Self-Efficacy and Locus of Control as Correlates of Senior Secondary School Students Academic Achievement in Biology in Ebonyi State, Nigeria

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***Abstract*: This study examined the relationship among locus of control, self-efficacy and senior secondary school students' academic achievement in Biology in Ebonyi State, Nigeria. The study adopted the correlation survey research design. The sample for the study was 420 senior secondary schools students drawn using the multi-stage sampling technique. Rotters' Locus of control scale and new general Self-efficacy scale by Chen, Gully and Eden were used in data collection. Pearson product moment correlation coefficient (r) was used in answering the research questions while t-test for correlation analysis and multiple regression analysis were used in testing the null hypothesis at level of significance. Results showed that there is a very low relationship between students' self-efficacy scores and their academic achievement scores in Biology. There is no significant relationship between secondary school students' self-efficacy scores and their academic achievement scores in Biology. Further more there is a very low relationship between students' locus of control scores and their academic achievement scores in Biology. There is a significant relationship between secondary school students' locus of control scores and their academic achievement scores in Biology. There is a moderate positive relationship among self-efficacy, locus of control and secondary school students' academic achievement in biology. Hence, it could be concluded that the academic achievement of the students could not be ascribed to their self-efficacy or locus of control alone as other factors contribute to the achievement of students in Biology**

***Keywords*: Locus of control; Self-efficacy; Academic achievement.**

I. BACKGROUND

Biology, described as the science of life, plays vital roles in the life of every human being. Biology is a natural science subject consisting of contents from microscopic organisms to the biosphere general, encompassing the earth's surface and all living things (Okwo and Tartiyus, 2004). It is very vast with many disciplines including zoology, botany, ecology, genetics, morphology, anatomy, physiology histology, microbiology, biochemistry, evolution and the more advanced cell biology, molecular biology etc. Apart from the interrelatedness that exists among these branches, biology is closely related with other science subjects like agricultural science, chemistry, Geography, mathematics and physics as it is applied in many specialized areas like medicine, pharmacy, food production and processing industries, biotechnology, genetic engineering, agriculture and horticulture, agriculture and environmental protection, tourism industry among other (Osuafor and Okoro 2013). It is one of the core subjects at Secondary School Certificate Examination (SSCE) whose study is very relevant to man's successful living (Akindele, 2009). Araoye (2009) opined that, exposure to Biology education offers the learners a wide range of relevance to all aspects of life. In spite of the importance of Biology, it is pertinent to note that most students still see and learn Biology as an abstract subject.

Biology as a subject has little or no mathematical calculation and as result receives high patronage from students. Most of the students in the senior secondary schools in Nigeria opt for Biology in their senior secondary schools. Supporting this, Akubuilo (2014) stated that the subject has popularity among students and as a result, has high students' enrolment in external examinations when compared to other science subjects in Nigerian secondary schools. In spite of its popularity and simplicity as viewed by students, percentage credit pass recorded over years has improved a little but is still lower compared to other science subjects like Chemistry and Physics hence a higher percentage pass will be a welcome development. (WAEC results 2015-2019).

According to WAEC 2015-2019 results the average percentage credit pass of students in Biology is 57.08% against 59.04% in Chemistry and 58.42% in Physics. To support the premise, Chief examiners report for biology in the 2019 WASSCE highlighted some of the observed weaknesses of students in the examination leading to their unsatisfactory performance: Poor spellings of some technical terms, poor performance in questions that require application of knowledge, inability to answer questions that require corresponding answers correctly, inability to compare biological processes appropriately, inability to use technical terms to describe some processes among others.

