



Influence of Agreeableness and Openness to Experience Personality Traits on Biology Students' Achievement in Bosso Local Government Area, Niger State, Nigeria

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Abstract

This research investigated the influence of agreeableness and openness to experience personality traits on academic achievement of Biology students in Bosso Local Government Area of Niger State. A survey research design was employed to investigate two of the Big Five personality traits of openness to experience, and Agreeableness on academic achievement of secondary schools Biology students, the population of the study comprised of 7550 SSII Biology students. A sample size of 365 students 184 males (40%) and 217 females (60%) were selected using Hat and Draw random sampling techniques. Two instruments were employed in the study; (a) The Multimodal Personality Inventory (MmPI) and (b) 2022/2023 third Term Biology Examinations Scores (FTBES). The coefficients of reliability of the instruments were such that Agreeableness had 0.73, and Openness to Experience had 0.82. Two research questions were asked and two hypotheses formulated and tested at 0.05 level of significance using Product moment correlation coefficient. One of the hypotheses was rejected while one was upheld. The findings of the study reveal that; openness to experience had the highest Biology achievement score of 0.78 and p -value = 0.00, while agreeableness personality trait with Biology achievement score of 0.07 and p -value = 0.138, the findings of the study revealed that there is a strong relationship between openness to experience and Biology achievement of students and no significant relationship between academic achievement and agreeableness personality traits. Two recommendations were made, among which is that teachers should encourage students with openness to experience personality traits through the use of reward and positive reinforcements so as to sustain the explorative behavior which has positive influence in their academic achievement.

Keywords: Agreeableness, Openness to Experience, Personality Traits, Biology Students, and Academic Achievement

Introduction

Academic achievement is the learning outcome normally measured through test, examinations or continuous assessments. Academic achievement of students has been a major concern among education stakeholders like students, parents, teachers, school administrators and the society at large. Consequently, parents and guidance change their wards' schools from time to time and most times pay through their noses in private schools with the hope of achieving better academic achievements of their wards, while the elites in the society do not mind exploring alternative options outside the shores of their counties for the same purpose. This is because there is a general perception of the positive relationship between academic achievement and higher chances of professional success in the society. Irrespective of all these efforts, most learners still under-perform. These disturbing situations raise concern among educators, parents/guidance and the society at large. Efforts have been made by many psychologists to identify factors responsible for disparities in academic achievements of students taught under the same condition (Shehu, 2022). Heredity, learning environments, teaching methods, gender, self-concept, maturation, teachers' qualifications/competencies, use of instructional materials, learners' family background,

parental involvement in the learning process amongst other factors have been exhaustively explored by researchers (WAEC, 2023).

According to Nkok (2023) a good percentage of researchers have identified strong relationship between intelligence level and academic performance of students, while other researchers have concluded that there are still observable differences in academic performance of learners within the same intelligence level; which signals the presence of other factors like personality traits, environmental factors, psychological and sociological factors. Similarly, the findings of several psychologists have revealed that personality traits play fundamental role in learning outcome of students. Shehu Opined that, many students feel frustrated when they are not encouraged and stimulated to learn in accordance with their personality traits. Nabia and Ruhu (2020), conducted researches on a number of personality traits in a class room setting and concluded that quit a good number of students are not motivated to learn with the situation in class rooms, some of the identified causes of students' challenges for effective learning were teachers' ignorance of different personality traits and learning styles of individual students which culminates in diversity in their academic achievements. Teaching methods employed in most class rooms do not take care of this diversity among students. According to Heliyon (2021) different Psychologists have consistently researched on the major causes of differences in individual learning outcome in schools for nearly a century now. The findings of the study of Wangisn et al. (2019) have suggested that different factors such as personality, intelligence, and vocational interests can influence academic achievement. Personality has been identified as one of the factors that determine how learning takes place in different individuals. All learners prefer learning environments which aligns with their own personality type which also relates with their academic achievements. According to (Goldberg, 1992) personality traits have significant relationship with career and school performance, there are so many research findings that point to the fact that personality significantly influences individuals' learning styles, with recommendations that educators go beyond cognitive level of students and investigate other variable like personality traits in understanding academic behavior. Personality is the totality of the behavioural and mental characteristics that differentiate an individual from other people (Tomas & Adrain, 2022). It refers to individuals' specific patterns of behaviour, thoughts, feelings and responses to situations (Nkok, 2023). The nature of different individual patterns of behaviors varies, this diversity has a great influence on individual life styles including academic achievement of students.

