



Correlational Study of Science Process Skills and Academic Achievement in Biology among Secondary School Students in Sokoto State, Nigeria

ABUBAKAR, Abdulrashid¹

aburashid130@gmail.com

08065632655

MUKHTAR, Nasiru¹

nmukhtar.ste@buk.edu.ng

08035722487

¹Department of Science and Technology Education, Bayero University of Kano, Kano State, Nigeria

Abstract

The study was conducted on correlational study of science process skills and academic achievement among biology secondary school students in sokoto state. Two research objectives, which were corresponded with research questions and research hypotheses, were developed to guide the study. Research design for the study was correlational research design, with population of 24,137 SS II Biology students which a sample of 379 students drawn using Krejcie and Morgan (1971) table for sample size determination. Multistage sampling technique was used to select the schools and participating students. Four instruments were used for data collection, namely; Science Process Skill Acquisition Test (SPSAT) and Biology Achievements Test (BAT). Instruments used were validated by 14 experts. The instruments achieved the reliability coefficients of 0.88 and 0.66 respectively. The data collected were analyzed using Descriptive (Mean, Standard Deviation and Pearson r) and Inferential (Simple Linear Regression and Multiple regressions) Statistics. The analyses of data were based on the research questions and stated null hypotheses of the study, all the hypotheses were tested at 0.05 level of significance. The results show that there was significant, positive but weak relationship between science process skills and the academic achievement in biology among senior secondary school students. Male biology students' Science Process Skills has moderate, positive and significant relationship with their academic achievement, while female biology students science Process Skills has weak, positive and significant relationship with their academic achievement in senior secondary school Sokoto, Nigeria. Based on the findings, recommendations were made among. State Ministries of Education and Science Teachers Associations of Nigeria (STAN) must implement compulsory professional development workshops, which should specifically train biology teachers on how to effectively scaffold basic science process skills within the senior secondary curriculum.

Keywords: Science, Science education, Biology, Science Process Skills, Gender

Introduction

The significance of science in the national development cannot be overemphasized, because it is an important aspect in school curriculum as man's future depends to a large extent on scientific advances and development of productive activities and also for suitable and socio-economic development as well as for technological advancement of the nations. The knowledge of science is therefore required in all countries due to the numerous challenges that are facing them. Science has made it possible for man to know more about the universe through acquisition of science process skills, which require students to be more active in learning, not only as recipients of subject matter (Muchsin & Hamdi, 2021). The process of transmitting the discoveries of science in form of knowledge, skills, attitudes, as well as fostering understanding of how science works to prepare individuals for informed participation in society, future carriers and continued scientific advancement is referred to as science education. Science education emphasizes the teaching and learning of science process, skills and principles. It is also the field of education that focuses on the teaching of science concepts and addressing challenges that students may have with regards to



Correlational Study on Science Process Skills and Academic Achievement in Biology among ... Abubakar, A. & Mukhtar, N. (2026)

science concepts and phenomena. It is very important to the scientific, technological and economic development of any nation that is why every nation must take it serious in all institutions of learning (Jolaoluwa, Mustapha, Salami, Ogundeji & Oluwagbemi, 2024). Science education focuses to put up a scientifically literate society where individual can solve their problems, provide evidence-based decisions and also evaluate information logically (Glaze, 2018). It is also help the students in the development of various skills, focusing on acquiring knowledge. Meaning there should be integration of knowledge and skills by the students for them to fully understand the scientific concepts (Kimba, Giwa, & Libata, 2018). Teaching students how to engage in inquiry is one of the essential goals of science education. In Nigeria, science education is taught in the Senior Secondary School and comprises of as Chemistry, Physics, Agricultural Science, Geography and Biology.

