Influence of Motivation on Academic Performance in Biology among Public Secondary School Students in Bayelsa State

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ABSTRACT

This study investigated the influence of motivation on academic performance in Biology among public secondary school students in Bayelsa State. The study adopted a correlational research design. A sample of 415 students was employed for the study through a multi-stage sampling technique.Two research questions were answered and two corresponding hypotheses were tested in the study at a 0.05 level of significance. Data used for the study was collected directly from SS2 students of the nine (9) sampled schools of this study. Two instruments were utilized for the collection of data for this study: Biology Performance Test (BPT) and Students' Performance Motivation Scale (SPMS). Reliability was established using Cronbach Alpha for SPMS and Kuder-Richardson20 technique for Biology Performance Test (BPT), which produced the a reliability coefficients of 0.78 and 0.90 respectively.The data obtained was analysed using simple regression analysis.The result of this study revealed that extrinsic motivation isa significant predictor of students' academic performance in Biology in public senior secondary schools in Bayelsa State while the following However, the study found that intrinsic motivation does not significantly predict students' academic performance in Biology in public senior secondary schools in Bayelsa State. Amongst others, it was recommended that parents should endeavour to provide not only the physical basic needs but also the emotional needs of their children and should embrace their children's shortcomings with love and empathy.

Keywords: Intrinsic Motivation, Extrinsic Motivation, Academic performance

INTRODUCTION

Academic performance, particularly in secondary school subjects like Biology, is a central concern for educators, policymakers, parents, and other stakeholders in education. It reflects not only the student's understanding of the material but also the effectiveness of the instructional methods, curriculum design, and learning environment. Academic achievement encompasses the intellectual accomplishments of students, often demonstrated through grades, test scores, degrees, or certifications. It is a key indicator of a student's ability to assimilate and apply knowledge acquired through structured educational experiences (Steinmayr et al., 2016). The ability to perform well academically in subjects like Biology is considered essential, as it often determines future educational and career opportunities.

Biology, as a subject, is of particular importance because it lays the foundation for a variety of science-related careers, including medicine, environmental science, and biotechnology. Despite its significance, the academic performance of students in Biology has consistently been below expectations. This trend has raised concerns among educators, government officials, and parents, as poor performance in science subjects could limit the pool of students qualified for advanced studies in science and technology fields. For example, the West African Examination Council (WAEC) and the National Examination Council (NECO) have consistently recorded low achievement levels in Biology, sparking debates over the underlying causes of poor performance (Ali et al., 2014).

Several factors influence academic performance, ranging from environmental conditions, instructional methods, and resources to students' intrinsic characteristics such as motivation. Motivation, in particular, plays a crucial role in determining how students engage with learning tasks and persist in overcoming academic challenges. Motivation can either drive students towards achieving their educational goals or hinder them from realizing their potential (Cherry, 2016). When students are motivated, they tend to exhibit behaviors like regular attendance, attentiveness during lessons, timely submission of assignments, and active participation in class activities. Conversely, students with low motivation often demonstrate a lack of interest in their studies, leading to academic underachievement (Bong & Skaalvik, 2018).

Motivation, broadly defined as the process that initiates, guides, and sustains goal-directed behavior, has been identified as a critical factor in students' academic success (Cherry, 2016). It influences how much effort students put into their studies, how long they persist in their tasks, and their overall approach to learning. According to Omidiyan, as cited in Skaalvik et al. (2018), motivated behaviors are energetic, goal-oriented, and enduring, which makes motivation an essential component in the academic environment.

Motivation is typically classified into two broad categories: intrinsic and extrinsic. Intrinsic motivation refers to the internal drive to engage in activities for their inherent satisfaction or personal reward, such as a genuine interest in learning. On the other hand, extrinsic motivation is driven by external factors, such as rewards or the desire to avoid negative consequences. Both types of motivation can significantly impact students' performance, with intrinsic motivation often being linked to deeper engagement and better academic outcomes (Guay et al., 2019).