There has been consensus among Psychologists that there are five major types of personality, commonly referred to as the "Big 5" personality traits. These five major personality traits are commonly described as extraversion (extroversion), agreeableness, openness to experience, conscientiousness, and neuroticism. Personality is seen as a consistent individual pattern of thoughts, feelings, social adjustments, and behaviours. Personality traits strongly influence one's attitude, taught, self-concept and values. Habit attitudes, interest, values, principles and intelligence are a sum total of an individual's personality traits. Personality type or traits can also be seen as the consistent nature of an individual which make him different from other individuals. These traits can be simply referred to as special qualities that make up an individual. John and Srivastava (1999) opined that an individuals' patterns of behavior, temperament and emotion or attributes, thoughts, feelings and reactions to issues on regular bases forms the personality of such an individual. This personality trait influences how people associate/interact with others and can be measured using personality test (usually questions about attitude, behaviour and feelings) which the respondents have to agree or disagree with stated items or assertions, personality traits are very crucial in predicting academic, career and social relationships successes (Nabia & Ruhu, 2020).

Psychologists have established a relationship between the five personality dimensions and heredity (Goldberg 1992). Tomas (2022) has proposed an evolutionary explanation for these five core personality traits, suggesting that these personality traits are the most fundamental qualities that shape our social behaviours. In the same vein, Goldberg's research described the five broad personality traits as: (Extraversion vs. Introversion, Agreeableness vs. Antagonism, Conscientiousness vs. Irresponsibility, Neuroticism vs. Emotional Stability, and Openness to New Experience vs. Closed-mindedness) this description is increasingly gaining acceptance for assessing personality. The Big Five personality traits (BFPT) also known as The Five-Factor Model (FFM) of personality FFM is one of the most recognized models in modern psychology with acronym "OCEAN", which stands for: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, Neuroticism, (McCrae & Costa, 1985). The Five Factor Model (FFM) or BTPT encompasses all the personality traits. Though Psychologist seems to have reached a consensus about classifying personality traits into five groups, this study will investigate only two of the five traits (Openness to Experience and Agreeableness personality traits) and examines their influence on

academic achievement of Biology Students in Bosso Local Government of Niger State. According to (Asghar et al., 2020)

Openness to Experience personality trait is the degree to which a person can imagine things, show curiosity as against shallow thinking. The major features of such traits are imagination and insightfulness. Individuals with high degree of openness to experience trait have a large range of interests in exploration. People with openness to experience trait ask questions about the world and are always ready to explore the world with the hope of gaining new knowledge and enjoying new experiences (Nabia & Ruhu 2020). People with this trait are very creative, open to trying novel situations, they are focused and always ready to handle new challenges, they think about abstract concepts and explore them. According to Tomas and Adrain (2022) students with low degree of this trait are much more rigid in making adventures and often have challenges with abstract thinking, hate changes, does not enjoy new things, resist new ideas and very unimaginative. Since most concepts in Biology are abstract and requires critical thinking and experimentation to understand, the result of the investigation of the influence of Openness to experience trait might be interesting in tackling the problem of variance and low academic achievement of Biology and other science students.