Biology is one of the subjects that deal with how living organisms came into existence and how they interact with one another and with the environment. Biology simply means the study of living things, including plants and animals, or the study of life. It is a natural science that is concerned with the study of living organisms which include their structure, function, growth, distribution and taxonomy (Stencel & Proszewska, 2018). It is one of the subjects at the secondary school level which is related on how to find out about nature systematically and using the scientific method (Zhaoi, Tripp & Liu, 2024). By studying Biology, students learn more about themselves, the world they live in and also equip them with acquisition of science process skills which enhances their academic achievement. Academic achievement is the extent to which learners have gained from a particular course of instruction. According to Khalid and Abdulrahman (2023) academic achievement refers to a students' progress after they are exposed to educational program. Also, Suman (2020) refers to academic achievement as the extent to which teaching and study has resulted to mastering, outcome of general and specific objectives. Also, Ibrahim and Mohammed (2023) found that poor performance in biology significantly impacts students' career aspirations in health sciences and related fields, as many students develop negative attitudes toward the subject following repeated academic failures. They also added that inadequate teacher preparation in modern pedagogical strategies, limited access to microscopes and other essential laboratory equipment, large class sizes that prevent individualized attention and the abstract nature of microscopic and molecular concepts as primary contributors to persistent low achievement in secondary school biology education. Science process skills (SPS) are set of skills commonly used by scientist for conducting scientific inquiry (Gizaw & Sota, 2023). According to the Sapna (2020) learners interact with their environment in a scientific way, and during the process they find themselves observing, questioning, hypothesizing, predicting, investigating, interpreting and communicating. Also, the SPS emphasizes the procedure in quest of knowledge actively while conducting the science experiment rather than the transfer of knowledge as the teacher's role is restricted to that of a facilitator who oversees and steers the experiment (Herranen & Aksela, 2019). Also, Limatahu and Prahani (2018) stated that, learning science has to be supported by science process skills for it to be more effective as it directly affect the students' academic achievement. Setiani, Surasmi and Tresnaningsih (2020) observed that science process skills when effectively use will help in the students' scientific literacy help them to develop their creativity, make them think like scientist and also perform better in their academic achievement.

Statement of the Problem

Biology is one of the science subjects that senior secondary school students offer in Nigeria. It is a very important science subject and a requirement for further learning of a number of science related professional courses like medicine, agriculture, pharmacy and others (Adesola, Olorode &



Correlational Study on Science Process Skills and Academic Achievement in Biology among ... Abubakar, A. & Mukhtar, N. (2026)

Aranmolate, 2022). It is of great value in determining and shaping the future of the students and hence the future of the country in term of scientific, technological and economic development. However, despite its importance, the students' academic achievement in Biology has been consistently fluctuating for some time, which poses a serious problem that warrants investigation. Table 1 shows the results of students in Biology in Sokoto state from 2018-2023.

Table 1: Biology Students' Result of NECO in Sokoto State, Nigeria

Year	Total No of Student sat	No of students with credit and above	No of students with fail	Percentage (%) Pass	Percentage (%) fail
2018	26982	11381	15601	42.18	57.82
2019	27841	11097	16744	39.86	60.14
2020	6552	4248	2304	64.84	35.16
2021	32974	16177	16797	49.06	50.94
2022	32254	20027	12227	62.09	37.91
2023	23042	12880	10152	55.09	44.1

Source: Exams Unit Ministry of Basic and Secondary Education Sokoto (MOBSES, 2024).

Table 1 shows the analysis of Biology students' achievement in the senior secondary school certificate examination from 2018-2023. The result shows fluctuation from 42.18% in 2018, 39.86% in 2019, 64.84% in 2020, 49.06% in 2021, 62.09% in 2022 and 55.09 in 2023. According to Widiyati and Sari (2019) this low academic achievement could be attributed to lack of science process skills and laboratory usage. This study investigated a correlational study of science process skills, laboratory utilization, self-efficacy and academic achievement among biology secondary school students in Sokoto state, Nigeria.

Objectives of the Study

The main objectives of this study are to:

1. Determine the relationship between science process skills and academic achievement in Biology among senior secondary school students in Sokoto, Nigeria.
2. Investigate the difference in the relationship of male and female biology students' science process skills and academic achievement in senior secondary school of Sokoto, Nigeria.

