoring, and self-reflection into classroom activities to strengthen students' self-regulation skills, which have been shown to significantly enhance academic achievement.

Key words: Self-regulation skills, Physics, Academic achievement, Gender, Secondary School

Introduction

Physics plays a vital role in national development by driving technological innovation, industrial growth, and scientific advancement essential for economic progress and societal transformation. Physics being a foundational pillar that provides fundamental insights into the natural world and enabling learners to explore and understand the basic principles that govern the



universe. Physics is defined as a branch of science that deals with the study of the fundamental laws and principles that underpin the behaviour and workings of the physical universe. Ilo (2022) described Physics as the very essence of scientific and technological progress, as its fundamental principles, laws, and theories form the foundational knowledge underpinning the development of innovative technologies. Furthermore, Onah (2022) averred that Physics is a science subject that studies matter, objects, energy and their interaction in a given system or environment.

The deep understanding of physical phenomena provided by the discipline of Physics is the wellspring from which modern advancements in science and engineering emerge. Physics has profoundly shaped our comprehension of the cosmos and has been instrumental in the development of countless technologies that have become integral to our everyday lives. Through rigorous experimentation and theoretical modeling, Physicists have uncovered the laws that describe phenomena ranging from the sub-atomic realm of quantum mechanics to the grand scales of cosmology and astrophysics. From the mechanics of motion to the dynamics of fluids, the properties of light and electromagnetic radiation, the behaviour of heat and thermodynamics and the peculiarities of atomic and nuclear structures, through the lens of Physics the foundational principle of the universe can be explained. This scientific discipline has not only enhanced our knowledge of the natural world, but has also enabled the development of transformative technologies that have revolutionized modern society, from electronics and communications to transportation, energy systems, and medical imaging. By continuing to push the boundaries of our understanding of physical reality, Physics remains a driving force behind scientific progress and innovation.

Despite the importance of Physics to national development, students' achievement in the subject over the years has not been consistent. Analysis of West African Senior School Certificate Examination (WASSCE) results over the past decade further highlights persistent fluctuating performance in Physics (Mhide, Obinne, Aduloju and Agi, 2023). Although credit-level passes briefly hovered around 60 percent in 2015 (60.10 %), 2018 (60.24 %), and 2022 (61.44 %), nearly 40 % of candidates scored below credit in those years. Even more concerning is the downward trend observed between 2016 (58.95 %) and 2017 (56.48 %), which persisted into 2019 (56.42 %), plummeted to just 51 % in 2020, edged up slightly to 53.52 % in 2021 and recovered only modestly to 57.31 % by 2023 levels that remain well below expectations for a core science subject. Students'



performance in individual subjects often reflects their overall academic achievement, serving as a measure of their learning outcomes and educational progress.

Academic achievement refers to the extent to which a student, teacher, or institution has attained their short or long-term educational goals, as evidenced by measurable outcomes such as test scores, curriculum delivery, or institutional benchmarks. Udegbe and Okoli (2022) defined academic achievement as the quantifiable assessment of knowledge acquired through formal education. This measurement is typically represented by various indicators such as test scores, grade point averages, and academic degrees. In essence, a student's level of achievement is primarily evaluated based on the marks or grades they obtain in examinations. Academic achievement serves as a crucial metric and primary standard for evaluating the effectiveness of all educational endeavors. It continues to be a significant concern for parents, educators, society at large and researchers, especially in light of the perceived decline in secondary school students' academic achievement. Various factors can influence this metric, including the student's mental state, level of attention, instructional techniques employed and the overall school environment, among other variables. Achievement levels can be categorized as poor, fair, or high, and are typically evaluated using a grading system. In the context of Physics, achievement is specifically measured by the grade's students earn in tests or examinations.

Students' poor achievement in Physics in particular and sciences in general, have been attributed to many factors. These include; poor methods of Physics instruction by the teachers, insufficient number of qualified Physics teachers, lack of indigenous textbooks, inadequate apparatus in the Physics laboratory, self-regulation and test anxiety towards Physics, inadequate instructional materials and aids, educational background and parental expectations on the learners and finally students' related factors or variables like academic self-efficacy, academic locus of control, academic motivation and more (Ajadi & Amoo, 2024). According to Ugwuanyi, Okeke and Asomugha (2020), psychological factors such as emotional intelligence, self-esteem, self-regulation, test anxiety and self-efficacy have significant predictive capabilities on students' academic achievement in Physics. Among these psychological factors, self-regulation skills stands out as a critical component that may directly influences students' ability to manage their learning processes and achieve academic success in Physics.