McCrae and Costa (1985) posited that; Agreeableness traits encompasses features like empathy, sympathy, cooperativeness, and aids towards others. It is a degree to which an individual is naturally good, receptive and always showing cooperation with people as opposed to rigid, unpleasant, resistible and opposing nature. People with this trait are often careful, responsible and dependable. Goldberg (1992) asserted that, Agreeableness personality showcases attributes like, kindness, affection, care and other good social behaviors. People with high degree of agreeableness trait tend to be more peaceful and cooperative while those low in this trait are more manipulative and competitive in nature. (Costa & McCrae, 1992; Mayer et al., 1998) further opined that; agreeable people show more interest, empathy, care and concern in other people affairs, they enjoy rendering help and contributing to the success and happiness of other people. In the contrary, people with low degree of this trait lack self-discipline, hardly care about others, not empathetic, have no interest and show no concern in other people's problems, they can easily use demeaning words on others and are manipulative. This agreeableness personality trait may affect the learning style of science students and is therefore necessary to investigate the influence of Agreeableness personality trait on Biology students' achievement. Therefore, this study will also investigate the influence of Agreeableness personality trait on Biology students' achievement in Niger State, Nigeria.

Statement of Problem

Some students in public secondary schools in Bosso Local Government Area of Niger State have high achievements in Biology in their terminal examinations and SSCE, while other students have low achievement in same examinations despite being taught by same teachers in the same learning environments (Niger State Ministry of Education 2022/2023 academic session). This leaves one in doubt about the causes of this variation/poor achievements. The study of Muhammed et al. (2022), revealed that there is poor performance of Biology students in Bosso Local Government of Niger State, as most students performed below average in Senior Secondary Certificate Examination, "Out of 6,914 students that sat for WAEC in 2022/2023 session 567 (8.11%) had Excellent Grade (A₁ & A₂), 790 (11.42%) had Very Good Grades (B₁ and B₂), 1,375 (19.77%) passed at Credit level (C₄ & C₆) and 1,940 (28.05%) had Pass Grades (P₇ and P₈) while a total of 2,324 (33.61%) failed the subject with F₉ Grades". These poor and dwindling performances is worrisome despite the fact that all the students had similar learning experiences, factors like personality traits, learning styles, motivations among other factors may be responsible for this variation in academic achievement of Biology students. If this trend is allowed, most students will not pass Biology examination at credit level in external examinations like WAEC, NECO and JAMB and the implication of this is that greater percentage of the students will not be qualified to read science and technology related courses in the higher institutions since Biology is a pre-requisite for admission into any science and technology programme in all higher institutions in Nigeria. The resultant effect of this is that there will be shortage of man power in science and technology related professions in the society. Since science and technology play prominent roles in the society, it therefore became pertinent to investigate causes of variation in/poor achievements in Biology among students and map out effective interventions in this regard.

Objectives of the Study

The main objective of the study is to determine the relationship between personality traits and academic achievement of students in Bosso Local Government of Niger State. Specifically, the objectives of the study are to determine:

- i. The relationship between openness to experience personality trait and Biology achievement of students in Bosso Local Government of Niger State.
- ii. The relationship between agreeableness personality trait and Biology achievement of students in Bosso Local Government Area of Niger State.

Research Questions

The following research questions guided the study

- i. What is the relationship between openness to experience personality trait and Biology achievement of students in Bosso Local Government Area of Niger State?
- ii. What is the relationship between an Agreeableness personality trait and Biology achievement of students in Bosso Local Government Area of Niger State?

Hypotheses

The following Hypotheses were tested at 0.05 level of significance

HO₁: There is no significant relationship between openness to experience personality trait and Biology achievement of students in Bosso Local Government Area of Niger State

HO₂: There is no significant relationship between agreeableness personality trait and Biology achievement of students in Bosso Local Government Area of Niger State

