IMPACT OF COLLEGIAL TEACHING AND VERBAL INTERACTION ON ATTITUDE IN BIOLOGY AMONG SENIOR SECONDARY SCHOOL STUDENTS IN SOKOTO STATE, NIGERIA

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Abstract

This study investigated the impact of collegial teaching and verbal interaction on attitude in biology among Senior Secondary Schools students, Sokoto State, Nigeria. The research used quasi-experimental control group design involving pretest and posttest. Four objectives, four research questions and four null hypotheses guided the study. Out of the nine (9) co-educational schools with 1,612 (927 boys and 685 girls) SS II biology students as the target population, three co-educational secondary schools with 164 SSII Biology students (85 boys and 79 girls) were randomly selected as sample size of the study.. Two schools were subjected to two different experimental groups where Biology concepts were taught to the students employing collegial teaching using high and low verbal interaction. The third group was taught the same Biology concept using lecture method as the control group. The treatment lasted for six weeks. Data was collected using Attitude of Students Toward Biology Questionnaire (ASTBQ) with a reliability co-efficient of 0.87. The collected data was analyzed using Man whitney and Kruscal wallis to test the null hypothesis. Findings of the study reveals that Collegial method is significant for improving students' attitude towards biology, although this attitude is not gender stereotyped. Overall, collegial method is more beneficial than lecture method in terms of students' performance and attitude when the same concepts are taught by teachers using high and low verbal interaction. The conclusion from this study was that if teachers collegiate among themselves and allow active participation of students to dominate discussion during lesson, then we should expect improved and positive attitudes towards Biology. It was therefore recommended that Biology teachers should employ collegial teaching method and encourage high teacher-student interaction.

Keywords: Attitude, Biology, Collegial teaching and Verbal interaction

Introduction

The success of a school depends on effective administration, teachers' professional, personal and social development as well as close relationship between and among teachers. One way of attaining close working relationship is through fostering collegiality among teachers. Collegiality is the quality of relationships that exist within and between the levels of the education system, a climate of trust running from top to bottom, respect for the views of staff and opportunities for them to engage in decision making, a reflective co-operative approach to the processes of commitment to share values with regards to relationship. (Ibrahim, 2000). High level collegiality among staff members and students attitude is associated with successful and effective schools in terms of academic performance. Collegial support provides an opportunity for reflection on practice and sharing expertise for problem solving through group processes ultimately deepening the knowledge of teaching and learning.

It was reported by Quinn and Karler (2004), that collegial teaching is simple team work between two or more qualified instructors who together make presentations to an audience. They also reported that collegial teaching as a restructuring of teaching procedures in which two or more educators who possess distinct sets of skills, work in a

co-active and co-ordinate fashion to jointly teach academically and behaviorally heterogeneous groups of students in an educationally integrated classroom setting.

Another important variable closely linked to collegial teaching is Verbal interaction. According to Berko, (2013), verbal interaction is an act of conveying messages, ideas, or feelings through the use of mouth. This engagement can be in the form of verbal interaction, gestures, research work, assignment questioning, soliciting responses, and many other forms of interactions The beauty of these interactions often gives birth to good academic performance and positive attitudes towards the subjects. Causes of fluctuating performance among students have also been attributed to teacher-teacher, teacher -students' relationships, methods employ for teaching and attitudes toward the subject.

Attitude is defined as a person's feeling and thought which predicts position to behave or responds in some particular manner (Lakpini, 2006). Attitude according to Michael (2007), is an expression of like and dislikes or person's disposition towards a particular area, a discipline or an object. Biology is defined as natural science concerned with the study of life and living organisms, including their structure, function, growth, origin, evolution, distribution and taxonomy (Albert, 2002).

It has been discovered in some studies that some biology concepts are abstract and therefore difficult to comprehend for teachers (Albert, 2002). Harwell (2003), opined that, once teachers have difficulty in understanding certain biology concepts, he/she will not be able to teach such concepts to the students rightly. There is the likelyhood that some aspects of the subject will be left partially taught or not taught at all. The challenge has further been aggravated by teachers' interest and attitudes towards the subject. According to Shuaibu and Usman (2002) and Alausa (2007) who equally asserted that the attitude and the type of method usually adopted in teaching biology affects students' academic performance, The lecture or expository method of teaching does not give students the desired opportunity to express themselves well and it equally limits interaction between students-students, and teacher- students' interaction.