Research Questions

The study answered following research questions.

1. What is the relationship between science process skills and academic achievement in Biology among senior secondary school students in Sokoto, Nigeria?
2. What is the relationship between science process skills and academic achievement of male and female Biology students in senior secondary school Sokoto, Nigeria?

Research Hypotheses

The following research hypotheses were formulated and tested at 0.05 level of significance.

H₀₁: There is no significant relationship between science process skills and academic achievement in Biology among senior secondary school students in Sokoto, Nigeria.

H₀₂: There is no significant relationship between of male and female Biology students' science process skills and academic achievement in senior secondary school in Sokoto, Nigeria.

Research Methodology

Research design for the study was correlational research design, with population of 24,137 SS II Biology students which a sample of 379 students drawn using Krejcie and Morgan (1971) table for sample size determination. Multistage sampling technique was used to select the schools and

Correlational Study on Science Process Skills and Academic Achievement in Biology among ... Abubakar, A. & Mukhtar, N. (2026)

participating students. Two instruments were used for data collection, namely; Science Process Skill Acquisition Test (SPSAT) and Biology Achievements Test (BAT). Instruments used were validated by 14 experts. The instruments achieved the reliability coefficients of 0.88 and 0.66 respectively. The data collected were analyzed using Descriptive (Mean, Standard Deviation and Pearson r) and Inferential (Simple Linear Regression and Multiple regressions) Statistics. The analyses of data were based on the research questions and stated null hypotheses of the study, all the hypotheses were tested at 0.05 level of significance.

Presentation of Results

The data analyses of the students' responses obtained and the result with respect to each research questions and hypotheses were presented in the following tables:

Research Question 1: What is the relationship between science process skills and the academic achievement in biology among senior secondary school students in Sokoto, Nigeria?

Table 2: Pearson (r) showing the Relationship Between Science Process Skill and Academic Achievement of Biology Students of Sokoto Secondary School.

Variable	N	$\bar{x}$	SD	r	Remark
Science Process Skill	379	7.82	7.36	0.361	Positive Weak Relationship
Biology Achievement Test	379	10.01	4.21		

Table 2 shows the relationship between science process skill and academic achievement of Biology students in secondary schools in Sokoto, Nigeria. From the Table, it is revealed that students mean score in science process skills vary widely ($\bar{x} = 7.82$, $SD = 7.36$), as shown by the high standard deviation, while their scores in the Biology achievement test ($\bar{x} = 10.01$, $SD = 4.21$) are more clustered and less dispersed, indicating more consistency in their academic achievement than in their science process skills. Furthermore, the Table revealed that there is a weak and positive relationship between the science process skill and the academic achievement of the students $r(379) = 0.361$. Figure 1 shows a scatter plot that depicts the nature of the relationship.

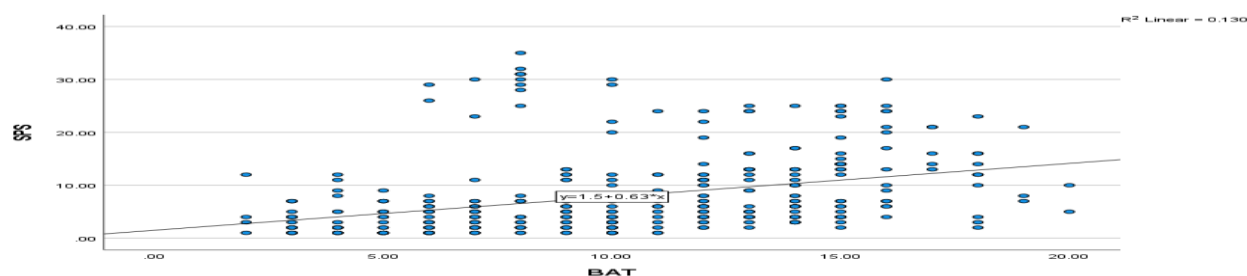


Figure 1: Scatter plot for the Relationship between Science Process Skill and Biology Achievement Test

The figure 1 shows a scatter plot illustrating the relationship between science process skills and Biology achievement test. The points show a weak upward trend, meaning that as students science process skills increase the Biology academic achievement tend to increases slightly. This is confirmed by the positive regression line, which indicates a small positive slope ($slope = 0.63$). The wide spread of the points around the line indicates weak relationship. The coefficient of determination $R^2 = 0.13$ means that only 13% of the variation in Biology achievement is explained by science process skills, while the remaining 87% is due to other factors.

