



Biology Students' Questioning Behaviour in Relation to Their Achievement in Biology in Barkin Ladi, Local Government Area, Plateau State

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Abstract

This study investigated the relationship between senior secondary two students' questioning behaviour and their achievement in Biology in Barkin Ladi Local Government Area of Plateau State. The research design was partly an ethnographic research design through observation and narrative survey. The study also incorporated a correlational research design in which the correlation coefficient was computed to determine the relationship between the variables. The population of the study comprised all the fifteen (15) senior secondary schools in Barkin Ladi. A sample of two senior secondary schools out of fifteen senior secondary schools was selected using purposive sampling technique. Blooms' category system was used to transcribe students' questions. The research instruments were observation using Audiotape recorder and Biology Achievement Test (BAT). The audiotape recorded students' questions were coded by two science education specialist in University of Jos while the test items were also scrutinized by two biology teachers at the secondary school level. The reliability of the BAT was determined using split-half method and it yielded 0.80. The research questions were answered using descriptive statistics while Pearson Product Moment Correlation was used in testing the Null hypothesis at 0.05 level of significant. The findings indicated that a high positive linear relationship exists between the raw number of students' questions and their achievement scores in Biology. The findings equally showed that students asked mostly low level questions and the types of questions that students ask during biology lesson does not depend on gender. Consequently, the study recommended among other things, the training and re-training of teachers as well as students on how to ask thought provoking questions to facilitate students' performance, teaching and learning of Biology in Senior Secondary schools.

Keywords: Biology, Students' questions, Academic Achievement, Gender.

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Introduction

Biology is a science subject which aims at equipping students with appropriate scientific skills, attitudes, competences and ability to apply scientific knowledge to every challenges of life. Biology is a natural science that deals with the living world (Umar, 2011). Yilshik, Ezekiel and Umar (2020) posited that the subject Biology excites intellectual curiosity, increases awareness of fragile ecosystem and stimulates critical thinking. Biology is a prerequisite subject for many fields of learning that contribute immensely to the technological growth of the nation, this includes Medicine, Pharmacy, Nursing, Agriculture, Forestry, Biotechnology, Nanotechnology and many other areas (Ahmed, 2008; Ahmed and Abimola, 2011). However, Students' performance in Biology

at the Senior School Certificate Examination has been unsatisfactory over the years (Chief Examinations' Report, 2018).

In spite of the importance of Biology, the performance of students at senior secondary school level is still very poor (Ahmed, 2008). In recent years, research in education has laid more emphasis on the use of teaching methods which can be used to enhance teaching and learning because students learn more when the teacher use teaching methods that will enable them to understand biological concepts better. It has been observed that the knowledge of Biology is very important to national development; students' performance in this subject at secondary level has not been very impressive. West African Examination Council (WAEC 2015 to 2018) shows that few students got the grade above pass level



Ezekiel, D. P., Yilshik, O. M. and Joseph M. which can qualify them for admission into higher institution to study Biology and other Biology-related disciplines, (Chief Examiner's Report, 2018).

Academic achievement is the assessment of how much students have learnt or attained after a learning period. Academic achievement is an important indicator of adjustment of learning and also serves as an important variable in school system as it provides the yardstick for measuring academic progress (Yilshik, et al, 2020). Chin (2006) asserted that there is a relationship between the quality of students' questions and achievements as well as their conceptual understanding. Similarly, King (1992) found a significant positive correlation between students' questions and their academic achievement. Etkina (2000) also reported a direct relationship between depth of questioning and prior conceptual knowledge. Gender is defined as a state of being male or female in relation to the social and cultural roles an individual place (Collins English Dictionary, 2016). Several authors advocated that the gender of the student may be a factor in determining students' conceptual understanding, academic achievement and success in education (Lorezo, Crouch & Mazur, 2006; Dayioglu and Turut-Asik, 2007; Harvey, Drew & Smith, 2006). Similarly, Temitope in Yilshik et al. (2020) opined that due to African culture and traditions, males are more inclined towards the sciences while females tend to tilt more to the arts. Jones, Howe & Rua (2000) observed that males are less frightened than girls to pose questions. In contrast, the World Bank report on gender equality and development highlight that currently females participate equally as their male counterparts at all education levels (The World Bank, 2011).

Questioning is an important tool for scientific investigation, promote thinking, communication and achievement of students in the classroom. This implies that questioning form the integral part of classroom business, as well as scientific inquiry. Chollom (2013) views a question as any sentence that has an interrogative form or function. Chin and Osborne (2008) posited that questions from students indicate that they have been thinking about the ideas presented and have been trying to link them with other things they know. Chin and Osborne

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maintained that the source of students' questions is a gap or discrepancy in the students' knowledge or a desire to extend their knowledge in some direction. Hence active learners are always questioning and students who take responsibility for asking their own questions become more productive and engaged in their learning processes. Posing oral questions help students better understand text, and also allows them to seek out information, solve problems, and extend their understanding. No wonder the Nigerian National Policy on Education emphasized the need to inspire students with a desire for self-improvement and achievement of excellence as well as the development of problem solving skills in the senior secondary schools (Federal Ministry of Education 2014). In realization of this, Chollom (2013) posited that science instruction in Nigerian basic primary and secondary schools should be based on "hands-on and minds-on activities" that can trigger good questions.

