

Relationship between motivation and biology achievement of senior secondary school students in Chanchaga Local Government Area of Niger State, Nigeria

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Abstract

The study examined the relationship between motivation and biology achievement of secondary school students in Chanchaga Local Government Area of Niger State, Nigeria. The study employed descriptive survey design and stratified and simple random sampling techniques were used for selecting 320 senior secondary students. A Motivational Scale was used as instrument for data. Two research objectives guided the study. Pearson's Product Moment Correlation and t-test statistics were used to test the null hypotheses at .05 levels of significance. The finding of the study showed that there was a significant relationship between motivation and students' biology achievement in secondary schools in Chanchaga Local Government Area. The finding also revealed that there was a significant difference in biology achievement of male and female senior secondary school students. The study concluded that the higher the motivation the better the achievement of students in Biology. It was recommended that both human and material resources should be well and adequately provided and utilized to ensure high motivation of both male and female students for better biology achievement in secondary schools.

Key words: Relationship, motivation, biology achievement, senior secondary school students

Introduction

Motivation is a process that promotes self-interest with internal and external factors that influence to attain significant benefit in learning. Motivation is therefore, an important psychological concept that helps individual to strive consistently to achieve an objective as it energizes, directs and sustains behaviour (Birgen, 2017: 44). The term motivation was derived from the word "motive", and in turn from Latin word "movere"; meaning "to move" (Igoche *et al.*, 2022). According to Deci and Ryan (2000:227), to be motivated means to be moved to do something. Yilmaz, et al. (2017: 112) stated that motivation is perceived as a driving force that stimulates, directs and sustains effort or behaviour. Gbollie and Keamu (2017) maintained that motivation is a combination of motive and action. Kariuki and Mbugua (2018) posited

that motivation is an action word that influences every aspect of our daily lives and is fundamental in the level of success an individual attainment. It is a personal and internal feeling, which arises from needs and wants. Motivation is a continuous process because as we get our needs fulfilled, it gives rise to other needs (Birgen, 2017). According to Boris (2021), scholars agreed that motivation as a concept is very important for both teachers and students in identifying and perceiving the root of academic success or failure.

Therefore, motivating oneself is about setting the direction independently and then taking a course of action that will ensure that one gets to his or her targets. People are motivated when they expect that a course of action is likely to lead to the attainment of a goal and satisfies their needs and wants (Yilmaz, et al., 2017: 112).

Leonardou et al. (2020) defined motivation as forces acting either within or on a person to initiate behaviour or as a desire, need or drive that contribute to and explain behavioural changes. Igoche et al. (2022) also defined motivation as an inner drive in an individual to excel in whatever he or she is doing. Thus, motivation is a condition that activates and sustains behaviour toward a goal. It plays a very central role in learning and achievement on many levels of individual's life, as well as in both formal and informal learning settings. Providing motivation to students is an essential part of teaching and learning (Kariuki & Mbugua, 2018). Hence, anything that gets students moving, and keeping them going in a particular direction is a motivator (Birgen, 2017: 45).

Alcivar et al. (2020) analyzed two major types of motivation namely; intrinsic and extrinsic motivation. Intrinsic motivation is the urge to engage in the learning activity or desire to do or achieve something for its own sake or because one truly wants to and takes pleasure or sees value in doing so (Javed, et al., 2022). Nyandera, et al. (2019) referred to intrinsic motivation as an internal reward that comes about because of performing a task. Students are therefore, motivated to learn naturally because of their own interest and enjoyment in the task, which gives deep meaning to what they have learned and its effects on their lives (Johnson, 2017). Extrinsic motivation, on the other hand, is the motivation that is derived from external incentives or desire to do or achieve something not for the enjoyment of the thing itself but because doing so leads to a certain result that include material benefits or job security (Kagema, 2018). Nyandera et al. (2019) described extrinsic motivation as a tangible reward that an individual gets out of the work or task accomplished.

In this context, students who are motivated work better and harder, and engage in an action by the driving force. Low motivation affects teachers' teaching effectiveness and in turn, influences students' performance (Nyandera, et al., 2019). Boris (2021: 21) stated that students' motivation greatly affects their learning and engagement in formal, semi-formal and informal activities. Students' motivation for learning is consider among the most crucial determinants of the quality and success of learning outcome in a school setting (Kariuki & Mbugua, 2018: 14). According to Kennedy (2020: 50), motivation in education can have several effects on how students learn and behave towards subject matter since it can direct their behaviour toward particular goals, guide them to increase effort and energy, as well as increase their persistence and resilience in undertaking learning activities. Student who are motivated tend to have higher achievement in grades and test scores than other amotivated students (Ahn, et al., 2021). Individuals can be motivated through grade, reward, money, power or praise. Some students are self-motivated and their actions are a result of their desire to face challenges. Hence, teachers can praise, promote and encourage this personal trait (self-motivated) by showing students that their efforts are worthwhile and they will benefit from them (Ayenigbara & Seidu 2017: 2182).