Materials and Methods

This study adopted a survey research design because the design is related to the aim and objective of the study and will enable the researcher to reach the accessible population with ease. Survey design was considered relevant because it provided the opportunity for the researcher to use a sample out of the large population and in-turn generalize the findings on the entire population. The target population of the study consisted of all Biology students in secondary schools in Bosso Local Government Area of Niger State. There were seven thousand five hundred and fifty (7550) students, of which 4950 were males (representing 65.5%) and 2600 were females (representing 34.5%). While the accessible population consisted of all SSII Biology students in the Local Government Area which is 3,227 of the total population of Biology students in the area 1,895, boys (representing 58.7%) and 1,332 were girls (representing 41.3%) (Source Niger State Ministry of Education 2022). The sample size of the study comprised three hundred and sixty-five (365) students; representing 5% of the population was randomly selected from 5 public senior secondary schools. This sample size was considered adequate to enable the generalization of the findings of the study according to the population table for determining sample size by (Krecie & Morgan, in Baji, et al. 2015)). The instruments for data collection in this study were; The Multimodal Personality Inventory (MmPI) and First Term Biology Examinations Scores (FTBES)

- (a) The Multimodal Personality Inventory (MmPI) by Akinade (2015) was adopted and employed in this study. This is because the inventory is related to this study, openness to experience and agreeableness personality were investigated in this study. The inventory employed four- point scale format of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) which was rated 4, 3, 2 and 1 respectively.
- (b) The second instrument in the study was the First Term Biology Examinations scores (FTBES) collected from the examination officers of the selected schools, the examination was set, marked and recorded by respective Biology teachers. (Akinade, 2015).

The Multimodal Personality Inventory (MmPI) was validated by some experienced and distinguished professors of counseling and psychology. It was trial tested on different groups of people, male, female, highly educated and not so well educated, young and old. Many of these individuals asserted that the inventory asks relevant personality related questions. The test showed face and construct types of validity. According to the examination officers of the selected schools, the examinations that produced the results used as Biology achievement test of this study was set by Biology teacher of the schools, and dully validated by the test and measurement experts in the school, the content and context validity was determined to be The First Term Biology Examination Result (FTBER) of the respondents used in this research and the reliability of the instrument was determined by the examination unit of the school to be 0.88 using split half reliability indices, Firstly, the researcher visited the sampled schools with a letter of introduction from her school and met with the principals of the schools for introduction and permission to carry out the research, after which, the researcher had a session of training of the Biology teachers who were used as research assistance. After the training, the Multimodal Personality Inventories were handed over to the research assistance for administration. Reliability: Number of trials tested respondents

was 73. Internal consistency value of each sub scale follows; Agreeableness 0.73, Openness to experience 0.82 respectively. The results show acceptability high levels of each subscale. Therefore, the instrument can be adopted to measure comprehensive personality traits of normal people. The second instrument for the study was Third Term Biology Terminal Examination Results of students who responded to the questions in MmPI were collected from examination officers of the sampled schools and used as Biology Achievement Test (BAT). The examination was set by the Biology Teachers of the sampled schools validated by experts in test and measurement section of the schools, and the reliability of the test was determined through a trial test of the instrument (examinations) by the examination officers of the schools. The examinations were administered on SSII Biology students, invigilated by teachers assigned by the school, marked and recorded by Biology teachers and submitted to the examination officers of the schools who vetted the results before recording in the broad sheet. The researcher through the permission of the principals accessed the broad sheet and collected the Biology results of the respondents and used as Biology Achievement Test (BAT). Data was analyzed using Pearson product moment correlation coefficient to measure the relationship between various personality traits and academic achievements. The significance of the various statistical analyses was ascertained at 0.05 alpha levels.

Testing Hypotheses

HO₁: There is no significance relationship between openness personality trait and Biology achievement of students in Bosso Local Government Area of Niger State

Table 1: Correlation Results of Openness to experience Personality Traits and Biology Achievement Test of Biology students in Bosso L.G.A of Niger State.