Correlational Study on Science Process Skills and Academic Achievement in Biology among ... Abubakar, A. & Mukhtar, N. (2026)

Null Hypothesis 1: There is no significant relationship between science process skills and the academic achievement in biology among senior secondary school students in Sokoto, Nigeria.

Table 2a: Model Summary for the Relationship Between Science Process Skills and Academic Achievement

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.361 ^a	0.130	0.128	3.92669

a. Predictors: (Constant), SPS

Table 2a shows the regression model for the relationship between science process skill and academic achievement in Biology among senior secondary school students in Sokoto. The Table revealed that $R = 0.361$, a positive weak relationship between science process skills and academic achievement of the students, and $R^2 = 0.130$ meaning that the 13% of the students' academic achievement is explained by the science process skill. By implication, the science process skill has positive relationship with the student's academic achievement. However, the influence of the science process skill is weak as 13% academic achievement was explained only.

Table 2b: Regression Coefficients of Relationship between Science Process Skills and Academic Achievement of Biology Students

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.397	0.295		28.511	0.000
	SPS	0.206	0.027	0.361	7.516	0.000

Table 2b shows the regression coefficient of the relationship between science process skills and academic achievement of Biology students. The regression model implies that for every unit increase in science process skills there is a corresponding of 0.206 increase in the academic achievement of the students in Biology. The constant 8,397 unit increase account for other factors associated with the Biology academic achievement. The null hypothesis that stated "There is no significant relationship between science process skills and the academic achievement in Biology among senior secondary school students in Sokoto, Nigeria" is hereby rejected having ($p = 0.000$). Thus, science process skill is influence academic achievement of the Biology students.

Research Question 2: What is the relationship between science process skills and academic achievement of male and female biology students in senior secondary school Sokoto, Nigeria?

Table 3: Pearson (r) showing the Relationship Between Science Process Skills and Academic Achievement of Male and Female Biology Students of Sokoto Secondary School.

Gender	Variables	N	$\bar{x}$	SD	r	Remark
Male	Science Process Skill		9.28	6.83	0.528	Moderate and Positive Relationship
	Biology Achievement Test	171	11.09	4.48		
Female	Science Process Skill		6.63	7.58	0.168	Weak and Positive Relationship
	Biology Achievement Test	208	9.12	3.74		

Table 3 shows the relationship between science process skill and academic achievement score of male and female secondary school students in Biology. The Table provided that male students' mean in science process skills vary widely ($\bar{x} = 9.28$, $SD = 6.83$), as shown by the high standard deviation,

Correlational Study on Science Process Skills and Academic Achievement in Biology among ... Abubakar, A. & Mukhtar, N. (2026)

while in the Biology achievement test ($\bar{x} = 11.09$, $SD = 4.48$), the scores are more close to the mean and less dispersed, indicating more uniformity in academic achievement than in science process skills. Furthermore, the Table revealed that there is moderate and positive relationship between the male students' science process skill and academic achievement $r(171) = 0.528$. Figure 4.4 illustrate the nature of the relationship. Again, the Table 20 indicated wide variation in female students' mean scores in science process skills ($\bar{x} = 6.63$, $SD = 7.58$), the standard deviation is higher than the mean, while in the Biology achievement test ($\bar{x} = 9.12$, $SD = 3.74$), indicating less dispersed in the females' mean scores in the academic achievement revealing uniformity in the academic achievement than in science process skills of the female students. Furthermore, the Table revealed that there is moderate and positive relationship between the male students' science process skill and academic achievement $r(208) = 0.168$. Figure 5 shows a scatter plot that illustrate the nature of the relationship.

