Behavioural Characteristics as Determinants of Secondary School Students' Achievement in Biology in Ondo State, Nigeria

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Abstract

The study investigated behavioural characteristics as determinants of secondary school students' achievement in Biology in Ondo state, Nigeria. The descriptive survey research was adopted in this study. The population for this study consisted of all S.S.S. 3 students in 241 secondary schools in Ondo State. The sample for the study consisted of 200 S.S.S. 3 students drawn from 10 public secondary schools in Ondo State. The sample was selected using multistage sampling procedure. Two instruments tagged Behavioural Characteristics Questionnaire (BCQ) and Student Biology Achievement Inventory (SBAI) were used to collect relevant data for the study. The instruments for the study were validated by experts in the area of Tests and Measurement. The reliability of BCQ was determined by finding the internal consistency which yielded reliability co-efficient of 0.813. The data collected through the instruments were analyzed using inferential statistics of multiple regression and t-test analysis. All hypotheses were tested at 0.05 level of significance. The findings of the study revealed that behavioural characteristics of students such as attitude, self-concept, self-efficacy, self-perception and interest significantly predicted their achievement in Biology with self-efficacy being the highest contributor while self-concept was the least contributor. In addition, male and female students share the same behavioural characteristics in the learning of Biology. It was recommended among others that Biology teachers should carefully identify students with high self-efficacy and encourage them, while those with low self-efficacy should be guided appropriately.

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Introduction

Behavioural characteristics of students are activities that are observable, actions and reactions that are commonly exhibited by the students all through the teaching and learning process. For the purpose of this research study, the behavioural characteristics that are considered are attitude, self-efficacy, self-concept, self-perception and interest.

Attitude of students' towards Biology could be a key factor that might have an impact in the achievement of the students. Several studies have been conducted in different countries to find out students' attitudes (Tahar, Ismail, Zamani & Adnan, 2010; Tezer & Karasel, 2010). Attitude as a concept is anxious about an individual's way of acting, thinking, and behaving as it has very serious implications for the students.

The researcher detected that some secondary school students display negative emotional disposition to learning of Biology due to the abstract nature adopted by teacher in teaching the subject. It is mainly the attainment of proficiency in a subject that leads to positive attitude in that subject. As an outcome of students' hatred for Biology, some of them refuse to progress on their interest in Biology. It has been detected that students form the habit of departing the classroom either before or during the Biology lesson under the charade of relieving themselves, students refuse to do assignments and this is one of the possibilities whereby the teacher can know the students' problems.

Self-concept is a product of a student's strength and confidence in Biology. Self-concept has to do with social ability since it has impacts on how a person feels, how he or she thinks, learns, values himself or herself, relates to others, and ultimately, how he or she acts (Osei, 2014). Self-concept is the impressions a student made about his/her appearance. These impressions form the reasoning or the understanding in coping with persons or things.

Self-concept consists of three mechanisms thus: self-image, self -esteem and self-ideal (Iroegbu, Nkwocha & Onyemerenkeya, 2012). Self-concept then is a person's view of oneself. It is a self-view, the way one views and feels about oneself. It is ones attitude towards one's self. It has been long learnt that self-concept has a vital and predictable influence on the life of a person.

Self-Concept is of two ways namely: high and low, which could predict students' performance in Biology. The researcher detected that some students have low self-concept towards Biology and this appears to negatively has an effect on their performance. It is thus proper to say that a student's response to Biology is often influenced or moderated by the manner they see Biology in regard to values, needs, abilities, esteem, and limitations.

Self-efficacy is the judgment of one's skills to shape and implement actions needed to produce desired attainments (Erdogan & Sengul, 2014). Yusuf (2011) claims that academic self-efficacy makes students to always reason about the most efficient ways to achieve each task. It refers to the level of self-reliance and self-belief of a student to complete a task and to produce something at its best according to their respective capabilities. Self-efficacy is a very significant factor which can influence people's level of thinking, feeling and acting (Olagoke, 2015).

It seems that high self-efficacy creates a feeling of calmness or serenity when approaching tough tasks while low self-efficacy may result in an individual observing a task as more difficult than reality, which, in turn, may create worry, stress and a narrower idea on how finest to approach the solving of a problem or activity. Students with low self-efficacy are likely not to do well in Biology since they may not be worried to get involved in challenging task. Zulhamri (2014) highlighted the characteristics of students with high self-efficacy which includes the ability to get involved in inspiring tasks and be intrinsically inspired. These classes of students will strive towards accomplishing their goals and are not easily affected by

external factors. They will improve rapidly from failures. In contrast, people with low self-efficacy develop a poor sense of self-confidence about their skills in chasing their goals. Therefore, they are less likely to make concerted effort in undertaking any task. They will also tend to avoid challenging tasks and regard the tasks as threats.

