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Effect of Discussion Instructional Strategy On Secondary School Students' Performance in Biology in Ekiti State

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Abstract:

This study examined the effect of discussion instructional strategy on secondary school students' performance in Biology in Ekiti State. This study adopted a pre-test, post-test, control group quasi experimental design in which two groups (one experimental group and one control group) were involved. The population of the study comprised of all S.S.S. 2 students offering Biology in all the public secondary schools in Ekiti State. The sample consisted of 101 students offering Biology drawn from 4 public secondary schools in Ekiti State. The sample was selected using multistage sampling procedure. Performance Test in Biology (PTB) was used for collecting the data for the study. The face and content validity of the instrument was ensured by experts of Tests and Measurement, and two senior Biology teachers. The reliability of the instrument was determined through the test re-test method and the reliability coefficient value of 0.81 was derived. The study was carried out in three phases namely pre-treatment stage, treatment stage and post-treatment stage. The findings of the study revealed that the use of discussion instructional strategy enhanced better performance of students in Biology than the conventional strategy. In addition, the application of discussion instructional strategy was not gender biased. It was recommended among others that the use of conventional lecture method for teaching Biology should be supported with the application of more learner-centred approaches that get the students actively engaged. This can be achieved when discussion instructional strategy is used during Biology lessons.

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Introduction

Biology, in particular is central to many of the scientific fields of human endeavours and its teaching should be given a serious attention. The study of Biology helps in the appreciation and enjoyment of nature and life. In addition, it prepares students for professional careers in such fields, as, medicine, bio-technology, agriculture and pharmacy. Biology is the science which studies living things and concerns itself with the study of the structure, behaviour, distribution, the origin of plants and animals and their relationship with their environments (Awodun, Adekunle & Femi-Adeoye, 2019).

Biology is offered at the Senior Secondary School (senior secondary school One (S.S.S 1) to senior secondary school three (S.S.S 3) classes) as a single subject. This group of students must have offered Basic Science and Technology at the Junior Secondary School (J.S.S 1 – 3) which is aimed at preparing them for core science subjects at the Senior Secondary level. It has been observed that Biology is a preferred science subject among senior secondary school students because it has less mathematical calculations unlike Physics and Chemistry. Therefore, Biology often has a higher enrolment figure of students in external examinations, such as, the West African Senior School Certificate Examination (WASSCE) and National Examination Council's Senior School Certificate Examination (NECO SSCE) more than Physics and Chemistry. It is also a popular subject for prospective medical, engineering and agricultural students.

Alafiatayo, Anyanwu and Salau (2018) pointed out that the teaching of Biology is important because it equips to comprehend the world around them and equips them with necessary skills to build a progressive society. The principles of science taught in Biology that could make students comprehend or understand their environment includes; observation, critical thinking, inferring among others. There is need for it to be properly taught in secondary schools so as to improve students' performance.

Despite the importance of Biology, the performance of Nigerian students in the subject at the secondary school remains not encouraging. The Senior Secondary School Biology results of Ekiti State between 2015 and 2020 were also generally not encouraging as the percentage of candidates that passed Biology at credit level and above in Ekiti State were below 49%. One of the major contributory factors for this under-achievement in Biology examination by students is linked to the use of conventional method in the teaching of secondary school Biology. This conventional method of teaching has been reported to dwell more on the transmission of knowledge in a manner that emphasizes memorization and has been criticized as a poor method of teaching Biology and other science subjects because it involves unidirectional flow of information/knowledge from the teacher to the students (Uzoma & Amadi, 2018). The quest to curtail the shortcomings of the conventional method used in teaching and learning of Biology led the researcher to investigate the effect of discussion instructional strategy on students' performance in Biology

Discussion strategy is a technique in which a teacher leads or guides the students in groups towards expressing opinions and ideas with the view to identifying and solving problems collectively. The role of the teacher in this technique is that of a facilitator. The teacher presents the lesson topics to the learners and also creates enabling environment for them. According to Rahman, Khalil, Jumani, Muhammad, Malik and Sharif (2016), discussion method is a teaching method that includes questioning which is similar to testing. A teacher may ask a series of question to collect information of what students have learned and what needs to be taught. Testing is another application of questioning. A teacher tests the student on what was previously taught in order to identify if a student has learned in order to identify

if a student has learned in the material. According to Ishaku (2019), there are different types of discussion methods this include round table discussion and panel discussion.