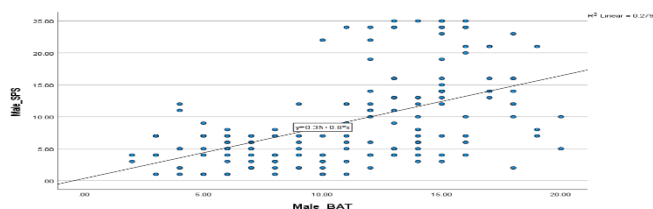


Figure a

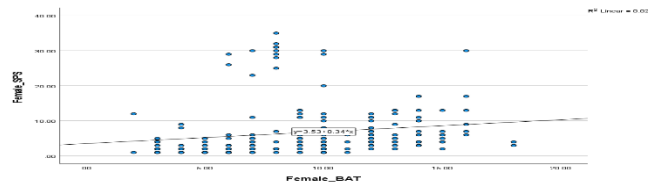


Figure b

Figure 3a & b: Scatter plot of Male and Female Students' Relationship of Science Process Skills and Academic Achievement in Biology

Figure 3a shows the relationship between male academic achievement in Biology and their science process skill. The figure indicated that the scatter plot is positive upward trend, meaning that as male students' science process skills increase their Biology academic achievement also increases. The regression equation $y = 0.35 + 0.81x$ indicates a strong positive slope, showing that for every one-unit increase in the male science process skills their academic achievement increases by 0.81 units. This indicates a strong relationship between the male academic achievement and their science process skills. On the other hand, Figure 3b shows the relationship between female academic achievement and their science process skills. The figure shows that the dots are widely scattered with a slight upward trend, showing that as female students' academic achievement increases, their science process skills tend to increase marginally. The regression equation $y = 5.53 + 0.34x$ shows a very small positive slope (0.34), meaning the increase in science process skill for each unit increase in the academic achievement is minimal. In summary, there is moderate, positive and meaningful relationship between science process skill and academic achievement of male Biology students, while for female students the relationship is very weak and positive. This shows that the male science process skills contribute significantly to their academic achievement, while the female science process skill gives little contribution to their academic achievement.

Hypothesis 2: There is no significant relationship between science process skills and academic achievement of male and female Biology students in senior secondary school Sokoto, Nigeria.

Table 3a: Regression Model of the Relationship between Science Process Skills and Academic Achievement of Male and Female Biology Students

Gender	Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate
Male	1	0.528	0.279	0.274		3.81712
Female	1	0.168	0.028	0.023		3.69968

Correlational Study on Science Process Skills and Academic Achievement in Biology among ... Abubakar, A. & Mukhtar, N. (2026)

Table 3a shows the regression model of the relationship between science process skills and academic achievement of male and female Biology students. For the male students, $R = 0.528$ indicating a strong influence of the male science process skill on their academic achievement, while $R^2 = 0.279$ revealing that 27.9% of the variation in the male students' academic achievement is explained by their science process skills, this shows a moderate positive relationship.

Again, Table 3a shows that $R = 0.168$ revealing weak relationship between science process skill and academic achievement of female students, while $R^2 = 0.028$ showing that 2.8% of the variation in female students' academic achievement is explained by their science process skills, this confirmed a very weak positive relationship between female students' science process skill and their academic achievement.

Table 3b Regression Coefficients of the Relationship between Science Process Skills and Academic Achievement of Male and Female Biology Students

Gender	Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
			B	Std. Error	Beta		
Male	1	(Constant)	7.886	.493		15.982	0.000
		SPS	0.347	0.043	0.528	8.079	0.000
Female	1	(Constant)	8.567	0.341		25.118	0.000
		SPS	0.083	0.034	0.168	2.441	0.015

Dependent Variable: BAT of Male and Female

Table 3b shows the regression coefficient for male and female Biology students' science process skill and academic achievement. For the male students the regression coefficient is $Y = 7.886 + 0.347x_1$, this means for every unit increase in science process skill (x_1) of the male students there is corresponding of 0.347 unit in their academic achievement, while constant factors contribute by 7.886-unit increase.