Self-efficacy refers to student's beliefs in their ability to master new skills and tasks, often in a specific academic domain (Pajares and Miller, 1994, cited by Nasiriyan, Azar, Noruzy, Dalvand, 2011). In other words, perceived self-efficacy is concerned with people beliefs in their capabilities

to produce given attainments (Bandura, 1997, cited by Bandura, 2006). Self-efficacy is explained in the theoretical framework of social cognitive theory by Bandura (1986, 1997, cited by Mahyuddin, Elias, Loh, Muhamad, Noordin & Abdullah, 2006) which stated that human achievement depends on interactions between one's behavior, personal factors and environmental conditions. Learners obtain information to appraise their self-efficacy from their actual performances, their vicarious experiences, the persuasions they receive from others, and their physiological reactions. Self-efficacy beliefs influence task choice, effort, persistence, resilience, and achievement (Bandura, 1997; Schunk, 1995). Compared with students who doubt their learning capabilities, those who feel efficacious for learning or performing a task participate development of academic self-efficacy more readily, work harder, persist longer when they encounter difficulties, and achieve at a higher level (Schunk, & Pajares, 2002). In briefly, self-efficacy is said to have a measure of control over individual's thoughts, feelings and actions. In other words, the beliefs that individuals hold about their abilities and outcome of their efforts influence in great ways how they will behave. Therefore, it is not surprising that many research show that self-efficacy influences academic achievement motivation, learning and academic achievement (Pajares, 1996; Schunk, 1995, cited by Mahyuddin, Elias, Loh, Muhamad, Noordin & Abdullah, 2006).

Locus of control is a personality characteristic that determines the degree with which an individual believes they are in control of life events. The concept of locus of control has been originally developed by Julian Rotter, and can be generalized into basic dichotomy which is internal and external locus of control (Khir, Redzuan , Hamsan and Shahrimin , 2015). Khir et al. further stated that individuals with internal locus of control believe that future outcomes depend primarily on personal actions, whereas individuals with external locus of control ascribe actions to factors outside their control, such as fate or chance. According to (Sagone and DeCaroli, 2014) internal and external locus of control have been analyzed in relation to other important aspects and is seen to be related to the daily life of students, such as academic achievement, self-concepts, self-efficacy, motivation, optimism among others.

Academic achievement is interestingly an important issue and a fundamental premium upon which all teaching and learning activities are measured. Academic achievement among students has remained a source of concern to parents, educators, the society and researchers, particularly as the academic achievement of secondary school students is deemed to be declining. Olusegun (2018) reported that less than 40 percent of the candidates who sat for public examination obtained up to credit passes in five subjects which are the minimum academic qualifications for admission into tertiary institutions. Teachers in secondary schools measure the academic achievements of students with the aim of achieving desired educational goals and objectives. The realization of such objectives is the touchstone for any educational system; hence if the achievement corresponds to the objectives, the system has justified its existence. Adeyemi and Adeyemi (2014) had attributed the causes of low academic achievement in schools to factors such as school environment, home background, economic, political, and intellectual capability, social and entry qualification as well as personality traits. In addition, academic achievement is associated with other socio-psychological variables such as locus of control, academic interest, self-efficacy among others.

Nevertheless, the joint relationship among locus of control, self-efficacy and secondary school student's academic achievement seems not to have been empirically established in Ebonyi state, this however creates a gap in the body of literature. Based on the foregoing, the need to examine psychological variables (locus of control, self-efficacy) in relation with academic achievement among secondary school students becomes paramount.

1.1 Objectives of the Study

1. The relationship between locus of control and academic achievement of senior secondary school students' in Biology
2. The relationship between self-efficacy and academic achievement of senior secondary school students' in Biology.

1.2 Research Questions

The following questions were raised;

1. What is the relationship between self-efficacy and academic achievement of senior secondary school students' in Biology?
2. What is the relationship between locus of control and academic achievement of senior secondary school students' in Biology?
3. What is the relationship among locus of control, self-efficacy and academic achievement of senior secondary school students in Biology?

1.3 Hypotheses

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

1. The relationship between self-efficacy and academic achievement of senior secondary school students in Biology is not statistically significant.
2. The relationship between locus of control and academic achievement of senior secondary school students in Biology is not statistically significant.
3. The relationship among locus of control, self-efficacy and academic achievement of senior secondary school students in Biology is not statistically significant.