Round table discussion involves small number of persons nearly three to eight. It needs a moderator to introduce the members of the discussion group, present the problem to be discussed and keep the discussion moving. The leader's role is one of guiding the group rather than one of dominating it. The responsibilities of a moderator included the introduction of the topic, keep the discussion moving, avoid having the group become sidetracked, avoid quibbling over irrelevancies, summarize and draw conclusions. While the responsibilities of members of the discussion group are to be well informed on the topic, speak informally while avoiding arguing and quibbling, stay with the topic under discussion, have sources of information available, back up statements with facts, and help the group summarize its conclusions. A panel discussion is similar to a round table discussion in many ways, but different to exist. The responsibilities of the moderator are the same as in round table discussion. The procedure is more formal than that of the round table. It begins with a short statement by each discussion member.

The discussion teaching strategy is a teaching approach in which students are given opportunity to interact, share ideas, share their opinions and express themselves while the teacher coordinates the points expressed. The teacher allows the students to provide the information required for developing meaning. Classroom discussion is thus a teaching strategy that involves active participation of the learner in the learning process. It does not leave the students to passively receive knowledge. It allows for the role of the teacher to be that of guiding the classroom learning process. This approach is intended to facilitate the development of meaning in the learning of concepts and principles. When properly used, discussion becomes a dependable source of enhancing students' comprehension of science. This makes it suitable as a means of improving students' acquisition of knowledge of Biology when teachers use it in their instruction. Classroom discussion can therefore be one means by which the science teacher can promote effective learning so as to avert mass failure among the students (Ogunkunle & Onwunedo, 2017).

Rahman, et al (2016) explained that discussion works on the principles that the knowledge and idea of several people are more likely to find solution or answers to specific problem or topics. Discussion enhances learning by giving the learners room to develop their communicating skills, mental skills such as critical thinking, reflective thinking and evaluating diverse opinion (Efe, 2017). The role of the teacher is that of a facilitator. The teacher encourages the learner to discover things for themselves this could increase the retention ability of students towards certain concepts. Retention is the ability to store what has been learnt and recall what has been stored in the memory.

It is against this background that this study therefore examined the effect of discussion instructional strategy on secondary school students' performance in Biology in Ekiti State. Specifically, the study examined;

1. the difference between the pre-test and post-test mean score of students exposed to discussion instructional strategy;
2. the difference between the pre-test and post-test mean scores of students in the Control Group; and
3. the difference in male and female students' academic performance after being exposed to discussion instructional strategy.

Research Question

This research question was raised for this study;

1. What is the performance of students before and after exposure to discussion instructional strategy in Biology?

Research Hypotheses

The following research hypotheses were formulated for this study;

1. There is no significant difference between the pre-test and post-test mean score of students exposed to discussion instructional strategy.
2. There is no significant difference between the pre-test and post-test mean scores of students in the Control Group.
3. There is no significant difference in male and female students' academic performance after being exposed to discussion instructional strategy

Methodology

This study adopted a pre-test, post-test, control group quasi experimental design in which two groups (one experimental group and one control group) were involved. The population of the study comprised of all S.S.S. 2 students offering Biology in all the public secondary schools in Ekiti State. The sample consisted of class intact size (101 students offering Biology) drawn from 4 public secondary schools in Ekiti State. The sample was selected using multistage sampling procedure.