On other hand, for the female students the regression coefficient is $Y = 8.567 + 0.083x_2$, revealing that for every -unit increase in the female students' science process skill there is also 0.083unit increase in their academic achievement, however the increase is minimal. 8.567-unit increase in the constant factors also influences the female students' academic achievement. In summary, the regression analysis showed that the relationship between science process skills and academic achievement was statistically significant for both male and female Biology students. For the male students, the regression coefficient was significant at $p = 0.00$, while for the female students, it was likewise significant at $p = 0.015$. Since both p-values are lower than 0.05 level of significance, this indicates that science process skills significantly predict academic achievement for both male and female students. Thus, the hypothesis that stated "There is no significant relationship between science process skills and academic achievement of male and female Biology students in senior secondary schools in Sokoto, Nigeria" is hereby rejected. By implication, the strength of the relationship differs, with male students showing a stronger predictive relationship than female students. The statistical evidence confirms that science process skills contribute meaningfully to academic achievement in both male and female students.

Discussion of Findings

The findings from research question one shows a positive weak relationship between science process skills and the academic achievement in biology among senior secondary school students in Sokoto, Nigeria. This finding is in line with the findings Adebayo et al. (2022) reported that students with stronger science process skills demonstrated better academic performance in various science subjects, including biology, suggesting that proficiency in skills such as observation,



Correlational Study on Science Process Skills and Academic Achievement in Biology among ... Abubakar, A. & Mukhtar, N. (2026)

experimentation, and data analysis can enhance comprehension and problem-solving abilities in science. The study contradicted the findings of Eze (2023), while science process skills are important, the extent of their impact on academic performance in biology could be limited if not paired with effective teaching strategies and a conducive learning environment.

The findings of hypothesis one shows a significant relationship between science process skills and the academic achievement in biology among senior secondary school students in Sokoto, Nigeria. The finding added that only 13% of the variation in science process skills is explained by Biology achievement, while the remaining 87% is due to other factors. Meaning that as Biology achievement increases, the students science process skills also tend to increase slightly. The finding of this study is in line with Emmanuel, Comfort, and Venita (2018); Saputro, Irwanto, Atun and Wilujeng (2019); Ardina, Rizhal, Diana and Mieke (2020); Ibrahim, Mohd and Hairul (2023); Libata, Ali and Ismail (2023); Carlo Jaime, (2023), were of the opinion that science process skills has significant difference on academic achievement as their result revealed positive and significant correlation between science process skills and academic achievement. They also agreed that science process skill is one of the important skills possessed by students in conducting the learning process, that if students have good science process skills, they will be able to more easily understand learning concepts.

The findings from research question two shows there is moderate, positive relationship between science process skill and academic achievement of male students, while for female students' shows very weak and positive relationships among Biology Secondary School Students in Sokoto State this attributed to differences in classroom participation, confidence in practical activities, exposure to laboratory experiences, cultural expectations, teacher encouragement, and access to science learning resources. Male students are often more actively engaged in experimental and inquiry-based learning, which strengthens the connection between science process skills and academic performance, while female students may experience lower self-efficacy, limited participation in practical work, anxiety toward science-related tasks, or socio-cultural barriers that weaken the relationship despite still showing a positive trend. This finding is in agreement with the study of Akinbobola and Afolabi (2022), who reported that male students demonstrated a stronger relationship between science process skills and academic achievement in biology, attributing this to higher participation and confidence during practical activities. Similarly, Sani and Mohammed (2023) found a moderate positive relationship between science process skills and biology achievement among male secondary school students in North-West Nigeria, noting that male students tend to engage more actively in hands-on laboratory and inquiry-based tasks, which enhances their academic performance. However, the findings contradicted the study of Okeke and Eze (2022), who found no significant gender difference in the relationship between science process skills and biology achievement, concluding that both male and female students benefited equally when exposed to learner-centred and activity-based instructional strategies.