II. LITERATURE REVIEW

Studies conducted by several scholar where reviewed as follows, Majzub , Bataineh , Ishak and Rahman (2016) examined the relationship between locus of control and academic achievement, and discussed the possibility of gender differences in selected higher education institution in Jordan. The study adopted the correlational survey design. The sample for the study comprised of 204 first year students aged 18-24 from four departments in Yarmouk university Irbid, Jordan. Mean and standard deviation were used to answer the research questions, while multiple regression with stepwise method was used to test the hypothesis. The findings of the study revealed that the internal locus of control was high and positively correlated with academic achievement among the male students and positively correlated with external locus of control. The findings further revealed that the internal locus of control was positively correlated with academic achievement among female students and negatively correlated with external locus of control. Based on this finding it became evident that male students were more internal and external then females. Similarly, Ogunmakin and Akomolafe (2016) investigated Academic Self-Efficacy, Locus of Control and Academic Performance of Secondary School Students in Ondo State, Nigeria. Descriptive research design of correctional type was used for the study. The sample consisted of three hundred and sixty four students randomly selected from ten secondary schools. Two standardized instruments were used to collect data from the sample while students' scores in their previous promotion examination were used to measure their academic performance. Through multiple regression analysis, the researchers found that academic self-efficacy and locus of control jointly predicted academic performance. Further analysis revealed that academic self-efficacy significantly predicted academic performance while locus of control was not a good predictor. It is recommended that teachers, school management, school administrators and counselling psychologists should use appropriate psychological interventions to enhance academic self-efficacy of secondary school students.

Furthermore Akunne and Anyamene (2021) investigated the Relationship among Locus of Control, Academic Interest and Secondary School Students Academic Achievement in Anambra State, Nigeria. The study adopted the correlational survey design. A sample size of 2,160 students was used. Two adopted instruments were used. Data collected were tested using Pearson Product Moment Correlation Coefficient, while the hypotheses postulated was tested at 0.05 level of significance using t-test of correlation and multiple regression analysis. Results showed that the relationship between locus of control and academic achievement of secondary school students in English language is moderate and positive (r = 0.469/n = 2050), the relationship between academic interest and academic achievement of secondary school students in English language is high and positive (r = 0.731, n = 2050), the relationship between locus of control and academic achievement of secondary school students in Mathematics is high and positive (r = 0.613, n = 2050). The relationship between locus of control and academic achievement of secondary school students in English language is significant (t-cal. = 24.03 > t-cal. 1.960), the relationship between academic interest and academic achievement of secondary school students in English language is significant (t – cal. = 48.46 < t – crit. = 1.960), the relationship between locus of control and academic achievement in Mathematics is significant (t-cal. = 35.12 > t-crit. = 1.960), the relationship between academic interest and academic achievement of secondary school students in Mathematics is statistically significant (t-cal. = 28.32 > t-crit. = 1.960). Conclusion: locus of control and academic interest are variables associated with academic achievement of secondary school students in Anambra state. Similarly, Amalu and Dasel (2019) investigated the influence academic locus of control, study habits and secondary school students' academic achievement in mathematics. To achieve the aim of the study two research questions were asked and two null hypotheses formulated to guide the study. Survey research design was adopted for the study. Five hundred and seventy-five SS11 students were randomly selected from public secondary schools in Calabar Municipality, Cross River State. The selection was done through simple random and stratified sampling techniques. Academic Locus of Control and Study Habit Questionnaires (ALOCSH) and achievement test were used for data collection. The internal consistency of the instrument and achievement test with Cronbach alpha reliability coefficient was 0.81 and 0.75 respectively. Data collected were analyzed using independent t-test and analysis of variance statistical techniques. And hypotheses were tested at .05 level of significance. The result of the analysis revealed that internal academic locus of control and study habit had influence on academic achievement.

III. METHOD

This study on locus of control and self-efficacy as correlates of secondary school student's academic achievement adopted the correlation survey research design; a correlation research design seeks to establish relationship between two or more variables as well as indicates the direction and magnitude of the relationship between the variables [Nworgu, 2015]. The population for the study comprised of 2885 senior secondary school students in 65 secondary schools. The sample for the study was 420 senior secondary school students; this sample was drawn using the multistage sampling procedure. Locus of control scale developed by Julian Rotter and New general self-efficacy belief scale by Chen, Gully and Eden were used of data collection. The NGSEBS has two sections A and B. Section A contains personal information of the respondents. Section B contains a list of 8 items on students Self Efficacy using a 5-point scale namely, Strongly Agree (SA), Agree (A), neither Agree nor disagree (NAOD), Disagree (D), Strongly Disagree (SD), and weighted as 5, 4, 3, 2 and I respectively. While the Julian Rotter locus of control scale has

two sections A and B. Section A contains personal information of the respondents. Section B contains a list of 29 items on students Locus of Control Orientation. Each question has two options a and b for the participant to choose from: one option expresses a typical attitude of internal locus of control expectancy, and the other indicative of the attitude of external expectancy. This choice represents an extreme option, and the participants are asked to choose the option which they more strongly believe in, or the option that is closest to their preference. One point is scored for each option chosen by the participant among the 23 items excluding the 6 filler items which have zero (0) score; thus, the higher the score, the more external the individual is regarded.