During the course of such interactions, students fears and anxieties are not addressed in the class. For effective teaching and learning of biology, it is expected that students participate actively in the process by asking questions, holding discussions, carrying out class activities and making generous intellectual contributions. The biasness of teachers does not encourage interactions couple with high population of students in classrooms (Usman, 2007). As a result of all these effects mentioned and even more, the attitude of students in biology has been a growing concern in schools in recent times (Olatoye, 2009). It is against this background that collegial teaching and verbal interaction and their impact on, students' attitudes was experimented towards biology.

Objectives of the Study

The main aims and objective of this study is to investigate the impact of Collegial Teaching and Verbal Interaction on Attitude in Biology among Senior Secondary Students in Sokoto State, Nigeria. While the specific objectives of this study were to;

i.   Investigate the impact of collegial teaching on students attitude towards learning biology when taught using high levels verbal interaction and those taught the same concept employing lecture method.

ii.   Investigate the impact of collegial teaching on students attitude towards learning biology when taught using low level verbal interaction and those taught the same concept employing lecture method.
iii.   Investigate the impact of collegial teaching on students attitude towards biology when taught using high level of verbal interaction and those when taught using low level verbal interaction employing collegial teaching.
iv.   Investigate the impact of collegial teaching students' attitudes towards biology when taught using high level of verbal interaction, low level of verbal interaction and those taught using lecture method?

Research Questions

i.   What is the difference in attitude of students taught biology using high level verbal interaction employing collegial teaching and those taught using lecture method?
ii.   What is the difference in the responses of students attitudes towards biology when taught using low level verbal interaction employing collegial teaching and those taught using lecture method?
iii.   What is the difference in the responses of students attitude towards biology when taught by teachers using high level verbal interaction and those taught using low level verbal interaction employing collegial method.
iv.   What is the difference in the responses of students' attitudes towards biology when taught using high level of verbal interaction, low level of verbal interaction and those taught using lecture method?

Hypotheses

The following null hypotheses are formulated for testing at $p \geq 0.05$

$H0_1$:   There is no significant difference in the attitude of students towards Biology concept when taught using high level verbal interaction employing collegial teaching and those the same concept using lecture method.
$H0_2$:   There is no significant difference in the attitude of students towards Biology concept when taught using low level verbal interaction employing collegial teaching and taught the same concept using lecture method.
$H0_3$:   There is no significant difference in the attitude of students' towards Biology when taught using high level verbal interaction employing collegial method and those when taught using low level verbal interaction employing collegial method.
H_{04}:   There is no significant difference in the attitude of students towards biology when taught using high level verbal interaction, low level verbal interaction and lecture method.

Significance of the Study

The findings of the study will hopefully benefit the Science Teachers, Curriculum Planners, Professional Bodies and Associations, Students, Textbooks Publishers and Researchers:

Research Design

Quasi experimental design was adopted for this research. The design enable comparison between treatments verses control conditions on participants in a pretest and posttest design. This design was used to examine the impact of Collegial Teaching and verbal interaction on students' attitudes toward biology when they are taught by biology teachers using different levels of teacher- student verbal interaction for experimental groups while lecture method was used for the control group. There were high level verbal interaction (HV1) and low level verbal interaction, (LVI). The treatments comprised two groups which were subjected to high and low level verbal interaction while control group comprise one group respectively. Similarly quasi experimental design is best for this study because the sample is non-randomized which means intact class were used.

Population of the study

The population of the study comprised 1,612 senior secondary two (SSII) biology students recruited from nine (9) public co-education senior secondary schools in six (6) educational zones of   Sokoto State.

Sample and Sampling Technique

Three co-educational schools were selected through stratified random sampling method from the six local governments that are part of the six educational zones. This was done to allow wide and equal representation of each local government. Three schools were selected because of their location and proximity to the state capital, also because of the nature of the study as it is an experimental research using Quasi experimental design.

These schools were GDSS, Minanata, , GDSS Shuni and GDSS Moreh. Two schools out of the three formed the experimental groups while the last school formed the control group. One intact class was selected from each school.

