

INFLUENCE OF SELF-EFFICACY ON ACADEMIC ACHIEVEMENT OF BIOLOGY STUDENTS IN UNIVERSITS AND COLLEGES OF EDUCATION IN NORTH-WEST, NIGERIA

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Abstract

The study investigated the influence of self-efficacy on academic achievement of biology students in universities and colleges of education in north-west, Nigeria. The study employed correlational research design. The population of the study comprised the four thousand eight hundred and seventy two (4,872) level 300 biology education students generated from eight (8) universities and seven (7) colleges of education in north-west, Nigeria. The study's sample consisted of three hundred and seventy one (371) students, proportionally drawn from three state owned universities and three colleges of education located in Katsina, Sokoto and Jigawa states. The biology students' self-efficacy questionnaire (BISSEQ) and biology students' academic proforma were used for data collection. (BISSEQ) attained the reliability coefficients of 0.887 and 0.747 for self-efficacy sub-scales of mastery, experience, persuasions and modelling respectively with the overall internal consistency of 0.78. Hypotheses were tested at 0.05 level of significance using mean, standard deviation, Pearson product-moment correlation coefficient and regression analysis. The results of the study shows a significant positive relationship between self-efficacy and academic achievement of biology students at colleges of education, while no significant relationship between self-efficacy and academic achievement at universities was revealed. The study concluded that self-efficacy influenced academic achievement of biology students at colleges of education and no influence was established between them at universities in north-west, Nigeria. It was recommended by the study that an instructional practices should be designed to actively foster and encourage students' self-efficacy and teachers at various levels of education and teachers should try to identify self-efficacy of their students so as to make plans in their science lesson preparations and delivery.

Keywords: Self-Efficacy, Academic Achievement, Biology Students.

Introduction

Self-efficacy is an important factor associated to students' academic achievement, it is the belief that a person can plan and carry out a specific course of action, find a solution to it and complete it. Self-efficacy beliefs according to Bandura (2004) serve as the foundation for enthusiasm, happiness, and accomplishments. These are embedded primarily in the belief that individuals have the capacity to create changes through their actions. In this regard, students' aspirations, degree of interest in academic pursuits, as well as achieving high academic excellence are all favorably impacted by their confidence in their ability to conquer academic tasks. Students with good self-efficacy demonstrate excellent enthusiasm for working on the tasks by gathering the assignments on time and consistently strive to complete such task despite their complexity (Abd Basith, Andi, & Muhammad, 2020).

For an improved academic performance, students need to be directed and encouraged to increase their academic resilience and self-efficacy. Positive relationship between academic success and self-efficacy in the classroom was discovered by Kelly and Ileri (2022) were learners who had high self-efficacy beliefs scored better in academics than those with low self-efficacy. Similar conclusions were made by Kolo (2017) in a research ascertained the relationship between academic success and self-efficacy. As a result, strong self-efficacy is correlated with high academic scores, whereas low self-efficacy is correlated with low academic results. It was shown that self-efficacy influenced academic performance. Self-efficacy has a significant role in academic success because of its favorable effects (Burns & Burns, 2018). Therefore, students who have strong sense of self-efficacy likely excel academically.

Though, many researchers discovered significant relationship between self-efficacy and academic achievement but nevertheless, other studies revealed weak or no relationship between them. Kanmani (2018) suggested that high school students from marginalized social groups did not substantially differ in their levels of self-efficacy and academic achievement. Devrim and Funda (2020) find out no evidence of a significant link between participants' self-efficacy and their academic performance. For example, if the academic performance reduced, the participants' level of self-efficacy increased. On this basis, the present study tends to find out whether there is relationship or not between self-efficacy and academic achievement among biology students in north-west zone of Nigeria.