Performance Test in Biology (PTB) was used for collecting the data for the study. PTB was used to measure students' performance in Biology. It consists of Sections A and B. Section A sought for the bio-data of the respondents which include the name of the school, identification number and gender. Section B of PTB consisted of 50 objectives items which cover all the topics to be taught for the 6 weeks. The PTB was used for both pre-test and post-test for data collection. The face and content validity of the instrument was ensured by experts of Tests and Measurement, and two senior Biology teachers. The reliability of the instrument was determined through the test re-test method in one secondary school outside the sampled area. The instrument was administered on 20 students and within a period of two weeks, the instrument was re-administered on the same set of students. The responses collected were correlated using the Pearson's Product Moment Correlation statistics which yielded reliability coefficient value of 0.81.

To carry out the research in the schools, the researcher obtained permission from the authorities of the four schools. The study was carried out in three phases namely pre-treatment stage, treatment stage and post-treatment stage. The data collected through the instruments were analyzed using descriptive and inferential statistics. The research question was answered using means, standard deviation and bar chart while hypotheses were tested using t-test.

Results

Research Question 1: What is the performance of students before and after exposure to discussion instructional strategy in Biology?

Table 1: Mean and standard deviation of pre-test and post-test scores of students exposed to discussion instructional strategy

Strategies	Test	N	Mean	S.D	Mean Diff.
Discussion Instructional	Pre Test	57	22.54	1.94	**19.36**
	Post Test		41.90	2.92	
Conventional	Pre Test	44	22.17	1.03	**3.89**
	Post Test		26.06	3.17	

Total		101			

Table 1 revealed that the performance difference of students in Biology between pre-test and post-test scores for discussion instructional strategy is 19.36, and conventional method is 3.89. It appears that the use of discussion instructional strategy and conventional method influences students' performance in Biology with discussion instructional strategy being the more effective method in the teaching of Biology. The graphical representation below further shows the more effective method in the teaching of Biology.
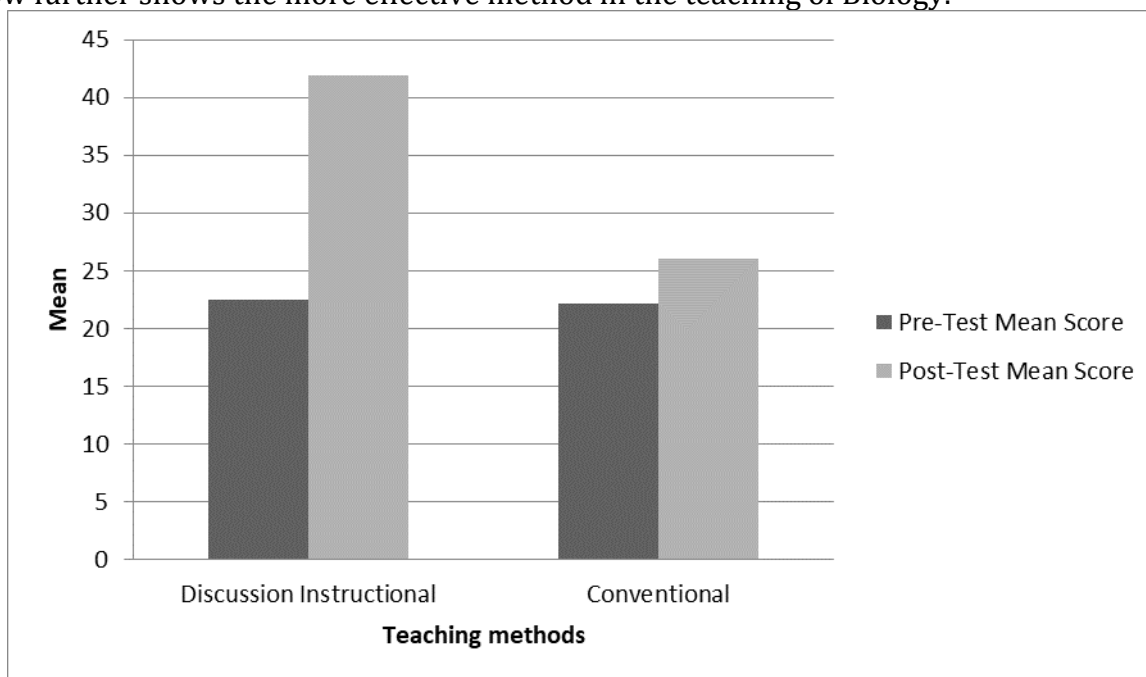

Figure i: Pre-test and Post-test mean scores of students exposed to discussion instructional strategy and conventional method

Test of Hypotheses

Hypothesis 1: There is no significant difference between the pre-test and post-test mean score of students exposed to discussion instructional strategy.