The sample is presented in table below:

Table 1:   Sample of the Study

S/No	Name of School	Educational Zone	No. of Students per class	Boys	Girls	Group
	GDSS Minanata	Sokoto South	61	29	32	Experimented Group 1 (EG1)
	GDSS Shuni	Bodinga	45	24	21	Experimented Group 2(EG2)
	GDSS Moreh	Sokoto North	58	32	26	Control Group (CG)
	Total		**164**	**85**	**79**	

Source: Research field data.

Instrumentation

The instruments used before and after the commencement of teaching for students' attitude toward biology in experimental and control groups was adopted questionnaire named as Attitude of Students Toward Biology Questionnaire (ASTBQ).

Validation of the instrument

In order to ascertain the validity of this instrument which is initially contain 48 items was given to some experts in the field of Test and Measurement and science educators in Department of Science and Vocational Education, Faculty of Education and Extension Service Usmanu Danfodiyo University, Sokoto. Some specialists in Department of Science Education, Sokoto State University and some Biology teachers to validate. The experts and educators examined the items and made necessary correction and adjustment. In order to add value to the questionnaire some questions were reframed and restructured, while others were discarded, arriving at 40 items to be responded.

The reliability of the instrument

The reliability of Attitude of Students towards Biology Questionnaire (ASTBQ) was determined by conducting the test with the designed instruments. Two test in a test-retest approach were concluded within two weeks interval. The scores obtained were then tested for reliability index and internal consistency coefficient for the items within the instruments. It was established to be 0.87. This was obtained by using the Cronbach Alfa statistical technique.

Method of Data Collection

Data was collected using Attitudes of Students Toward Biology Questionnaire (ASTBQ) items for both the pre-test which was conducted at the beginning of the treatment to establish equivalence of the subjects, While the post test data was conducted at the end of the treatment.

Method of Data Analysis

The data collected were analyzed based on the hypotheses formulated for testing at $p < 0.05$. This was able to form the basis for rejecting, retaining or accepting the null hypothesis.

H_{01}: There is no significant difference in the attitude of students towards Biology concept when taught using high level verbal interaction employing collegial teaching and those the same concept using lecture method. Man Whitney statistical technique was used to find the significant differences in attitude between the two groups.

H_{02}: There is no significant difference in the attitude of students towards Biology concept when taught using low level verbal interaction employing collegial teaching and those the same concept using lecture method. Man Whitney statistical technique was used to find the significant differences in attitude between the two groups.

H_{03}: There is no significant difference in the attitude of students' towards Biology when taught using high level verbal interaction employing collegial method and

those when taught using low level verbal interaction employing collegial method.. Man Whitney statistical technique was used to find the significant differences on attitude between the two groups.

H_{04}:   There is no significant difference in the attitude of students towards biology when taught using high level verbal interaction, low level verbal interaction and lecture method. Kruscal Wallis statistical technique was used to find the significant differences in attitude between the two groups.

Results

Answering Research Questions

Research question one: What is the difference in the responses of students' attitudes towards Biology when taught using high verbal interaction (HVI) employing collegial teaching and those taught using lecture method (LM)?

Table 2:   Mean Difference in Attitude between HVI and LM

Category	N	Mean	SD	Mean difference
HVI	61	4.21	0.43	1.87
LM	58	2.34	0.27	

Source: Research field data.

Table 2 shows the mean difference in attitude towards biology between students taught using high verbal interaction of collegial teaching method and those taught using lecture method. The result indicates that students taught using high verbal interaction demonstrated positive attitude (M = 4.21; SD = 0.43) compared to those taught with lecture method (M = 2.34; SD = 0.27), with an observed mean difference of 1.87.

Research question two: What is the difference in the responses of students' attitudes towards Biology when taught using low verbal interaction (LVI) employing collegial teaching and those taught using lecture method?

Table 3:   Mean Difference in Attitude between LVI and LM

Category	N	Mean	SD	Mean difference
LVI	45	3.69	0.36	1.35
LM	58	2.34	0.27	

Source: Research field data.

Table 3 shows the mean difference in attitude towards biology between students taught using low verbal interaction of collegial teaching method and those taught using lecture method. The result indicates that students taught using low verbal interaction demonstrated positive attitude (M = 3.69; SD = 0.36) compared to those taught with lecture method (M = 2.34; SD = 0.27), with an observed mean difference of 1.37.

Research question three: What is the difference in the responses of student attitude towards Biology when taught using high level verbal interaction and those taught using low level verbal interaction employing collegial method.