Statement of the Problem

Many factors contributes students' poor academic performance, among which are their poor cognitive engagement when learning (Nathan, 2018; Aloba & Odongo 2018; Al-Abyadh, Mohammed & Hani Abdel 2022). This is frequently not treated during classroom instructions as well as in the evaluation procedures. Reports of dissatisfactions in the performance of biology students of higher institutions in Nigeria have been recorded were many of them were not performing effectively (Sam, Nwankwo & Kent, 2017; Usman, 2020). This is traced in the performance of Biology students in universities and colleges of education in north-west zone, Nigeria which indicated that grade D (2.00-2.99) have the highest percentage followed by grade F (1.00 and below) for many years. This is of great concerns by every stakeholders of education sector which include government, teachers, parents, students, school administrators, parent and teachers associations and educational researchers. As such this study attempt to find out whether there self-efficacy influenced academic achievement of Biology students in North-west zone, Nigeria.

Objectives of the Study

The study has the following objectives:

1. Determine the relationship between self-efficacy and academic achievement of biology students of colleges of education in north-west, Nigeria.
2. Determine the relationship between self-efficacy and academic achievement of biology students of universities in north-west, Nigeria.

Research Questions

The following research questions were answered:

1. What is the relationship between self-efficacy and academic achievement biology students of colleges of education in north-west, Nigeria?
2. What is the relationship between self-efficacy and academic achievement of biology students of universities in north-west, Nigeria?

Hypotheses

The following research hypotheses were postulated for the study.

Ho1: There is no relationship between self-efficacy and academic achievement of biology students of colleges of education in north-west, Nigeria.

Ho2: There is no relationship between self-efficacy and academic achievement of biology students of universities in north-west, Nigeria.

Methodology

This study employs a correlational research design. The correlational design deals with exploring one or more characteristics of a group to determine the extent or magnitude to which those characteristics relate with each other (Bichi, 2004; Cohen, Manion & Morrison, 2018). Trochim (2020) described correlation as non-experimental technique used to examine the relationship between changes in one variable (or group of variables) associates changes in another one. The main concern of the correlation design is to find the direction and intensity of the relationship between the variables (Sekaran & Bougie, 2016). The design will allow the researcher to identify the relationships between these variables and will also include the procedures required for hypotheses confirmation and rejection.

The population of this study is made up of all level 300 biology education students in the states' universities and colleges of education in north-west zone Nigeria comprising of eight (8) universities and seven (7) colleges of education with population of four thousand eight hundred and seventy two (4,872) students. The sample of this study is made up of three hundred and seventy one (371) students. The sample were derived proportionately using Taro Yamane (1967) formula from three universities and three colleges of education in Katsina, Sokoto and Jigawa states. Thus: Multistage sampling techniques was employed in this study. The selection procedures are as follows: Cluster sampling technique was used in selecting Jigawa, Katsina and Sokoto states in north-west Nigeria. In cluster sampling, the population is divided into groups, or clusters, and a subset of those clusters is chosen at random to reflect the total population. Then, stratified sampling technique was employed in choosing state owned institutions of higher learning from the two assigned strata of federal and state institutions. Stratified random sampling was also used in selecting universities and colleges of education in the three selected states (that is Jigawa, Katsina and Sokoto). Proportionate sampling technique was then used in selecting BSc (Ed) and NCE students, and lastly simple random sampling was employed in generating the sample of three hundred and seventy one (371) students from the selected schools.

The instruments used for data collection in this study were Biology students' questionnaire and Biology students' academic proforma for generating data on academic achievements (GPA). All the instruments were validated by experts and pilot tested, high indices were achieved. Six academic professionals between the ranks of senior lecturer and professor were chosen

from the universities in North-west zone, Nigeria who specialized in biology education, science education, and statistics validated the instruments. They thoroughly and critically examined the areas and the items as they were displayed on the form, after which they assign a score to each item as they were requested. Their remarks, corrections and suggestions during the validation process were taken into account in the final version of the questionnaire. Then, the content validity index (CVI) was calculated inform of items CVI (I-CVI). Based on the experts' judgment on the inter-rater review of the questionnaire's items, 16 out of 20 items on Biology students self-efficacy recorded I-CVI of 0.83 and above with S-CVI of 0.91 and are considered for collecting data.