The findings from hypothesis two shows there is significant relationship between science process skills and academic achievement of male and female Biology students in senior secondary school Sokoto, Nigeria. This showed that the male science process skills contribute significantly to their academic achievement, while the female science process skill gives little contribution to their academic achievement. The finding of this study is in line with Kasinatham, (2023) who found out that there are gender differences in favour of male students in science process skills and academic achievement. In contrast to findings favoring male students, some studies have documented stronger relationships among female students. Achor and Kurumeh (2020); Ogunniyi and Fakayode (2023)



Correlational Study on Science Process Skills and Academic Achievement in Biology among ... Abubakar, A. & Mukhtar, N. (2026)

found that female students exhibited higher proficiency in certain science process skills such as observation, classification, and inference, which translated into better academic performance in Biology. Further contradictory evidence was provided by Okoli and Okeke (2019); Ogunleye and Babajide (2021); Ezeudu and Ezinwa (2022) found that science process skills significantly predicted academic achievement for both male and female students without any statistically meaningful difference between genders.

Conclusion

Based on the findings of this study it was therefore concluded that:

1. There is a positive but weak relationship between the science process skill and the academic achievement in biology among senior secondary school students in Sokoto, Nigeria.
2. Male science process skills has moderate, positive and significant relationship to their academic achievement, while the female science process skills has weak, positive and significant relationship with their academic achievement.

Recommendation

On the basis of the findings reported above, the following recommendations were made:

1. Biology teachers should deliberately integrate the teaching of science process skills, such as observing, measurement, classifying, predicting and experimenting, into everyday lessons.
2. The sokoto state ministry of education should provide a Teacher training programmes and workshops that will give particular attention to strategies that help female students derive greater benefit from science process skills.

References

- Achor, E., & Kurumeh, M. (2020). *Female students' science process skills and performance*. Nigerian Educational Research.
- Adebayo, K., Omotayo, O., & Kemi, A. (2022). Relationship between science process skills and academic achievement. *Nigerian Journal of Science and Mathematics Education*.
- Adesola, M. O., Olorode, G. B., & Aranmolate, T. R. (2022). Effect of instructional materials on biology instructions among high achieving secondary school students in SPED international secondary school, Oyo, Nigeria. *Journal of Educational Research in Developing Areas*, 3(2), 237-245.
- Emmanuel, A. Odoh, C.O and V.O Abakpa (2018) Use of Investigative Laboratory Strategy in Enhancing Acquisition of Science Process Skills Among Senior Secondary Biology Students. *ICSHER Journal*. 2(2), 68-75
- Eze, P. (2023). *Contextual factors and science process skills impact on achievement*. Sokoto Journal of Education.
- Ezeudu, F. O., & Ezinwa, J. C. (2022). Science process skills acquisition and academic achievement of secondary school Biology students in Anambra State. *International Journal of Science Education Research in Africa*, 5(1), 33-46.
- Gizaw, G., & Sota, S. (2023). Improving science process skills of students: A review of literature. *Science Education International*, 34(3), 216-224.
- Glaze, A. L. (2018). Teaching and Learning Science in the 21st Century: Challenging Critical Assumptions in Post- Secondary Science. *Education Sciences*, 8(1), 1-8.
- Herranen, J., & Aksela, M. (2019). Student-question- based inquiry in science education. *Studies in Science Education*, 55(1), 1-36.
- Ibrahim, A., Mohd, Z., & Hairul, A. (2023). *Science process skills and academic success*. *Asian Journal of Education*.
- Ibrahim, A., Mohd, Z., & Hairul, A. (2023). *Science process skills and academic success*. *Asian Journal of Education*.