Table 4: **Mean Difference in Attitude between HVI and LVI**

Category	N	Mean	SD	Mean difference
HVI	61	4.21	0.43	0.52
LVI	45	3.69	0.36	

Source: Research field data.

Table 4 shows the mean difference in attitude towards biology between students taught using high verbal interaction of collegial teaching method and those taught using low verbal interaction. The result indicates that students taught using HVI demonstrated slightly more positive attitude (M = 4.21; SD = 0.43) compared to those taught with LVI (M = 3.69; SD = 0.36), with an observed mean difference of 0.52.

Research question four: What is the difference in responses of students' attitudes towards biology when taught using high level of verbal interaction, low level of verbal interaction and those taught using lecture method?

Table 5: **Mean Difference in Attitude between HVI, LVI and LM**

Category	N	Mean	SD
HVI	61	4.21	0.43
LVI	45	3.69	0.36
LM	58	2.34	0.27

Source: Research field data.

Table 5 shows the mean difference in attitude towards biology between students taught using high verbal interaction of collegial teaching method, low verbal interaction, and lecture method. The result indicates that students taught using HVI demonstrated more positive attitude (M = 4.21; SD = 0.43) compared to those taught with LVI (M = 3.69; SD = 0.36), and LM (M = 2.34; SD = 0.27).

Testing Null Hypotheses

Null Hypothesis one (H_{01}): There is no significant difference in attitude of students towards Biology concept when taught using high level verbal interaction employing collegial teaching and those taught using lecture method.

Table 6: **Significant Difference in Attitude between HVI and LM**

Category	N	Mean	SD	Test	p-value	Decision
HVI	61	4.21	0.43			
LM	58	2.34	0.27	9.86	0.00	H_0 Rejected

$\propto \geq 0.05$

Result presented in table 6 shows the significant difference in attitude towards biology between students taught using high level verbal interaction employing collegial teaching method and those taught using lecture method after treatment. There was a significant difference in attitude towards the two groups (Test = 9.86; p-value < 0.05) in favor of students taught with high level of verbal interaction. The research hypothesis was therefore rejected.

Null Hypothesis two (H_{02}): There is no significant difference in attitude of students towards Biology concept when taught using low level of verbal interaction employing collegial teaching and those taught using lecture method.

Table 7:   Significant Difference in Attitude between LVI and LM

Category	N	Mean	SD	Test	p-value	Decision
LVI	45	3.69	0.36	6.75	0.00	H_0 Rejected
LM	58	2.34	0.27			

$\propto \geq 0.05$

Result presented in table 7 shows the significant difference in attitude towards biology concepts between students taught using low level verbal interaction of collegial teaching method and those taught using lecture method after treatment. There was a significant difference in attitude towards the two groups (Test = 6.75; p-value < 0.05) in favor of students taught with low level of verbal interaction. The research hypothesis was therefore rejected.

Null Hypothesis three (H_{03}): There is no significant difference in attitude of students towards Biology concepts when taught using high level verbal interaction and low level verbal interaction employing collegial method.

Table 8:   Significant Difference in Attitude between HVI and LVI

Category	N	Mean	SD	Test	p-value	Decision
HVI	61	4.21	0.43	1.65	0.07	H_0 Accepted
LVI	45	3.69	0.36			

$\propto \geq 0.05$

Result presented in table 8 shows the significant difference in attitude between students taught Biology concepts using high verbal interaction of collegial teaching method and those taught using low level verbal interaction. Subjects were categorized according to the intervention they were exposed to. The dependent variable is the scores on attitude. There is no significant difference between students taught Biology concepts using HVI and those using LVI (Test = 1.65; p-value > 0.05). Based on this result, the research hypothesis was therefore accepted, suggesting that students do not differ in terms of their attitude towards Biology concepts when taught using and HVI and LVI.

Null Hypothesis four (H_{04}): There is no significant difference in the attitude of students towards biology when taught using high level verbal interaction, low level verbal interaction and lecture method.

Table 9:   Significant Difference in Attitude between HVI, LVI & LM

Category	N	Median	p-value	Decision
HVI	61	4.02		
LVI	45	3.88	0.000	H_0 Rejected
LM	58	2.37		

$\propto \geq 0.05$

Table 9 shows the significant difference in attitude among students taught biology using HVI, LVI and LM. There was a statistical significant difference among the three groups (p-value = 0.00 < 0.05). However, an inspection of the median scores shows that students

taught using HVI and LVI displayed more positive attitude towards biology than those taught using LM. On the other hand, those taught using HVI and LVI have no much attitude difference. In view of this, the research hypothesis was rejected.