The reliability was conducted by pilot testing through administering the questionnaires to twenty (20) level 300 Biology students each of Kaduna state college of education Gidan-waya and Kaduna state university. Cronbach Alpha statistical analysis of the SPSS Version 26 was used in establishing the reliability. Self-efficacy sub-scales of mastery, experience, persuasions and modelling attained the reliability coefficients of 0.887 with the overall internal consistency of 0.78. Therefore the instrument appears to be a valid and reliable tool for assessing the targeted variable (self-efficacy) of pre-service biology teachers.

Academic proforma was the instrument used for collecting the students' academic achievements in the form of GPA. The proforma was given to six experts in the field of science education, Biology and statistics for review. All the experts were requested to critically look at the components of the proforma and the information to be collected and ascertained its suitability, clarity and comprehensiveness. All the recommendations, remarks, suggestions and corrections were reflected in the final draft of the proforma. The data collected was analyzed using descriptive and inferential statistics. Statistical Package for Social Sciences (SPSS) Software version 21 were used. All hypotheses were tested at 0.05 level of significance using mean, standard deviation, Pearson product-moment correlation coefficient and regression analysis.

Results

Hypothesis One: There is no relationship between self-efficacy and academic achievement of biology students of colleges of education in north-west, Nigeria.

Table 1: PPMC on relationship between self-efficacy and academic achievement of biology students of colleges of education in north-west Nigeria.

Variable	N	Mean	SD	Df	r-value	P-Value	Remark
Self-efficacy	310	60.6032	8.348				
				308	.359	0.00	Weak relationship
Academic Achievement	310	58.1032	7.489				

Table 1 presents the result of Pearson product moment correlation coefficient statistics with the R-value of 0.359 and p-value of 0.00 which indicates a very weak positive relationship between self-efficacy and academic achievement among biology students’ of the colleges in north-west Nigeria.

Figure 1: Scatter plot showing the relationship between self-efficacy and academic achievement of biology students of colleges of education in north-west Nigeria

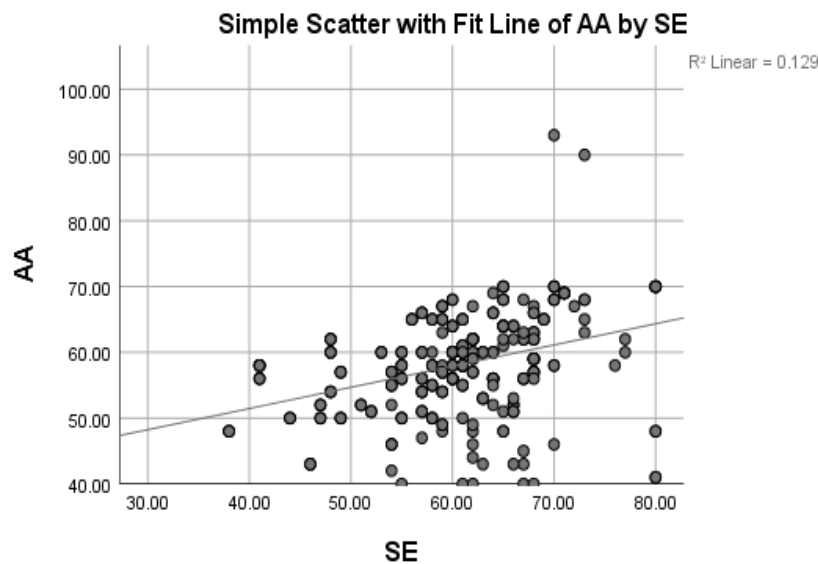


Figure 1 shows the relationship between self-efficacy and academic achievement biology students of colleges of education in north-west zone, Nigeria. The points indicates a weak upward trend, meaning that as the academic achievement increases, the students’ cognitive engagement also tend to increase slightly. The coefficient of determination $R^2 = 0.129$ mean that only 12.9% of the variation in academic achievement is explained by cognitive engagement, while the remaining 87.1% is due to other factors.

Table 2: Linear regression statistics on relationship between self-efficacy and academic achievement of biology students of colleges of education in north-west, Nigeria.