Correlational Study on Science Process Skills and Academic Achievement in Biology among ... Abubakar, A. & Mukhtar, N. (2026)

- Jolaoluwa, G.T., Mustapha, A.G., Salami, S.A., Ogundeji, R., & Oluwagbemi, E.R. (2024). *Harnessing Science Education for Future Transformation in Nigeria. Educational Perspectives*, 12(1), 255-267.
- Kasinatham, S. (2023). *Gender differences in science process skills and achievement. Education Journal*.
- Khalid, S.A. & AbdulRahman, N. (2023). Academic Self-Efficacy, Intrinsic Motivation and Academic Achievement: Moderating Effect of Gender. *International Journal of Academic Research in Business and Social Sciences*. 13(1).
- Kimba, A. H., Giwa, A. A., Libata, I. A., & Wakkala, G. T. (2018). The relationship between science process skills and student attitude toward physics in senior secondary school in Aliero Metropolis. *African Educational Research Journal*, 6(3), 107-113.
- Libata, M., Ali, S., & Ismail, K. (2023). *Science skills influence on achievement in science. Journal of Educational Research*.
- Limatahu, I., & Prahani, B. K. (2018). The Effectiveness of CCDSR Learning Model to Improve Skills of Creating Lesson Plan and Worksheet Science Process Skill (SPS) for Pre-Service Physics Teacher. *In Journal of Physics: Conference Series* 997,(1) 012032).IOPPUBLISHING.
- Muchsin, & Hamdi. (2021). Analysis of Student's Creativity Value and Process Skills through Learning Strategies Guided Inquiry. *Jurnal Serambi Ilmu: Journal of Scientific Information and Educational Creativity*, 22(1), 98–109.
- Ogunleye, A., & Babajide, T. (2021). *Role of science process skills in achievement. Nigerian Journal of Science Education*.
- Ogunniyi, M. B., & Fakayode, S. O. (2023). Gender and science process skills development among Nigerian secondary school students exposed to inquiry-based learning. *Journal of Curriculum and Instruction*, 17(2), 134–149.
- Okeke, C., & Eze, B. (2022). *Gender equality in science educational outcomes. Journal of Sciences*.
- Sani, S., & Mohammed, I. (2023). *Gender and science process engagement in biology. Sokoto Journal of Educational Studies*.
- Sapna, S. (2020). Relationship Between Science Process Skills and Achievement in Science of Secondary School Students. St. Xavier's College of Education (Autonomous), Patna Arryabhatta Knowledge University, Patna State of Bihar, India. *International Journal of Creative Research Thoughts (IJCRT)*.(10)
- Saputro, E., Irwanto, A., Atun, R., & Wilujeng, I. (2019). *Science process skills and student performance. Indonesian Journal of Science Education*.
- Setiani, R., Surasmi, W. A., & Tresnaningsih, S. (2020). Effectiveness of Project Based Laboratory Learning to Increase Student's Science Process Skills and Creativity. *In Journal of Physics: Conference Series* 1491(1), 12006).
- Stencel, A., & Proszewska, A. M. (2018). *How research on Microbiomes is changing Biology: A discussion on the concept of the organism. Foundations of Science*, 23(4), 603–620.
- Suman, S. (2020). Relationship between Science Process Skills and Achievement in Science of Secondary School Students. *International Journal of Creative Research Thoughts*, 8(10), 3719-3726.
- Widyaningsih, D. & Gunarhadi, G. & Muzzazinah (2020). Analysis of Science Process Skills on Science Learning in Primary School. *Advances in Social Science, Education and Humanities Research*, (397), 679-687.
- Zhaoi, Y., Tripp, J., & Liu, X. (2024). Science Teacher Identity Research: A Scoping Literature Review. *International Journal of STEM Education*, 11(20).



www.foefugusau.com.ng

des@fugusau.edu.ng

DOI: <https://doi.org/10.64348/zije.2026585>

Correlational Study on Science Process Skills and Academic Achievement in Biology among ... Abubakar, A. & Mukhtar, N. (2026)