In the context of Biology, motivation can be particularly crucial, given that the subject requires both theoretical understanding and practical application. For students to excel in Biology, they need to be motivated not only to memorize facts but also to develop critical thinking skills, engage in experiments, and understand complex biological processes. Studies have shown that students who are motivated to learn are more likely to overcome obstacles such as difficult topics or lack of resources and perform better in their exams (Auwolu & Kabara, 2021).

Motivation influences academic performance by shaping students' attitudes towards learning and their persistence in the face of challenges. For example, students with high levels of motivation are more likely to attend classes regularly, participate actively in discussions, and seek help when they encounter difficulties. In contrast, students with low motivation may display a lack of interest in their studies, leading to poor academic performance (Bong &Skaalvik, 2018). This distinction is critical, as Biology is a subject that requires consistent effort and engagement due to its comprehensive and detailed nature.

A number of studies have explored the relationship between motivation and academic performance, with many finding a positive correlation between the two variables. For instance, Auwolu et al. (2021) conducted a study that examined the relationship between students' motivation and their academic performance in a Malaysian university. Their findings revealed a strong positive relationship between motivation and academic performance, indicating that motivation is a good predictor of students' success in their studies. Similarly, Raiyegbemi et al. (2020) investigated the factors responsible for students' performance in Biology examinations in Ogun State, Nigeria. They found that students' attitudes, motivation, and the availability of resources significantly influenced their performance in Biology.

Onyekwere et al. (2018) also investigated the influence of intrinsic and extrinsic motivation on pupils' academic performance in Mathematics. Their study revealed that motivation plays a significant role in improving students' academic performance, with intrinsic motivation having a greater impact on academic achievement than extrinsic motivation. The findings also suggested that gender differences exist in motivation types, with females being more intrinsically motivated and males more extrinsically motivated.

In another study, Abu Bakar et al. (2013) explored the relationship between university students' achievement motivation, attitude, and academic performance. Their results indicated a positive correlation between

students' motivation and academic achievement, further emphasizing the importance of motivation in academic success.

Despite the positive findings linking motivation and academic performance, there are still gaps in understanding how motivation influences specific subjects like Biology. For example, Njigwum and Longjohn (2019) found that previous achievement in Junior Secondary School Certificate Examination (JSCE) Basic Science did not predict performance in Senior School Certificate Examination (SSCE) Biology. This suggests that cognitive factors alone may not be sufficient predictors of academic success in Biology, and affective factors like motivation may play a more significant role.

While numerous studies have established the relationship between motivation and academic performance, there is a need for more specific research focusing on how motivation influences performance in Biology. The unique demands of Biology, which requires both theoretical understanding and practical application, may interact with motivational factors in ways that differ from other subjects. Furthermore, there is limited research on how different types of motivation (intrinsic vs. extrinsic) specifically affect students' performance in Biology in the Nigerian educational context.

Given the persistent low performance of students in Biology, understanding the role of motivation in shaping academic outcomes is crucial. Identifying the motivational factors that influence students' success or failure in Biology can inform the development of targeted interventions to improve academic achievement. This study, therefore, seeks to investigate the influence of motivation on academic performance in Biology, focusing on secondary school students in Bayelsa State, Nigeria.

In conclusion, academic performance in Biology, like other subjects, is influenced by a variety of factors, with motivation playing a key role. The existing literature highlights the positive relationship between motivation and academic achievement, but there are still gaps in understanding how motivation affects performance in specific subjects like Biology. This study aims to fill this gap by exploring the influence of motivation on the academic performance of secondary school students in Biology, with the hope of contributing to strategies that can enhance students' success in this critical subject.

Statement of the Problem

The persistent underachievement in Biology among secondary school students in Nigeria has become a significant concern for educators, policymakers, and parents alike. Biology, being a core science subject and foundational for numerous career paths in fields such as medicine, agriculture, and environmental science, plays a crucial role in students' academic and professional development. Despite its importance, numerous reports from public examination bodies, such as the West African Examinations Council (WAEC), have shown consistent low performance in Biology in external examinations. This recurring trend poses a threat to national educational goals and aspirations, especially in fostering science and technology-based careers.