Model	N	R	R ²	Df	Beta Value	P-Value	Decision
a. Constant	310	0.359	0.129	308	0.322	.000	H ₀ 2 Rejected

Self-efficacy

b. Dependent Variable: Academic Achievement

Significant at $\alpha = P \leq 0.05$

Table 2 presents the results of a linear regression analysis of the relationship between self-efficacy and academic achievement of biology students in colleges of education in north-west Nigeria. The results shows R-value of 0.359, the coefficient of determination $R^2= 0.129$, $N= 310$, and the Beta coefficient of 0.322. The P value is 0.00. Since the P value is greater than 0.05 level of significance, therefore, the null hypothesis which stated that; there is no significant relationship between self-efficacy and academic achievement of biology students in north-west zone, Nigeria is rejected. Hence a weak relationship exists between self-efficacy and academic achievement of biology students in north-west zone, Nigeria. The result further reveals that the model is strong in predicting the outcome with coefficient of determination (R^2) of 0.129 which accounts for 12.9% of the variability in the dependent variable (Academic Achievement) is as a result of the independent variable (Self-efficacy). The result also clearly shown that when the predictor variable that is self-efficacy increases by 0.322 units, the outcome variable that is, academic achievement will also increase by 0.322 units, since the beta coefficient was 0.322.

Hypothesis Two: There is no relationship between self-efficacy and academic achievement of biology students of universities in north-west, Nigeria.

Table 3: PPMC on relationship between elf-efficacy and academic achievement of biology students of universities in north-west Nigeria

Variable	N	Mean	SD	Df	r-value	P-Value	Remark
Self-efficacy	61	65.2	6.51				
				59	.229	0.076	Weak relationship
Academic Achievement	61	55.6	11.16				

Table 3 shows R-value of 0.229 and p-value of 0.076 of Pearson product moment correlation coefficient statistics on the relationship between self-efficacy and academic achievement among biology students of universities in north-west, Nigeria. This indicates a very weak positive relationship between the self-efficacy and academic achievement.

Figure 2: Scatter plot showing the relationship between self-efficacy and academic achievement of Biology students of Universities in North-west Nigeria

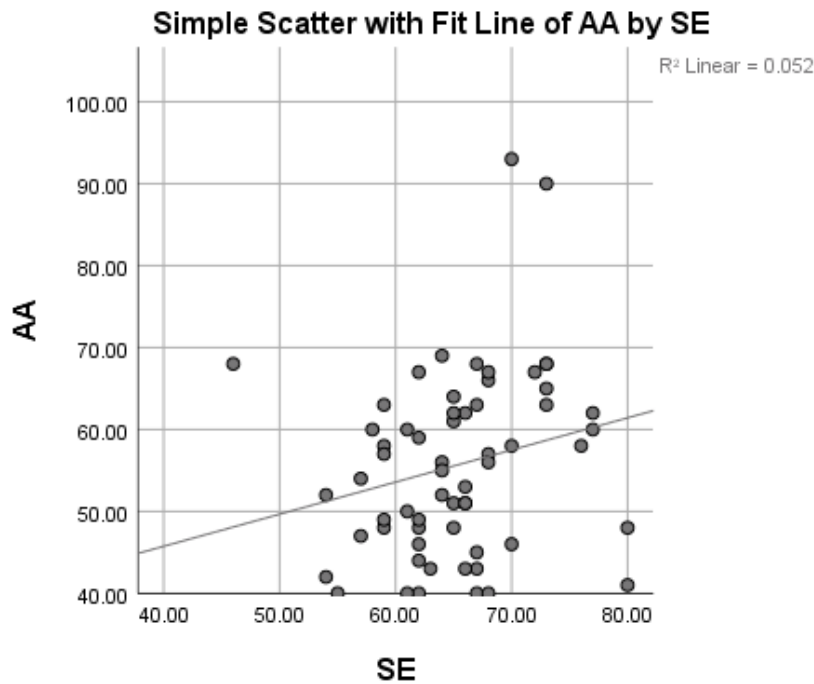


Figure 2 shows the relationship between self-efficacy and academic achievement of biology students of universities in north-west Nigeria. The points indicates a weak upward trend, meaning that as the academic achievement increases, the students’ self-efficacy also tend to increase slightly. The widespread of points around the line indicates weak relationship. The coefficient of determination $R^2 = 0.052$ mean that only 5.2% of the variation in academic achievement is explained by self-efficacy, while the remaining 94.8% is due to other factors.