Biology is a branch of science structured to train students with the knowledge of relevant concepts and scientific skills. Biology is the science that deal with study of plants and animals as classified into "ladder of nature" known as "hierarchy" today (Oyovwi, 2019: 150). According to Basil (2021), biology is the natural science that studies life and living organisms including their physical structure,

chemical processes, molecular interaction, physiological mechanisms, development and evolution. Biology is a science-oriented course; thus, it has developed advancement as it concerns the field of forensic science, genetic engineering and machines. It plays an important role in the understanding of complex forms of life involving humans, animals and plants along with their interaction between humanity and the world. Also, biology is one of the key subjects that formed part of the requirement for admission for students in many fields of studies in Nigerian colleges, polytechnics and universities (Bichi, et al., 2019: 302).

However, biology as a science subject is faced with some problems and challenges in schools. Lack of textbooks, laboratory apparatus and other learning resources in the schools, negative attitude towards the subject in the part of students and parents constitute reasons that affect the biology achievement of students. Increasing number of students' enrollment in science subjects in secondary schools without corresponding number of teachers puts pressure on the limited qualified teachers available to reduce the time allotted to practical classes. Teachers' supervision during laboratory activities and teaching large classes combined with practical work became difficult and ineffective. Most laboratory resources are scarce, obsolete and inadequate. In some cases, students are not allowed to make use of biology laboratories due to fear of losing valuable materials through stealing. The number of professional teachers are limited whereas competent and experienced teachers cannot give hundred percent of their time, energy and resources to biology practical due to limited materials and large students' population. Evidence from researchers testifies that most biology laboratories are not equipped with science facilities and even

when these resources are available their management becomes questionable (Bichi, et al., 2019).

Similarly, students' performance in biology at the Senior School Certificate Examination has been unsatisfactory over the years (West African Examination Council, 2018). Bichi et al (2019) stated that the percentage of students that passed biology at credits in the external examination (WAEC) was very low compared to the total entry as shown in 2014, 2015, 2016 and 2018 with 33.9%, 28.6%, 33.9% and 28% respectively. The West African Senior School Certificate Examination chief examiner's reports revealed reasons for candidates for poor performance to include their inability to tackle numerical and arithmetic questions, poor expressions, memorization of concept without understanding, writing of half-life reaction and incorrect balancing of ionic equations. Scholars also attached reasons for low level of students' performance in biology at the senior school examinations to lack of interest and commitment on the part of students, unqualified and improper motivation of teachers, teachers poor knowledge of the subject matter, nature of some of the topics, non-availability of instructional materials and facilities and over loaded curriculum (Bichi, 2019). Nyandera et al. (2019) also marked examination failure to amotivation, meaning dissatisfaction that led to absenteeism, aggressive behaviour, abandonment of duty and psychological withdrawal from work by students and teachers.

This dismal situation is not in conformity with the goal and aspiration of year 2030 agenda of the Sustainable Development Goals, because for a country to attain scientific, economic and technological advancement, excellent academic achievement of students in

Biology is essential (Zalmon & Wonu, 2017). This disheartening state of students' performance has been attributed by scholars to varying factors such as students' and teacher's motivation, incompetence, under motivation of teachers to teach science, poor teachers' training, poor implementation of curriculum and inadequate science teachers and resources for teaching and learning (Omonije & Obadiora, 2018). Although the essence of students to register for biology is to qualify them for science-based courses, the aim is being defeated because of absence of motivation, which leads to low students' enrollment in science classes in Nigerian schools (Nja, et al., 2020: 20). In addition, students' outcomes in internal and external examinations do not match the government and parents' investment (Omonije & Obadiora, 2018: 15). It is on the basis of this degeneration in biology achievement in senior secondary schools in Chanchaga Local Government Area, Niger State that this study is justified in order to uncover the underlying reasons for possible solutions. Thus, this study has covered statement of the problem, research objectives and hypotheses, methodology, results, discussions, conclusion and recommendations.