There is general impression that Biology is tough by its very nature and because of this impression, majority of students have fear for it (Ojimba, 2012; Saad, Adamu & Sadiq, 2014). Self-perception is conceptualised as a mental representation or view of Biology, apparently constructed as a result of social experiences, mediated through interactions at school, or the influence of parents, teachers, peers or mass media. It also refers to some kind of mental picture of something, created from past experience as well as related beliefs, attitudes and conceptions (Aremu & Sangodoyin, 2010).

When one is attentive in an activity, he is likely to accomplish highly in that activity. In other words, interest is thought to be a significant variable in learning. Interest as a kind of feeling which one has for something is valuable and beneficial, Adebule and Aborisade (2013). They have also seen interest as the attraction which powers or compels a child to react to a particular stimulus. According to Aybuke and Omen (2012), interest is a personal feeling of intentness or curiosity over something. The interest in a specific thing is a feeling displayed in an activity. It is the value that awakens concern or curiosity. However, interest to do something infers giving one's attention to something since the person adores finding out about it or doing it. When something is interesting, it draws attention because it is special and exciting.

In the learning of Biology, it's been well-known that students' interest could go a long way to improve their performance. Students' interest in the learning of Biology could be defined as their feeling of wanting to learn the subject. According to Adeyemi and Adeyemi (2014), interest has to do with a learner's tendency to react positively in sure ways towards certain areas of the environment and is usually established in relation to and remains associated to more basic motives. The researcher observed that absence of interest in a subject disheartens students from staying in class and working hard to attain a good grade and prevents them from being eager and taking the class earnestly. It seems that when students lose interest in their studies, failure rate will be greater.

Based on the foregoing, this study investigated behavioural characteristics as determinants of secondary school students' achievement in Biology in Ondo state, Nigeria. The study specifically examined:
i. if behavioural characteristics (attitude, self-concept, self-efficacy, self-perception and interest) of students predicted their achievement in Biology; and
ii. gender difference in behavioural characteristics of secondary school students towards Biology

Research Hypotheses
The following research hypotheses were generated for this study
i. Behavioural characteristics (attitude, self-concept, self-efficacy, self-perception and interest) would not significantly predict students' achievement in Biology.
ii. There is no significant gender difference in behavioural characteristics of secondary school students towards Biology.

Methodology
The descriptive survey research was adopted in this study. The population for this study consisted of all S.S.S. 3 students in 241 secondary schools in Ondo State (**Source**: Ondo State Teaching Service Commission, 2020). The secondary schools are located in all the 18

Local Government Areas in the three Senatorial Districts in Ondo State which are Ondo North, Ondo Central and Ondo South Senatorial Districts. The sample for the study consisted of 200 S.S.S. 3 students drawn from 10 public secondary schools in Ondo State. The sample was selected using multistage sampling procedure.

An instrument tagged Behavioural Characteristics Questionnaire (BCQ) was used to collect relevant data for the study. The second instrument was Student Biology Achievement Inventory (SBAI). Section A of the BCQ sought for students' demographic information, while Section B consisted of 20 items to elicit information on behavioural characteristics of students such as attitude, self-concept, self-efficacy, self-perception and interest. Likert type rating scale was used as follows: Strongly Agree, Agree, Disagree, and Strongly Disagree. The inventory (SBAI) was used to obtain students' results in Biology for at least 6 academic terms.

The instruments for the study were validated by experts in the area of Tests and Measurement. The experts took time to check its face and content so as to determine the extent to which items of the instruments represented the content and suitability of the items being measured. The reliability of BCQ was determined by finding the internal consistency. A pilot study was carried out in two secondary schools outside the sampled area; data collected was analysed using cronbach's Alpha which yielded reliability co-efficient of 0.813.

The researcher personally visited each of the school sampled to administer the instruments. The data collected through the instruments were analyzed using inferential statistics of multiple regression and t-test analysis. All hypotheses were tested at 0.05 level of significance.