Item	Achievement	N	df	p-value	Mean	Decision
Openness to Experience.	0.7807	365	364	0.000	0.002	Rejected

Table1: Shows the result of correlation of openness personality trait and Biology achievement of students in Bosso Local Government Area of Niger State. The correlation between these two variables is 0.7807, which is relatively large and positive, indicating a strong relationship. The p-value of 0.0000 suggested that there is statistically significant relationship between openness to experience and Biology achievement. This means that the null hypothesis which states that there is no significant relationship between openness to experience and Biology achievement was rejected. There is no significant relationship between agreeableness personality trait and Biology achievement of students in Bosso Local Government Area of Niger State

Table 2: Correlation Results of Agreeableness Personality Traits and Biology Achievement of SSII Students of Bosso Local Government Area of Niger

Item	Achievement	N	df	p-value	Mean	Decision
Agreeableness	-0.0784	365	364	0.1381	-0.001	upheld

Table 2. shows correlation result of agreeableness personality trait and the Biology achievement of students in Bosso Local Government Area of Niger State. The p-value of 0.1381 suggests that there is statistically no significant relationship between agreeableness and Biology achievement. This means that it is unlikely that the observed relationship between these two variables occurred by chance, and that the null hypothesis which stated that there is no significant relationship between agreeableness and Biology achievement was upheld.

Discussion

The findings revealed that there is a strong positive relationship between openness trait and academic achievement of Biology students, this trait had high academic achievement, the findings are in agreement with the findings of Asghar et al. (2020) which asserted that openness to experience is the major cause of variance in academic performance of students? Mohamed et al. (2022) also concluded that openness to experience trait is a major predictor of academic performance of science students. The findings of Nabia, and Ruhi (2020) further collaborated the present findings as it established significant relationships between the openness to experience personality trait, learning styles, and academic achievement. The findings of Shehu (2022) is also consistent with this finding as it concluded that openness personality trait helps students to be focused, be conscious of time frame

and to put extra efforts in their studies in order to improve their academic outcome. However, the findings disagree with the findings of Tomas and Adrian (2022) which posited that openness to experience is a negative predictor of academic achievement. The significant relationship between openness to experience and academic achievement might be because students with openness to experience traits are ready for new strategies of learning.

The finding of the study on agreeableness personality trait indicates no significant relationship with Biology achievement. This might be the consequence of the fact that a good Biology student is explorative in nature and hardly agrees to postulations without experimenting to confirm, these findings is consistent with that of Wangisn, et al. (2019) which asserted that there is no significant relationship between agreeableness personality trait and academic achievement of physics students in China. The findings of Tomas and Adrian (2022) also agree with these findings as it established that there is no significant relationship between agreeableness personality trait and academic achievement of students. However, this finding is not consistent with that of the study of Muhammed et al. (2022) which affirmed that there is a strong and positive relationship between agreeable personality trait and academic performance of students. The findings of Heliyon (2021) which concluded that agreeable personality trait had a negative influence on academic performance of students also contradicts the present findings. The review indicates the prominent role of personality traits with respect to academic performance that gives answer to the question; It shows that the recommendation of earlier researchers was correct that personality traits is related with academic performance; personality traits is not just assisting intelligence to determine the academic performance of students. Thus, individuals taught under the same learning environment do attain different levels of academic achievements as a result of variance in their personality types.

Conclusion

Personality traits play pivotal roles in academic achievement of students, students with openness to experience perform better in Biology and other science subjects because of their ability to explore the environment and take in new knowledge while those with agreeableness personality traits underperform in Biology and other science subjects because of their rigidity and inability to explore their environment and be opened to new experiences. Therefore, students with openness to experience do better in sciences than their counterparts with agreeableness personality traits.

Recommendations

Based on the findings of the study, the following recommendations were made.

- i. Teachers should encourage students with openness to experience personality traits through the use of reward and positive reinforcements so as to sustain the explorative behavior which has positive influence in their academic achievement.
- ii. School administrators through the help of class teachers should identify and select students with agreeable personality traits for appropriate referrals to school counselors and other relevant therapist

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