Self-regulation is the process by which individuals control and direct their thoughts, emotions and behaviours to achieve their goals. Ogbonneya and Nworie (2024) defined self-regulation as the ability to control one's thoughts, emotions and behaviours in alignment with personal goals, is vital in the academic context. In addition, Cameron, McClelland, Grammer and Morrison (2024) defined self-regulation as a complex interplay of intentional and emergent processes involved in planning, controlling, and directing one's cognitions, emotions, and behaviours. These interconnected levels (age, personal experiences, emotional state and stress sensitivity) collectively influence the effectiveness of self-regulation skills, which vary among individuals and within a person over time, depending on factors such as age, personal context (experiences or emotions) and individual stress sensitivity.

Self-regulation skills are the specific techniques and strategies individuals use to manage their thoughts, emotions and behaviours in pursuit of personal goals. According to Cavadel, Kauff, Anderson, McConnell and Derr (2017), self-regulation skills are the skills needed to finish tasks, stay organized, and control emotions. These skills includes: goal setting, self-assessment, self-monitoring, self-reinforcement, self-control and self-planning, which enable individuals to stay focused, adapt strategies and maintain motivation to achieve desired outcomes (Ogbonneya and Nworie, 2024). They are essential for academic achievement, emotional control and effective problem-solving. They are sometimes called soft skills, social and emotional skills, life management skills, executive skills, or executive functioning skills. These skills are important for succeeding in work, school and other aspects of life. Students need these skills to set objectives, create action plans, and apply what they've learned to their future aspirations (Derr, McConnell, Krantz, and Saunders, 2023). Students with higher self-regulation are more likely to plan their studies carefully and be willing to study.

Therefore, self-regulation skills are critical for academic achievement, particularly in senior secondary schools where students face increased academic demands. Teachers can play a pivotal role in enhancing students' capacity for self-regulation by instructing them on the growth mindset and the role of emotions in the learning process. Broadbent (2021) indicates that students with well-developed self-regulation skills maintained their academic achievement despite disruptions, highlighting self-regulation as a predictor of long-term academic achievement. In a study by Onah, Anamezie, and Nnadi (2022), the study found that self-regulation relatively



contributed significantly to the prediction of academic achievement of Physics Education students. In another study by Nnaji and Okoli (2019), the findings showed that there is a significant low positive relationship existed between self-regulated learning and achievement scores in Physics. The study went further to show that there is a significant low positive relationship between male students' self-regulated learning and their achievement score in Physics. However, no significant relationship was found between female students' self-regulated learning and their achievement scores in Physics. Understanding self-regulation skills also necessitates examining the potential influence of gender, as male and female students may differ in how they plan, monitor, and control their learning behaviours.

Gender is a cultural construct that defines the roles, behaviours, and emotional and mental characteristics society attributes to males and females. In the context of science, the role of gender in students' academic achievement particularly in Physics has garnered sustained research attention. Anafiza and Djukri (2017) asserted that gender encompasses not only biological distinctions but also the social and cultural identities that influence educational experiences and outcomes. Traditional sex-role stereotypes and the perceived masculinity of scientific disciplines often shape students' subject preferences and academic performance. These stereotypes may undermine female students' confidence, self-regulation skills and ability to manage test anxiety, all of which are crucial psychological factors for academic achievement in Physics. Nnaji and Okoli (2019) averred that gender remains an issue in Physics achievement, teaching and learning methods should enhance achievement across gender. This suggests a complex interaction between genders, psychological factors such as self-regulation skills and academic achievement. Therefore, examining gender differences in Physics achievement through the lens of self-regulation skills is essential to uncover how male and female students may be differently affected, thereby justifying further research in this area.

The need for improvement in Physics achievement is evident from students' performance in external examinations, such as those conducted by the West African Examination Council (WAEC). This situation necessitates a thorough investigation into the factors that may affect academic achievement in Physics, with a specific focus on psychological variables such as self-regulation skills. On the strength of the forgoing, it is therefore imperative to examine the



relationship between self-regulation skills and academic achievement of students in Physics in Awka Education Zone of Anambra State.

Purpose of the Study

The purpose of the study is to examine the relationship between self-regulation skills and academic achievement of secondary school students in Physics in Awka Education Zone. Specifically, the study sought to examine the:

1. Relationship between self-regulation skills scores and academic achievement scores of secondary school students in Physics in Awka Education Zone.
2. Relationship between self-regulation skills scores and academic achievement scores of secondary school male and female students in Physics in Awka Education Zone.

Research Questions

The following research questions guided the study:

1. What is the relationship between self-regulation skills and academic achievement of secondary school students in Physics in Awka Education Zone?
2. What is the relationship between self-regulation skills and academic achievement of secondary school male and female students in Physics in Awka Education Zone?