Statement of the problem

The low level of biology achievement in examinations such as West African Senior School Certificate Examination (WASSCE), National Examination Council (NECO) and low quality students that are turned out has call for very serious concern in this study. What could be responsible for this ugly trend, even when it is assumed that there are well-trained and qualified teachers to teach effectively? A closer look at motivation serves as a proof and way out that something needs to be done to improve the academic performance of the students. Secondary

schools in Chanchaga Local Government Area in Niger State are faced with so many problems and challenges such as poor infrastructural facilities, ineffective style of delivery of subject matter by biology teachers, poor reading habits, inability of teachers to cover the curriculum content, lack of teachers' commitment and motivation and unconducive learning environment. Also, insecurity, indiscipline, delay in payment of teachers salary and inducement are responsible in low biology achievement of students in Chanchaga Local Government Area which this study determined with the view of finding solutions in order to address them.

Objectives of the study

The objectives of this study are to:

- 1 Determine the relationship between motivation and biology achievement of senior secondary school students in Chanchaga Local Government Area of Niger State.
- 2 Determine the difference in biology achievement of male and female senior secondary school students in Chanchaga Local Government Area of Niger State.

Hypotheses

The following null hypotheses were tested in the study:

Ho₁ There is no significant relationship between motivation and biology achievement of senior secondary school students in Chanchaga Local Government Area of Niger State.

Ho₂ There is no significant difference in biology achievement of male and female senior secondary school students in Chanchaga Local Government Area of Niger State.

Methodss

The descriptive survey design was employed in this study. A descriptive survey design was considered suitable and appropriate for obtaining information that covered motivational trends surrounding biology achievement from senior secondary school students in Chanchaga Local Government Area. This is in line with the opinions of Baji, et al. (2015) that survey desin permit researchers to obtain data on personal and social characteristics, beliefs, and opinions of research respondents.

The target population of this study is all the senior secondary school Biology students in Chanchaga Local Government Area of Niger State. The accessible population, on other hand, is Biology students in senior secondary school two (SSII) from both public and private schools in Chanchaga. The population is 3,895 for 2022/2023 academic session (Department of Planning, Research and Statistics, Niger State Ministry of Education Minna, 2023). A breakdown of this figure showed that 2,107 (54%) were male while 1,788 (46%) were female.

This study adopted stratified and simple random sampling techniques. Stratified sampling is a probability sampling method in which the heterogeneous population is classified into different groups or strata according to their characteristics before sample selection (Akpan, 2020). Simple random sampling is a probability sampling method in which the representative subjects are selected by chance (Baji, et al., 2015). In the first stage, stratified sampling technique was used to classify students based on gender (male and female). For stage two, simple random sampling technique was used in selecting required number of students from each selected school. Krejcie and Morgan (1970)

population table for sample size was used to select 320 SSII Biology students as the sample size. This consisted of 176 (55%) for males and 144 (45%) for females.

The instrument used for data collection in this study was a structured questionnaire designed by the researchers titled: 'Motivational Scale (MS)' and Biology Achievement Test. The MS consisted of two sections (A & B). Section A contained information on students' demography (name of school and gender). The section B has thirty-six (36) items which measured motivation structured on a four-point modified Likert's scale, namely; Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) and scored 4, 3, 2 and 1 respectively. The Biology Achievement Tests was constructed on 20 multiple-choice items to measure students' performance in Biology as a subject offered at the secondary education levels.

The MS instrument was given to two research experts in Educational Psychology and test and measurement, Faculty of Education, Ahmadu Bello University, Zaria who validated the instrument through content validity. The instrument was carefully and independently scrutinized, vetted and the comments and suggestions were harmonized.

The reliability of the instrument was carried out using test re-test method. The instrument was given to thirty (30) students in Government Science College, Tudun Fulani at two different occasions. The scores generated were measured using Pearson's Product Moment Correlations to determine the internal consistency. The analysis made had 0.75 reliability index which was considered in the study.

The researchers developed consent the schools selected and students to fill in order to indicate their willingness to participate in the research process. The

approved institutional clearance was used in obtaining data from the selected schools. Upon approval, the researchers collaborated with the vice principal and biology teachers of the sampled schools. Two (2) research assistants were trained on the nature and procedures for administering the questionnaire. Before the administration of the questionnaire, the researcher took time to explain the purpose and procedures for completing the questionnaires to the students.

The instruments were administered on the respondents during the period approved by the schools 'authority and it lasted for three days for all the selected schools. The administration lasted between thirty and sixty minutes in each of the schools. The use of school Biology teachers as research assistants facilitated easy administration and retrieval of the instruments. Although, there were challenges in the course of data collection such as waste of time or long time waiting, double ticking of items, withdrawal of some and withholding of instruments by students

were also observed. All copies of the filled questionnaire were retrieved back on the spot.

The data analysis was carried out using mean, standard deviation, Pearson's Product Moment Correlations (PPMC) and t-test independent samples. Pearson's Product Moment Correlation was used to test the null hypothesis on the relationship between motivation and Biology achievement and t-test independent samples was employed to measure the difference in Biology achievement of male and female students. The analysis was made using SPSS version 21.