One critical factor believed to influence students' academic performance is motivation, which can manifest in different forms such as intrinsic motivation (interest in the subject itself), extrinsic motivation (external rewards such as grades or recognition), and the broader context of motivational environments created by teachers, parents, and the school system. Students who are motivated are likely to engage more actively with learning materials, show persistence in the face of academic challenges, and apply greater effort in their studies. However, the extent to which motivation influences academic performance in Biology remains inadequately explored, especially in the context of Nigerian secondary schools.

Given the importance of Biology to students' academic success and future opportunities, as well as the potential impact of motivation on learning outcomes, it becomes imperative to investigate how different types and sources of motivation affect students' performance in this subject. This study seeks to bridge the knowledge gap by examining the influence of motivation on students' academic performance in Biology,

providing insights that can inform educational practices and policy interventions aimed at improving learning outcomes in science education.

Research Questions

The following research questions guided the study;

1. To what extent does intrinsic motivation influence students' academic performance in Biology among public senior secondary schools in Bayelsa State?
2. To what extent does extrinsic motivation influence students' academic performance in Biology among public senior secondary schools in Bayelsa State?

Hypotheses

The following null hypothses were tested at 0.05 level of significance guided the study

1. Intrinsic motivation does not significantly influence students' performance in Biology among public senior secondary schools in Bayelsa State.
2. Extrinsic motivation does not significantly influence students' performance in Biology among public senior secondary schools in Bayelsa State.

METHODOLOGY

Research design

The study employed a correlational design. Correlational research is adopted for the investigation of the magnitude and direction of the relationship that exists between a dependent variable (Criterion variable) and one or more independent variables (predictor variables) (Kpolovie, 2010). Kpolovie further stated that correlational research is very suitable for investigations aimed at the prediction of one variable on others (one or more variable). Therefore, correlational design is the most suitable to this investigation as it will enable the researcher to achieve the objectives of the study.

Population of the Study

The population of this study was made up to all 9,569 senior secondary school students in the public secondary schools in Bayelsa State (Bayelsa State Ministry of Education, 2023). Senior Secondary school students were the favorites for the study because they are relatively mature and able to understand variables of the study. Also, they are the level of students who offer Biology as a subject.

Sample and Sampling Technique

A sample of 415 students was employed for the study. This size is higher than the minimum sample of estimated through the Taro Yamen formula for minimum sample size (see Appendix A). A multi-stage sampling procedure was utilized for data collection.

Instruments for Data Collection

Two instruments were used for the collection of data for this study. The first is a **Biology Performance Test** instrument to determine the performance of the respondents in Biology. The test was a self-constructed 20-item and 4-point multiple choice test on Biology. The second for data collection for this study is a questionnaire titled "**Student Performance Motivation Scale (SPMS)**" adapted from Awaulu and Kabara (2021). It is a standardized instrument with 20 items structured 5-point Likert scale with a reliability coefficient of 0.770. The researcher modified it into a 4-point Likert scale of Very High Extent (VHE 4), High Extent (HE 3), Low Extent (LE 2) and Very Low Extent (VLE 1).

Validation of the Instruments

The instruments were validated on face and content validity. The psychological instruments were validated by the researcher's supervisor and two other experts in Guidance and Counselling, and Educational Psychology, in the department of Educational Psychology, Ignatius Ajuru University of Education. Their corrections were effected and enabled the researcher in designing the final draft of the instrument. However, the Biology achievement test was validated using test blueprint and two senior Biology teachers in public secondary schools.

Reliability of the Instruments

The reliability of the SPMS was determined through the Cronbach reliability method. The copies of the instruments were administered to 30 students in public secondary schools in Obio/Akpor Local Government Area of Rivers State, a sample not part of the study area. The responses of the students on the sampled administration of the copies of the instruments were subjected to statistical analysis. However, Kuder-Richardson20 estimate were used in determining the reliability of the Biology performance test. The data generated was analyzed and it produced an internal consistency measure of 0.78 for Students' Performance Motivation Scale and 0.90 for Biology performance test. The reliability measures produced were above the 0.70 benchmark for good and acceptable reliability measure.