Hypotheses

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

1. There is no significant relationship between self-regulation skills and academic achievement of secondary school students in Physics in Awka Education Zone.
2. There is no significant relationship between self-regulation skills and academic achievement of secondary school male and female students in Physics in Awka Education Zone.

Methodology

The study adopted correlation survey research design. According to (Nworgu, 2015), correlation research design is a design that allows the researcher to investigate the strength, the magnitude and the direction of the association that exists between two or more phenomena without manipulating the situation. The study was carried out in Awka Education Zone of Anambra State,



Nigeria. The population of the study comprised 2,532 (1,299 females and 1,233 males) senior secondary school two students offering Physics in 62 public secondary schools in Awka Education. Multi-stage sampling procedures was used to sample 345 SS2 students offering Physics from fifteen out of 50 co-educational public secondary schools in Awka Education Zone. To effectively gather data for the study, one structured questionnaire and students' academic result Proforma were used. The questionnaire titled Physics Self-Regulation Questionnaire (PSRQ) was adapted from Carey, Neal and Collins (2004). To ensure validity of the instrument, the title of the study, the purpose of the study, the scope of the study, the instrument PSRQ were given to experts in Faculty of Education from Nnamdi Azikiwe University, Awka of Anambra State, the corrections provided by the experts were effected in incorporated into the instrument. To establish the internal consistency of the instrument (PSRQ), the validated instrument was administered to 34 students offering Physics in Nnewi Education Zone, the data collected was analysed with Cronbach's Alpha method which yielded a reliability coefficient of 0.86. A total of 345 copies each of the PSRQ was administered on the respondents by the researcher, with five research assistants. Out of 345 copies of the questionnaire administered, 340 copies were validly completed and returned for analysis. The data collected was analyzed using Pearson Product Moment Correlation (PPMC). Pearson Product Moment Correlation was used to answer research questions and to test the null hypotheses. The coefficients ranges that were used for interpreting the research questions are as follows: $r = 0.00$ (no relationship), $r = \pm 0.01$ to ± 0.20 (low relationship), $r = \pm 0.21$ to ± 0.49 (weak relationship), $r = \pm 0.50$ to ± 0.69 (moderate relationship), $r = \pm 0.70$ to ± 0.99 (high relationship), and $r = \pm 1.00$ (perfect relationship). In interpreting the values of the null hypotheses, when p-value is less than or equal to 0.05 ($p \leq 0.05$), the null hypothesis was rejected and when p-value is greater than 0.05 ($p > 0.05$), the null hypothesis was not be rejected.



Result

Table 1: Pearson r on the relationship between self-regulation skills and academic achievement of secondary school students in Physics in Awka Education Zone

Sources of Variation	n	Self-Regulation Skills r	Academic Achievement r	P-value	Decision
Self-Regulation Skill	340	1	0.595**	.000	moderate positive significant relationship
Academic Achievement		0.595**	1		

The result in Table 1 shows a moderate positive relationship between self-regulation skills and academic achievement of secondary school students in Physics in Awka Education Zone, with a correlation coefficient of $r = 0.595$. This indicates that students with higher self-regulation skills tend to achieve better in Physics, suggesting that effective self-regulation skills are associated with improved academic achievement in the Physics.

Table 2: Pearson r on the relationship between self-regulation skills scores and academic achievement scores of secondary school male and female students in Physics in Awka Education Zone

Gender	Sources of Variation	n	Self-Regulation Skills r	Academic Achievement r	P-value	Decision
Male	Self-Regulation Skills	169	1	0.547**	0.000	moderate positive significant relationship
	Academic Achievement		0.547**	1		
Female	Self-Regulation Skills	171	1	0.639**	0.000	moderate positive significant relationship
	Academic Achievement		0.639**	1		



Table 2 reveals a moderate positive relationship between self-regulation skills and academic achievement for both male and female secondary school students in Physics in Awka Education Zone. For male students, the correlation coefficient is $r = 0.547$, while for female students, the correlation coefficient is $r = 0.639$. This suggests that, for both genders, higher self-regulation skills are associated with better academic performance in Physics, with the relationship being slightly stronger among female students.

The result in Table 1 reveals that there is a significant relationship between self-regulation skills and academic achievement of secondary school students in Physics in Awka Education Zone. The result of the analysis shows a moderate positive and statistically significant correlation ($r = 0.595$, $p = 0.000$). Since, the p -value is less than 0.05, the null hypothesis is rejected, and hence, there is a significant relationship between self-regulation skills and academic achievement of secondary school students in Physics. This implies that higher self-regulation skills are significantly associated with better academic achievement in Physics among the students.