The process of data collection was done through direct delivery approach. In this approach the researcher with the help of some research assistants will administer the instrument to the students of interest. Pearson product moment correlation coefficient (r) was used in answering the research questions while t-test for correlation analysis and multiple regression analysis were used in testing the null hypothesis to determine the r, rs and R2 adjusted. Data analysis will be conducted using the Statistical Package for Social Sciences (SPSS) version 21. Academic achievement in this study will be measured thus; 70-100 = excellent achievement, 55-69 = average achievement (credit), 40-54 = poor achievement (pass), 0-39 = very poor achievement (fail).

IV. RESULTS AND DISCUSSION

4.1 Research Question 1: what is the relationship between self -efficacy and academic achievement in biology?

4.2 Hypothesis 1: There is no significant relationship between self-efficacy and academic achievement in biology.

Table 1: Pearson r on secondary school students' self-efficacy scores and their academic achievement scores in Biology

Source of variation	N	Self-efficacy	Achievement	r^2	Remark
Self-efficacy	401	1.00	0.094		
				0.009	Very low positive relationship
Achievement	401	0.094	1.00		

Adjusted $r^2 = 0.026$

Analysis presented in Table 1 revealed a Pearson Product Moment Correlation Co-efficient to determine the correlation between secondary school students' self-efficacy scores and their academic achievement scores in Biology. The result revealed that there is a very low relationship between students' self-efficacy scores and their academic achievement scores in Biology (r = .094, n = 401).

Table II: t-Test of significance between secondary school students' self-efficacy scores and their academic achievement scores in Biology

Correlation coefficient (r)	N	Df	A	t-calculated	t-critical	Decision
.094	401	399	0.05	1.89	1.960	Not Significant

Correspondingly, data relating to Hypothesis 1 presented in Table 2 shows that the t-calculated value (1.89) is less than the t-critical value (1.960) at .05 alpha level (1.89 < 1.960). Thus, the null hypothesis was not rejected. This means that there is no significant relationship between secondary school students' self-efficacy scores and their academic achievement scores in Biology. These findings agreed with that of [1] that there is positive low relationship between self-efficacy and students' academic achievement in social studies in FCT, Abuja. The finding also revealed that there is no significant relationship between secondary school students' self-efficacy scores and their academic achievement scores in Biology. This finding as in line with the finding of [25] that there is no significant relationship between self-efficacy and students' academic achievement in poetry.

4.3 Research Question 2: what is the relationship between locus of control and academic achievement in biology?

4.4 Hypothesis 2: There is no significant relationship between locus of control and academic achievement in biology.

Table III: Pearson r on secondary school students' locus of control scores and their academic achievement scores in Biology

Source of variation	N	Locus of control	Academic achievement	r^2	Remark
Locus of control	401	1.00	0.238		
				0.06	Very low relationship
Academic achievement	401	0.238	1.00		

Adjusted $r^2 = 0.103$

Data presented in Table 3 revealed a Pearson Product Moment Correlation Co-efficient to determine the correlation between secondary school students' locus of control scores and their academic achievement scores in Biology. The result revealed that there is a very low relationship between students' locus of control scores and their academic achievement scores in Biology (r = .238, n = 401).

Table IV: t-Test of significance between secondary school students' locus of control scores and their academic achievement scores in Biology

Correlation coefficient (r)	N	Df	A	t-calculated	t-critical	Decision
.238	401	399	0.05	4.90	1.960	Significant

Analysis presented in Table 4 shows that the t-calculated value (4.90) is greater than the t-critical value (1.960) at .05 alpha level (4.90 > 1.960). Thus, the null hypothesis was rejected. This means that there is a significant

relationship secondary school students' locus of control scores and their academic achievement scores in Biology.