Summary of Major findings

There was a significant difference in attitude towards Biology concepts between students taught using high level verbal interaction employing collegial method and those taught using lecture method (Test = 9.86; p-value < 0.05) in favor of students taught with high level of verbal interaction.

There was a significant difference in attitude towards Biology concepts between students taught using low level verbal interaction employing collegial method and those taught using lecture method (Test = 6.75; p-value < 0.05) in favor of students taught with low level of verbal interaction.

There is no significant difference in attitude between students taught Biology concepts using HVI and those using LVI (Test = 1.65; p-value > 0.05).

There was a statistical significant difference in terms of attitude among among students taught biology using HVI, LVI and LM (p-value = 0.00 < 0.05).

Discussion of findings

The study revealed two major findings from the four research hypotheses.

The first finding revealed that there was a significant difference in attitude towards Biology concepts among students taught using HVI, LVI and LM. When the results were separated, significant difference exist between HVI and LM, in favor of those taught using HVI (Test = 9.86; p-value < 0.05). In addition, there was a significant difference in attitude of students towards Biology concepts between students taught using low level verbal interaction employing collegial method and those taught using lecture method (Test = 6.75; p-value < 0.05), in favor of students taught with low level of verbal interaction.

Secondly, there was no significant difference in attitude between students taught Biology concepts using HVI and those using LVI (Test = 1.28; p-value > 0.05).

The significant difference between high level verbal interaction (HVI) and lecture method can be explained by active participation on the part of the students compared to passivity that characterized lecture method (LM). Students tend to develop positive attitude towards a subject when they are fully involved in classroom activities as opposed to when they are treated as passive recipient of knowledge. A number of explanations have been offered to clarify students' positive attitude towards a subject. Ibraheem (2008), revealed that students tend to manifest unfavorable attitudes towards a subject when they experience difficulties in the subject. This clarification was supported by Bature (2005), who observed that the major determining factors for attitude formation are the individual wants, information on group affiliation and personality. Bature's observation informed the present study of the importance of attitude which arises when it has strong influence upon behavior and kinds of satisfaction and values the individual chooses. Timothy (2005)

further explained that students' attitude towards a subject is influenced by the instructional strategies employed in the process of teaching, thus confirming the significant importance of collegial method of teaching in improving students' attitude.

By implication, these findings suggest that collegial teaching method involving high verbal interaction significantly improve students' attitude and high participation towards Biology teaching compared to low verbal interaction and lecture method. This further suggests that collegiality is beneficial at the highest level.

Conclusions

Based on the findings of the study, a number of conclusions were made. First, high and low verbal interaction proved to be significant for improving students' attitudes compared to lecture method, suggesting the need to allow students to dominate 70% of the classroom activities.

Secondly, high verbal interaction is more significant for improving students' performance than low verbal interaction, confirming the need to implement a more active teaching approach that involve high collaboration.

However, Collegial method is significant for improving students' attitude towards biology, although this attitude is not gender stereotyped. Overall, collegial method is more beneficial than lecture method in terms of students' performance and attitude.

Recommendations

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

1.   Since Collegial method is significant for improving students' positive attitude towards biology, Biology teachers should employ collegiality in their classroom activities. This method should however, be implemented to involve 70% domination of students.
2.   Since there was significant difference and almost equal attitudes in students taught biology in both low verbal interaction and lecture method, a research need to be conducted to find out which method should be most recommended
3.   Other strategies needs to be applied while using low level interaction in order to improve the students performance, since attitudes of students is more in favor using high verbal interaction,
4.   Teachers' attitudes towards Biology should be positive to encourage students' attitudes and for them to serve as role models.

Suggested Areas for further study

1.   Another study can be conducted to investigate teacher preparedness towards implementing collegial method of teaching on gender, locations and level of students.
2.   A comparative analysis can be conducted to compare the impact of cooperative learning with collegial teaching.
3.   In order to actually determine the impact of collegial method, a longitudinal analysis can be conducted to track student performance in a collegial classroom.

4.   Similar studies should be carried in other subjects like Chemistry, physics, mathematics at the Senior Secondary School Level.

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