The result in Table 2 also shows that there is a significant relationship between self-regulation skills and academic achievement of secondary school male and female students in Physics in Awka Education Zone. The results showed a moderate positive and statistically significant correlation for both male students ($r = 0.547$, $p = 0.000$) and female students ($r = 0.639$, $p = 0.000$). Since p -value is less than 0.05, the null hypothesis is rejected, therefore, there is a significant relationship between self-regulation skills and academic achievement of secondary school male and female students in Physics. This indicates that, for both genders, higher self-regulation skills are significantly related with better academic achievement in Physics, with the relationship being slightly stronger among female students.

Discussion of findings

The finding of this study showed that there is a moderate positive relationship between self-regulation skills and academic achievement of secondary school students in Physics in Awka Education Zone. This indicates that students with higher self-regulation skills tend to achieve better in Physics, suggesting that effective self-regulation skills are associated with improved academic achievement in Physics. The finding of this study aligns with that of Nwikpo, Okochi, Eluemuno and Nwasor (2024) who found a moderate relationship between self-regulation and academic performance of secondary school students. Also, Nnaji and Okoli (2019) revealed that



a positive relationship existed between self-regulated learning and achievement scores in Physics. Similarly, Bala, Balarabe and Yunusa (2020) reported that there is a positive relationship existed between self-regulated learning and academic achievement among undergraduate students of Ahmadu Bello University.

The corresponding hypothesis revealed that there is a significant relationship between self-regulation skills and academic achievement of secondary school students in Physics in Awka Education Zone. This implies that higher self-regulation skills are significantly associated with better academic achievement in Physics among the students. The finding of this study aligns with that of Suan (2023) whose findings showed self-regulation skills significantly influence students' academic achievement. Similarly, Onah, Anamezie and Nnadi (2022) reported that self-regulation contributed significantly to the prediction of academic achievement of Physics Education students. On the contrary, Nwikpo, Okochi, Eluemuno, and Nwasor (2024) who revealed that there was no significant relationship between the self-regulation and academic performance of secondary school students.

This study found that there is a moderate positive relationship between self-regulation skills and academic achievement for both male and female secondary school students in Physics in Awka Education Zone. This suggests that, for both genders, higher self-regulation skills are associated with better academic performance in Physics, with the relationship being slightly stronger among female students. This finding agrees to that of Appiah-Kubi, Amponsah, Nti-Adarkwah and Asoma (2022) who revealed that students were moderately self-regulated and moderately academically engaged. Although, male students were found to have more self-regulated learning capacities than their female counterparts but both sexes could similarly engage in their academic pursuits. Similarly, Parveen and Jan (2023) found that majority of students possess average levels of SRL. The results imply that, on the whole, female students outperform male students in SRL.

The corresponding hypothesis revealed that there is a significant relationship between self-regulation skills and academic achievement of secondary school male and female students in Physics in Awka Education Zone. This indicates that, for both genders, higher self-regulation skills are significantly related with better academic achievement in Physics, with the relationship being slightly stronger among female students. This finding is also supported by Nnaji and Okoli



(2019) who revealed there was a significant relationship between male students' self-regulated learning and their achievement score in Physics. Although, the findings showed no significant relationship was found between female students' self-regulated learning and their achievement scores in Physics. In contrast, Duru, Mba and Ike (2023) revealed that self-regulated learning skills significantly predict male students' achievement in mathematics. While self-regulated learning skill does not significantly predict female students' achievement in mathematics.

Conclusion

The study concluded that self-regulation skills are vital for improving students' academic achievement in Physics. The moderate, positive, and significant relationship observed between self-regulation skills and academic achievement underscores the importance of these skills in students' learning outcomes. These results provide strong evidence that enhancing students' ability to manage their learning processes is essential for improving their academic achievement. Accordingly, integrating skill-building activities into Physics instruction is crucial for creating a more supportive and effective learning environment. Overall, the study emphasizes the need to foster self-regulation skills as key strategies for improving students' achievement in Physics.

Recommendations

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

1. Physics teachers should deliberately incorporate strategies such as goal-setting, progress monitoring, and self-reflection into classroom activities to strengthen students' self-regulation skills, which have been shown to significantly enhance academic achievement.
2. Curriculum developers should embed self-regulated learning components into Physics curricula by including activities that encourage independent study, problem-solving and self-assessment on performance.
3. Government and education stakeholders should fund and implement professional development programs that train Physics teachers on effective methods for fostering self-regulation, ensuring they can create supportive and achievement-oriented learning environments.



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