Results

Hypothesis 1: Behavioural characteristics (attitude, self-concept, self-efficacy, self-perception and interest) would not significantly predict students' achievement in Biology

Table 1: Multiple Regression showing Beta Weight of Behavioural Characteristics

Model	Sum of Squares	df	Mean Square	R	R Square	Adjusted R Square	F	Sig.
Regression	1.686	4	.422					
Residual	.932	195	.005	0.926	0.857	0.801	84.402	.000a
Total	2.618	199						

Table 1 showed that the combination of the behavioural characteristics variables had multiple correlation of 0.926 with students' academic achievement in Biology. However, the combination of the variance explained 80.1% of variance in academic achievement as shown by the co-efficient determination of 0.801. This implies that other factors than the one used in the study accounted for 19.9% of academic achievement. The analysis of variance further showed an F-ratio of 84.402 which was significant at 0.05 level of significance. The null hypothesis was therefore rejected; hence, behavioural characteristics (attitude, self-concept, self-efficacy, self-perception and interest) significantly predicted students' achievement in Biology.

Table 2: Multiple Regression of the Relative Contribution of behavioural characteristics Variables on student academic achievement

Model	Understandized coefficients		Stand. coefficient	T	Sig.
	B	Std. Error	Beta		
Constant	9.705	.256		37.910	

Attitude	.171	.039	.583	4.385*	0.000
Self-Concept	.144	.042	.372	3.429*	0.000
Self-Efficacy	.249	.047	.753	5.298*	0.000
Self-Perception	.150	.031	.681	4.839*	0.000
Interest	.211	.058	.403	3.638*	0.000

a. Dependent Variable: Student academic Achievement in Biology   *P < 0.05

Table 2 showed that attitude, self-concept, self-efficacy, self-perception and interest of sub-variables of behavioural characteristics positively contributed to student academic achievement in Biology with attitude having a beta weight of (β = 0.583, p< 0.05), self-concept (β = 0.372, p< 0.05), self-efficacy (β = 0.753, p< 0.05), self-perception (β = 0.681, p< 0.05), and interest (β = 0.403, p< 0.05). The table also shows that self-efficacy is the highest contributor to students' academic achievement while self-concept is the least contributor to students' academic achievement in Biology.

The resulting regression equation is given as:

$Y = 9.705 + 0.171X_1 + 0.144X_2 + 0.249X_3 + 0.150X_4 + 0.211X_5$

where:

Y	=	Student academic Achievement in Biology
X_1	=	Attitude
X_2	=	Self-concept
X_3	=	Self-efficacy
X_4	=	Self-perception
X_5	=	Interest

Hypothesis 2: There is no significant gender difference in behavioural characteristics of secondary school students towards Biology

Table 3: t-test analysis of behavioural characteristics of secondary school students towards Biology

Variables	No	Mean	Standard dev	df	t-cal	p-value	Remark
Male	127	67.81	2.57				
Female	73	67.19	2.48	198	1.680	0.174	Not Significant

P>0.05

Table 3 showed that the t-cal (1.680) is not significant because the p-value of (0.174) > 0.05 at 0.05 level of significance. The null hypothesis is therefore not rejected. This implies that there is no significant gender difference in behavioural characteristics of secondary school students towards Biology.

Discussion

The findings of the study revealed that behavioural characteristics of students such as attitude, self-concept, self-efficacy, self-perception and interest significantly predicted their achievement in Biology. The result showed that the combination of the behavioural characteristics variables had multiple correlation of 0.926 with students' academic achievement in Biology. The result indicated that self-efficacy was the highest contributor to students' academic achievement while self-concept was the least contributor to students' academic achievement in Biology. Forgasz and Murimo (2011) concluded that students' self-perceptions of their ability were significantly related with achievement in examinations.

The findings of the study further revealed that there was no significant gender difference in behavioural characteristics of secondary school students towards Biology. This implies that male and female students share the same behavioural characteristics in the learning of Biology. This contradicts with findings by Hoang (2008) who reported that male consistently accounted slight positive perceptions and attitudes than females. Forgasz and Murimo (2011) also reported gender differences in favour of perceptions of male students. However, study carried out by Mohamed and Waheed (2011) found that there is no gender difference in behavioural characteristics of students.

Conclusions

The researcher concluded that behavioural characteristics of students such as attitude, self-concept, self-efficacy, self-perception and interest significantly predicted their achievement in Biology with self-efficacy being the highest contributor while self-concept was the least contributor. In addition, male and female students share the same behavioural characteristics in the learning of Biology

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Biology teachers should carefully identify students with high self-efficacy and encourage them, while those with low self-efficacy should be guided appropriately
2. Teachers should play an important role in shaping the perceptions and attitudes of students towards Biology.
3. Students should develop more interest towards learning Biology. This is due to the fact that a credit pass in Biology is necessary for science students to get admission into Universities for further studies.

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