Administration of the Instruments

The researcher administered 450 copies of the questionnaire and retrieved 415 copies which were utilized for data analysis. Thus, the administration of instrument had a retention rate of 92.2%.

Method of Data Analysis

Simple regression analysis was used to answer all the research questions and test all the corresponding hypotheses at a 0.05 level of significance. Statistical Package for Social Sciences (SPSS) version 27 aided the data analysis.

RESULTS

Research Question 1: To what extent does intrinsic motivation predict students' academic performance in Biology in public senior secondary schools in Bayelsa State?

Hypothesis 1: Intrinsic motivation does not significantly predict students' performance in Biology in public senior secondary schools in Bayelsa State.

Table 1a: The extent of prediction of Intrinsic motivation on students' academic performance in Biology

Model Summary		
Model	R	R²
1	.052	.003

Table 1b: Omnibus ANOVA Test

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	5.522	1	5.522	1.058	.304[b]
Residual	2056.114	394	5.219		
Total	2061.636	395			
a. Dependent Variable: Biology Performance					
b. Predictors: (Constant), Intrinsic motivation					

Table 1c: Testing the Significance of Standardized Regression Coefficient (b) between Intrinsic motivation and students' Biology Performance

Predictor	Estimate (B)	SE	t	Sig. (p)	Stand. Estimate
Intercept	3.630	0.985	3.69	.000	
Intrinsic motivation	0.300	0.292	1.03	0.304	0.0518

Dependent Variable: Biology Performance

The linear regression model was applied to determine the extent to which Intrinsic motivation predicts students' academic performance in Biology. The linear regression result in Table 4.4b indicated a non-significant model ($F(1, 394) = 5.83$, $p< .05$), with an R^2 of .003. The R^2 of .003in the regression model suggests that intrinsic motivation accounts for a near zero percentage (0.3%) variance in students' Biology performance in public senior secondary schools in Bayelsa State.

For hypothesis testing, result from table 4.4c shows that the predictive relationship between intrinsic motivation and Biology performance is not significant (t = 1.03, p = .304). Therefore, the null hypothesis is not rejected. This means that intrinsic motivation is not a predictor of students' academic performance in Biology in public senior secondary schools in Bayelsa State.

Research Question 2: To what extent does extrinsic motivation predict students' academic performance in Biology in public senior secondary schools in Bayelsa State

Hypothesis 2: Extrinsic motivation does not significantly predict students' performance in Biology in public senior secondary schools in Bayelsa State.

Table 2a: The extent of prediction of Extrinsic motivation on students' academic performance in Biology

Model Summary		
Model	**R**	**R²**
1	.194	.0378

Table 2b: Omnibus ANOVA Test

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	76.803	1	76.803	15.341	.000[b]
Residual	1957.508	391	5.006		
Total	2034.310	392			
a. Dependent Variable: Biology Performance					
b. Predictors: (Constant), Extrinsic motivation					

Table 2c: Testing the Significance of Standardized Regression Coefficient (b) between Extrinsic motivation and students' Biology Performance

Predictor	Estimate (B)	SE	t	Sig. (p)	Stand. Estimate
Intercept	0.345	1.111	0.311	0.756	
Extrinsic motivation	1.181	0.302	3.917	.000	0.194

Dependent Variable: Biology Performance

The linear regression model was applied to determine the extent to which extrinsic motivation predicts students' academic performance in Biology. The linear regression result in Table 4.5b indicated a statistically significant model ($F(1, 391) = 7.81$, $p < .05$), with an R^2 of .038. In the present regression model, the R^2 of .038 suggests that 3.8% of the variance in Biology performance in public senior secondary schools in Bayelsa State could be attributed to extrinsic motivation. This effect size implies that extrinsic motivation has a weak effect on students' academic performance in Biology in Bayelsa State.