Table 4: Linear regression statistics on relationship between self-efficacy and academic achievement of biology students of universities in north-west zone, Nigeria

Model	N	R	R ²	Df	Beta Value	P-Value	Decision
a. Constant	61	0.229	0.052	59	0.392	0.076	H ₀₂ Accepted
Self-efficacy							

b. Dependent Variable: Academic Achievement

Significant at $\alpha = P \leq 0.05$

Table 4 shows the results of a linear regression analysis of the relationship between self-efficacy and academic achievement of biology students in universities in north-west Nigeria. The results indicates the R-value of 0.229, the Coefficient of determination $R^2 = 0.052$, $N = 61$, and the Beta coefficient of 0.392. The P value is 0.076. Since the P value is greater than

0.05 level of significance, therefore, the null hypothesis which stated that; there is no significant relationship between self-efficacy and academic achievement of Biology students in North-west, Nigeria is accepted. Hence a weak relationship exists between self-efficacy and academic achievement of Biology students in North-west zone, Nigeria. The result further reveals that the model is very weak in predicting the outcome with coefficient of determination (R^2) of 0.052 which accounts for 5.2% of the variability in the dependent variable (Academic Achievement) is as a result of the independent variable (Self-efficacy). The result also clearly shown that when the predictor variable that is Self-efficacy increases by 0.392 units, the outcome variable that is, academic achievement will also increase by 0.392 units, since the beta coefficient was 0.392.

Discussion of Findings

Results of the findings from tables 1 and 2 indicated a strong positive relationship between self-efficacy and academic achievement of biology students at colleges of education in north-west zone, Nigeria. In other word as the Self-efficacy of the students' increases also their academic achievement increases. The results explained that about 12.9% of the variability in the dependent variable that is academic achievement of the students is as result of the independent variable that is, self-efficacy. This shows that self-efficacy influences the academic achievement of Biology students at colleges of education in north-west zone, Nigeria. The finding agrees with that of Akar, Dogan & Ustüner (2018); Nazir, Bhatti and Ali (2022); Tashaa, Novitrib & Aruan (2023); Obafemi et al (2023) who found that self-efficacy have a significant positive relationship with students' academic achievement. The finding disagrees with that of Attamah and Okoli (2021); Adjei, Amoah and Britwum (2021) who found no relationship between self-efficacy and academic achievement of students.

Results of the findings from tables 3 and 4 reveals no significant relationship between self-efficacy and academic achievement of biology students at universities in north-west zone, Nigeria. The results explained that no significant variability resulted in the dependent variable that is academic achievement of the students is as result of the independent variable that is self-efficacy, this shows that self-efficacy did not influence the academic achievement of biology students at universities in north-west zone, Nigeria. The finding agrees with that of Amoah et al (2021); Pratiwi, Laily and Sholichah (2022); Priyadharsan and Saravanabawan (2023) who found no significant relationship. The results of this study contradicts Khosiyah (2022); Al-Abyadh, Ali and Abdel-Azeem (2022); Pratiwi, Laily and Sholichah (2023); Chukwuka (2023); whose their findings discovered that self-efficacy have a significant positive relationship with students' academic achievement.

Conclusion

Based on the findings of this research study it was concluded that there exists a significant positive relationship between self-efficacy and academic achievement of biology students at colleges of education in north-west zone, Nigeria. However, no significant positive relationship exists between self-efficacy and academic achievement of biology students at universities in north-west zone, Nigeria.

Recommendations

The study recommended that:

1. Instructional practices must be designed to actively foster and encourage students' self-efficacy through which the pre-service teacher will believe in their capacity to achieve the desired learning outcomes and function effectively as Biology educators in the 21st century.
2. Teachers at various levels of education should try and identify self-efficacy of their students so as to make plans in their science lesson preparations and delivery, this will help each and every student learn and acquire the desired scientific literacy skills to function effectively.

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