Table 2: t-test analysis for difference in the pre-test and post-test mean score of students exposed to discussion instructional strategy

Variations	N	Mean	SD	Df	t_{cal}	P
Pre-test	57	22.54	1.94	112	70.081*	0.000
Post-test	57	41.90	2.92			

*$P<0.05$

Table 2 shows that the t-cal value of 70.081 is significant because the P value (0.000) < 0.05. This implies that null hypothesis is rejected. Hence, there is significant difference between the pre-test and post-test mean score of students exposed to discussion instructional strategy. The mean score showed a significant mean difference of 19.36.

Hypothesis 2: There is no significant difference between the pre-test and post-test mean scores of students in the Control Group.

Table 3: t-test analysis for difference in the pre-test and post-test mean score of students exposed to conventional method

Variations	N	Mean	SD	df	t_{cal}	P

Pre-test	44	22.17	1.03	82	4.237*	0.021
Post-test	44	26.06	3.17			

*P<0.05

Table 3 shows that the t-cal value of 4.237 is significant because the P value (0.000) < 0.05. This implies that null hypothesis is rejected. Hence, there is significant difference between the pre-test and post-test mean scores of students in the Control Group. The mean score showed a significant difference of 3.89.

Hypothesis 3: There is no significant difference in male and female students' academic performance after being exposed to discussion instructional strategy

Table 4: t-test analysis for difference in male and female students' academic performance after being exposed to discussion instructional strategy

Variations	N	Mean	SD	df	t_{cal}	P
Male	31	41.92	2.01	55	0.114	0.881
Female	26	41.84	2.35			

P>0.05

Table 4 shows that the t-cal value of 0.114 is not significant because the P value (0.881) > 0.05. This implies that null hypothesis is not rejected. Hence, there is no significant difference in male and female students' academic performance after being exposed to discussion instructional strategy.

Discussion

The study revealed that there was significant difference between the pre-test and post-test mean score of students exposed to discussion instructional strategy. There was a better improvement in the performance of students resulting from their exposure to discussion instructional strategy. This implies that the introduction of discussion instructional strategy to the experimental group made them to perform better than the control group that was not exposed to treatment. The findings of Ishaku (2019), Efe (2017) and Abdulhamid (2016) show that discussion instructional strategy application yielded better results than the conventional method. Abdulhamid (2016) concluded that good teaching strategies have the potent to improve cognition of students. This also justifies the earlier postulate of this study that discussion instructional strategy could facilitate meaningful learning of Biology.

The study further revealed that there was significant difference between the pre-test and post-test mean score of students exposed to conventional method. But the performance mean difference of students (19.36) between pre-test and post-test scores for discussion instructional strategy was higher when compared with those exposed to conventional method (3.89).

It was revealed that there was no significant difference in male and female students' mean scores after being exposed to discussion instructional strategy. By implication, discussion instructional strategy was not gender biased. The study is in line with the findings of Ishaku (2019) and Rahman et al (2016) that investigated the demographic index of discussion instructional strategy on sex of the students who were taught using discussion instructional strategy.

Conclusion

Based on the findings of this study, it could be concluded that the use of discussion instructional strategy enhanced better performance of students in Biology than the conventional strategy. The application of discussion instructional strategy is not gender biased.

Recommendations

Based on the findings from this study, the following recommendations were made;

1. The use of conventional lecture method for teaching Biology should be supported with the application of more learner-centred approaches that get the students actively engaged. This can be achieved when discussion instructional strategy is used during Biology lessons.
2. Biology teachers should be given adequate orientation through workshops and seminars to update their knowledge in the use of discussion instructional strategy.

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