Students' oral questions are the total raw number of questions that the students asked during classroom interactions. Keys (1998) found that the raw number of students' questions asked during science investigations determined the depth and breadth of the concept to be learnt, the scientific processes to be used and to a large extent the academic performance of the students. He maintained that the questions stimulated curiosity and encouraged profound thinking about relationships between questions, tests, evidence and conclusions. In contrast, Harper, Etkina, and Lin (2003) revealed that the raw number of questions asked had no significant correlation with any measure of conceptual achievement.

The nature and types of students' questions is paramount since different kinds of questions can challenge and stimulate the mind to different extents. Questions can be classified according to the level of thought required for answering them. Bloom (1956) posited that complex thinking in students can be promoted through questions and learning activities. Bloom identified six hierarchical levels of thinking: knowledge (remembering the facts), comprehension (understanding meaning), application (using learning in new applications), analysis (breaking the whole into parts for understanding), synthesis (creating a whole from parts), and evaluation



Ezekiel, D. P., Yilshik, O. M. and Joseph M. (determining worth based on criteria). Following Bloom, researchers divided these six levels of thinking into two categories: first three levels as lower order thinking and last three levels as higher order thinking (Krathwohl, 2002). Similarly, the first three levels of questions, which focus on students' knowledge, comprehension and application, are often considered lower level questions while the next three levels questions in the analysis, synthesis and evaluation domains are considered higher level questions (Tofade, Elsnor & Haines, 2013). Blooms' taxonomy provides a valuable framework for students as well as teachers to determine the types of questions to ask during classroom sessions (Raziye, Yasare & Mustafa, 2017). Though the importance of student questioning in meaningful learning has been stressed, poor question and low achievement in secondary School Biology seems to persist, probably because students are denied the opportunity to ask questions during classroom interactions. In most of Nigeria's classroom situations, question production particularly of thinking or more probing nature is not a usual student role. The teacher-centred mode of teaching embraced by most of the Biology teachers simply ignores or brushes aside students' questions and moves forward regardless of any learners' query. Consequently, students are most often expected to answer questions rather than to ask them. In spite of the importance of students' questions in facilitating learning, the reviewed literatures revealed that little studies have been done in this area in recent time and most of the works done are from foreign countries. Hence the need to examine the situation locally. It is on this background that this research work sort to investigate Biology students' questioning behaviour in relation to their achievement in Biology in Barkin Ladi, Local Government Area of Plateau State.

The purpose of this research therefore, is to examine and review the existing research on students' questioning behaviour and to explore ways of advancing future work into this area. The specific objectives of the study included;

- To find out the nature and type of questions the students ask during classroom interactions.

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- To determine the relationship between the raw number of questions asked by senior secondary two students and their achievement in Biology.

Research Questions

The research sought to answer the following questions:

- i. What type of questions do SS two students ask during Biology classroom interaction?
- ii. Does the type of questions SS Two students ask during biology interaction depend on gender?

Research Hypothesis

H₀₁: There is no significant relationship between the raw number of students' questions and their academic achievement in Biology in senior secondary schools in Barkin Ladi L. G. A. of plateau state.

Methodology

The design of this study was partly ethnographic research design through observation and narrative survey, the study also incorporated a correlational research design. Target population comprised all the 1480 Senior Secondary Two (SS2) students offering Biology out of fifteen (15) senior secondary schools in Barkin Ladi Local Government of Plateau State. Sampling was done purposively to include two Schools with fifty (50) participants from two Senior Secondary Schools. The schools were G. S. S. Barkin Ladi (A) and Gwol Prime Academy Barkin Ladi (B). Twenty-five (25) participants were selected from each group for this study. The instruments for this study were in two categories; observation using an audio tape recorder to collect data related to the students' questions which were later transcribed based on Bloom's questions category by two Science Education Lecturers in University of Jos. The second instrument was a Biology Achievement Test (BAT). The items were constructed by the researcher based on the topics taught by the Biology teachers in the Senior Secondary Schools. The BAT included 30 questions of Low-level order and High-level order which were scrutinized by two teachers teaching Biology at Senior Secondary School level. The instrument was pilot tested and reliability co-



Ezekiel, D. P., Yilshik, O. M. and Joseph M. efficient of 0.80 was obtained using Split half method. Data collected were analysed using descriptive statistics to answer the research questions while Pearson Product Moment Correlation was used to test the Null hypothesis at 0.05 level of significance using

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 Statistical Package for Social Sciences (IBM SPSS Statistics 22.0 software).

Results

Research Question 1: what types of questions do SS two students ask during Biology classroom interaction?