Furthermore, results from table 4.5c shows that the predictive relationship between extrinsic motivation and Biology performance is significant a ($t = 3.92$, $p < .001$). Therefore, the null hypothesis is rejected. This means that extrinsic motivation style is a predictor of students' academic performance in Biology in public senior secondary schools in Bayelsa State. The fitted regression model for predicted Biology performance is given as $Y' = .345 + 1.181x$. Consequently, for every one unit increase in the predictor (extrinsic motivation) there is a corresponding 1.181 unit increase in Biology performance.

DISCUSSION OF FINDINGS

Influence of Intrinsic motivation on students' academic performance in Biology

The result of this study shows that intrinsic motivation does not significantly predict students' performance in Biology in public senior Secondary Schools in Bayelsa State. This result is surprising because intrinsic motivation is the true drive in humans, which propels individuals to search for and to face new challenges for interest, inner satisfaction and/or fulfilment sake; this drive is short-lived when goal is accomplished (Fontana cited in Eccles & Wigfield, 2015). Schiefele cited in Onyekwere et al., (2018) described intrinsic motivation as an inner force that motivates students to engage in academic activities, because they are interested in learning and they enjoy the learning process as well. The student with intrinsic motivation does everything within his capacity to attain education set goals, such as being punctual, listing attentively, taking notes during lessons and does assignments. This student studies hard and does not wait for examination before studying because he wants to make good grades so as to be happy and fulfilled. An intrinsically motivated student puts in all his might into his studies to bring his potentials and abilities to bear. Eke and Onyekuru (2013) found that intrinsic motivation allows the student to demonstrate inner drive for excellence and brings in novel ideas to learning, curiosity to learn more and devices better ways of acquiring knowledge and solving problems.

This result agrees with Megan and Friedman (2015) who found that intrinsic motivation is negatively correlated with students' achievement. They said that intrinsic motivation is short-lived when there are no reinforcers to sustain it. The present study also agrees with Raiyagbemiet al., (2020) that factors such as inadequate resource materials, inadequate qualified biology teachers, availability of laboratories and frequency of practical classes significantly dampened intrinsic motivation of students' academic performance.

Influence of Extrinsic motivation on students' academic performance in Biology

The result of this study shows that extrinsic motivation is a significant predictor of students' performance in Biology in public senior Secondary Schools in Bayelsa State. This result is not surprising as extrinsic motivation is burn out of external environmental stimuli that fuels the students impute towards set goals. Extrinsic motivation pertains to an engaging in an activity to attain a specific goal or as an instrumental means to an end. It is that which propels an individual towards an activity or series of activities with the goal or objectives of the external rewards accruable from such activity and not for inner satisfaction (Ryan & Deci, 2014). The goal is the reason for engaging in that activity and not because it makes one happy. Certain external forces in the external environment engineer or help to arouse or spur the individual into such an activity. These forces are known as motivators and they include parental expectations, expectations of other trusted role models, earning potential to enroll in a course later and good grades. With all these reinforcers, the student is likely to explore every avenue within his/her reach to attain set objective. Benabou and Tirole

(cited in Onyekwere, 2018), opined that extrinsic motivation promotes effort and performance with rewards serving as positive reinforces for the desired behavior. Extrinsic motivation is not innately prompted but provokes for external reasons and typically yearns for immediate results unlike intrinsic motivation. This study agrees with Abu Bakar et al., (2013) whose study revealed that motivation hinged on external rewards is positively related with students' academic performance. However, the result of this present study disagrees with Ekwesiri and Mbonu (2018) as they found that extrinsic motivation does not correlate with students' performance. Similarly, authors who hold this perspective say that once the rewards are removed, students lose their motivation.

CONCLUSION

The study concludes that extrinsic motivation significantly related with students' academic performance in Biology in public senior secondary schools in Bayelsa State. This means that motivation is crucial in students' academic pursuit as it help to sustain the students' determination to succeed in his/her school work. The study affirmed that motivation is an important variable that could determine the magnitude of the students' academic performance in Biology.

RECOMMENDATIONS

1. All parents should endeavour to provide not only the physical basic needs but also the emotional needs of their children and should embrace their children's shortcomings with love and empathy.
2. The school apparatus, government and parents should encourage and reward academic excellence so that students can be motivated to learn and perform better.

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