Results

The results are presented according to the hypotheses in this section.

Hypothesis one: There is no significant relationship between motivation and biology achievement of senior secondary school students in Chanchaga Local Government Area of Niger State. The data in Table 1 are used to test this hypothesis.

Table 1: Pearson's Product Moment Correlation of relationship between motivation and biology achievement

Variables	Motivation	Biology achievement
Motivation Pearson's correlation	1	0.026
Sig. (2-tailed)		0.052
N	320	320
Biology achievement Pearson's correlation	0.026	1
Sig. (2-tailed)	0.052	
N	320	320

Correlation is significant at 0.05 levels (2-tailed).

Table 1 revealed a significant positive relationship between motivation and biology achievement of senior secondary school students ($r = .026$; $p > .05$). The null hypothesis which stated that there is no significant relationship between motivation

and Biology achievement of students in secondary schools was rejected.

Hypothesis two: There is no significant difference in biology achievement of male and female senior secondary school students

in Chanchaga Local Government Area of Niger State. The data in Table 2 are used to

test this hypothesis.

Table 2: Independent t-test analysis of Biology achievement of male and female students

Gender	N	Mean	Std. Deviation	Std. Error Mean	df	t-value	Sig. (2-tailed)	Decision
Male	176	5.4716	2.21921	.16728	317	-2.793	.006	Rejected
Female	144	6.1329	1.95094	.16315				

The t-test analysis in Table 2 showed that ($t = -2.793$, $df = 318$, $P = .006$) which is expressed in mean values as 5.47 for males and 6.13 for females. Since the computed P-value is less than 0.05 levels of significance, this implies that the null hypothesis is rejected. The finding showed that there is a significant difference in biology achievement of male and female senior secondary school students in Chanchaga Local Government Area of Niger State.

Discussion

The finding of the study showed that there is a significant positive relationship between motivation and biology achievement of senior secondary school students in Chanchaga Local Government Area of Niger State. This finding is supported by AL-Qadri and Wei (2019) who found that there is a positive and significant relationship between motivation and academic Biology achievement of students who studied at the Arabic schools in China. The finding also corroborated with the study of Aminu et al. (2019) who stressed that students' motivational level influence their academic performance. The study finding further agreed with Isah et al. (2019) who revealed a strong positive correlation between motivation and academic achievements among senior secondary school students in Zaria, Nigeria. The finding of Usen (2016) also reported a significant correlation between motivation and academic achievement among senior

secondary school students. However, the study of Saka and Onanuga (2022) disagreed with this finding; revealing that the direct effect of academic motivation on students' achievement was not statistically significant. The result therefore proved that motivation had a significant positive correlation with Biology achievement of secondary school students. This implies that the Biology achievement of student will increase if their motivation is improved.

The finding also indicated that there is a significant difference in Biology achievement of male and female senior secondary school students in Chanchaga Local Government Area of Niger State. This finding agreed with Shopelu et al. (2021) who reported positive relationship between gender and students' academic self-concept in Biology performance. The finding of Achufusi et al. (2019) also showed that motivation had a positive significant influence on both male and female achievement in physics. Contrary to the findings of Alafiatayo et al. (2019) and Atsuwe and Mba (2021), a no significant difference in biology achievement of male and female students was reported. This finding further disagreed with Aminu et al. (2019) who found the influence of gender on academic achievement of secondary students in mathematics to be insignificant. However, the difference in the means was in favour of female students; signifying that females performed better in biology achievement than the male students. This was in line with

the study of Bichi et al. (2019) which indicated that the female students have higher mean scores if compared with their male counterparts in biology achievement.

Conclusion

This study has established that a significant strong relationship exists between motivation and students' Biology achievement of senior secondary school students in Chanchaga Local Government Area of Niger State. Furthermore, the difference in gender achievement implies that female students performed better in biology achievement than the male students. Thus, there is the need to increase motivational strategies in teaching biology since is one of the major subjects prepare senior secondary students for the study of science-oriented courses at the higher institutions. The slight difference in gender achievement is an assurance that there is hope for both male and female students as they possess the potentials of benefiting from Biology education to produce require scientists in the society.

From the findings of the study, the following recommendations have been made:

1. Training of biology teachers in our secondary schools through workshop and seminars should be intensified by government, Science Teachers Association and development partners to improve their instructional strategies and pedagogies.
2. Provision of motivation through adequate and relevant learning materials and facilities should be given priority by government, Parents' Teacher Association, alumni body, non-governmental organizations, and development partners to improve students'

learning and quality of education in general.

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