Table 1: The type of student's questions and Percentages

School	Knowledge		Comprehension		Application		Analysis		Synthesis		Evaluation		Total	
	F	%	F	%	F	%	F	%	F	%	F	%		
A	2	6.77	12	40.00	5	16.67	8	26.67	0	0	3	10.00	30	55.56
B	9	37.50	5	20.83	7	29.17	2	8.33	0	0	1	4.17	24	44.44
TOTAL	11		17		12		10		0		4		54	

Table 2: Classification of Students' Questions Type

Low level questions		High level questions	
Frequencies (F)	Percentage (%)	Frequencies (F)	Percentages (%)
40	74.07	14	25.93

Table 1 and Table 2, revealed that senior secondary two students ask predominantly low-level questions. The students asked 74.07% low-order questions and 25.92% high-order questions. This implies that students in sampled secondary schools asked more low order questions and less high order

questions during Biology classroom interactions.

Research Question Two. Does the type of questions SS Two students ask during biology lesson depend on gender?

Table 3: The type of students' questions based on gender during Biology classroom interaction Using Bloom's Category system

School	Sex	Level of Question						Total
		Knowledge	Comp.	Application	Analysis	Synthesis	Evaluation	
A	M	1	6	3	5	0	1	16
	F	1	6	2	3	0	2	14
B	M	5	2	3	1	0	1	12
	F	4	3	4	1	0	0	12
Total	M	6	8	6	6	0	2	28
	F	5	9	6	4	0	2	26
Total		11	17	12	10	0	4	54

Table 4: Summary of Students Questions by Sex.

Sex	Level of Questions		
	Low Level	High Level	Total
	%	%	%
Males	62	38	100
Females	63	37	100

Table 3 and Table 4, revealed that male students asked 62% low-level questions and 38% high-level questions while the females asked 63% low-level questions and 37% high-level questions. The percentages above were obtained after the raw number of students' questions (students' oral questions)

were transcribed into low-level and high-level using Bloom' category system. This shows that both males and females in senior secondary two asked more low order questions and less high order questions during Biology lessons. Hence students question habit does not depend on gender.



H0₁: There is no significant relationship between the raw number of student's questions and their achievement in Biology

Table 5: Pearson Product Moment Correlation of Relationship between the raw number of Students' Questions and Academic Achievement in Biology

Variables	N	Mean	SD	R	α	P-value	Decision
Raw no. of Students' questions	19	5.47	3.53	0.90	0.05	.000	Significant
Academic Achievement scores	19	37.42	15.07				

Table 5 indicates that $r=0.90$, $P\text{-value}=0.000$, which means $P<0.05$. Since the probability value of 0.000 is less than 0.05 level of significant, we reject the Null hypothesis which says there is no significant relationship between the raw number students' questions and academic achievement in Biology because of insufficient evidence. The correlation coefficient (r) of 0.90 further reveals that there is a strong positive linear relationship between the raw number of students' questions and academic achievement in Biology. This shows that students that asked more questions during Biology class interaction performed better than their counterparts that do not ask questions.

Discussions

Findings from research question 1 revealed that students asked predominantly low level questions during Biology classroom interactions. This corroborates the findings of Chollom (2005) who stated that secondary school students ask largely low-order questions. This shows that students do not engaged themselves in critical thinking during teaching and learning. In the same vein, Ezekiel (2017) revealed that secondary school students mostly ask low order questions during Biology classroom interaction. Findings from research question 2 revealed that students' question type is not dependent on gender. This indicates that both males and females asked more low-order questions and less high-order questions during Biology lessons. This result is supported by King (1992), Keys (1998) and Chollom (2005). Their separate studies revealed that gender has no effect on students' questions type. Findings from the hypothesis revealed that a significant positive linear relationship exist between secondary school students' raw

number of questions and academic achievement in Biology. This indicates that as students' questions increases in number, their academic achievement also increases and vice versa. This result agrees with King (1992) who found that students trained to prepare for tests by generating and then answering their own questions significantly out-performed comparable groups who were not taught questioning skills. This finding is also supported by Chollom (2005) who found that a potentially useful method for improving students' achievement in Biology is to teach them how to ask good questions and find answers to them. That students' questioning is related to achievement level is further supported by the findings of Chin (2006) who postulated that there is a relationship between the qualities/quantity of students' questions and achievements. In contrast to the present research findings, Harper, Etkina, and Lin (2003) revealed that the raw number of questions asked had no significant correlation with any measure of conceptual achievement.

Conclusion

Based on the research findings, it was concluded that students in senior secondary schools asked predominantly low-order questions. In addition, this research showed that students' questions are an important variable in academic achievement. It clearly revealed that students' academic achievement is related to their raw number of questions. The study further concluded that students' question type is not dependent on gender.

Recommendations

Based on the findings and conclusion of the study, it would be appropriate to recommend that:



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- i. The present and subsequent government in Nigeria through various school authorities should embark on training and re-training of teachers and students in secondary school on how to ask both low-level and high-level questions during teaching and learning of Biology.
- ii. Students should be encouraged to ask thought provoking questions and find answers to those questions in order to improve their achievement in Biology

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