This conforms to the findings of Akunne and Anyamene [2021] who found that internal locus of control was high and positively correlated with academic achievement among the male students and positively correlated with external locus of control. The findings further revealed that the internal locus of control was positively correlated with academic achievement among female students and negatively correlated with external locus of control.

4.5 Research Question 3: What is the relationship among locus of control, self-efficacy and academic achievement of senior secondary school students in Biology?

4.6 Hypothesis 3: The relationship among locus of control, self-efficacy and academic achievement of senior secondary school students in Biology is not statistically significant.

Table V: Correlation among self-efficacy, locus of control and secondary school students' academic achievement in biology

N	Correlation co-efficient (r)	r^2	Remark
401	.492	0.242	Moderate positive relationship

Adjusted $r^2 = 0.220$

Data presented in Table 5 revealed a Pearson Product Moment Correlation Co-efficient to determine the correlation among self-efficacy, locus of control and secondary school students' academic achievement in biology. The result revealed that there is a moderate positive relationship among self-efficacy, locus of control and secondary school students' academic achievement in biology (r = .492, n = 401).

Table VI: Summary regression analysis on the relationship existing among self-efficacy, locus of control and secondary school students' academic achievement in biology

Correlation coefficient (r)	N	Df	A	F. cal	P-value	Decision
.492	401	399	0.05	0.345	.709	Not Significant

Analysis presented in table 6 shows a multiple regression analysis computed to reveals the correlation among self-efficacy, locus of control and academic achievement in biology, and it revealed that at 0.05 level of significance 2df numerator and 399df denominator, the calculated F 0.345 with P-value 0.709 which is greater than 0.05, the third null hypothesis is not rejected. The relationship existing among self-efficacy, locus of control and secondary school students' academic achievement in biology is not significant. This finding was in support of Adu and Oshati (2014) that there was a significant relationship among locus of control, self-efficacy and academic achievement in Economics in Oyo State and Ogunmakin and Akomolafe (2016) who stated that academic self-efficacy and locus of control when pulled together significantly predicted academic performance of secondary school students.

V. CONCLUSION

There is a very low relationship between students' self-efficacy scores and their academic achievement scores in Biology. There is no significant relationship between secondary school students' self-efficacy scores and their academic achievement scores in Biology. Furthermore there is a very low relationship between students' locus of control scores and their academic achievement scores in Biology. There is a significant relationship between secondary school students' locus of control scores and their academic achievement scores in Biology. There is a moderate positive relationship among self-efficacy, locus of control and secondary school students' academic achievement in biology. Hence, it could be concluded that the academic achievement of the students could not be ascribed to their self-efficacy or locus of control alone as other factors contribute to the achievement of students in Biology.

This implies that there is need for schools to initiate and implement procedures in order to help improve the quality and consistency in the outcome of academic achievement of students in biology which is a core subject at the secondary education level. More specifically, this study suggests that Teachers and parents should endeavour to encourage and motivate learners to believe in themselves, create conducive environment at home. This is because no matter how self-efficacious nor internally locus control oriented students are, it may not have any significant impact on students' achievement in biology if other crucial factors to the proper learning of Biology are left unattended.

VI. RECOMMENDATIONS

In line with the findings of this study, the researcher made the following recommendations:

1. Teachers should be encouraged to make learning student-centred and not teacher-centred. They should ensure that students are actively involved in the learning activity by ensuring their active participation and their lesson should be organized in such a way that students can bring their own related experiences to bear on the lesson and ask questions, make predictions and examine their own answers in order to be actively involved in the learning processes.
2. Teachers and parents should endeavor to encourage and motivate learners to believe in themselves, create conducive environment at home. They should bring out time to interact with the learner and assess their performance in tests, assignments and examinations.
3. Teachers and parents should not label any students negatively so as to weaken their morale not to believe in their selves.

4. School administrators, counseling psychologists and parents should work hard to develop and enhance students' academic self-efficacy by providing all essential conditions and instruments for students' success in schools and learning environment that is conducive and rich in high quality course curricula and offering challenges that can be met.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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