

Effects of Demonstration and Problem Solving Teaching Strategies on Academic Performance of Biology Students in Senior Secondary Schools in Ekiti State, Nigeria

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Abstract: The study focused on Effects of Demonstration and Problem-Solving Teaching Strategies on Academic Performance of Biology Students in Senior Secondary Schools in Ekiti state. The research adopted Quasi - Experimental Research Design. The study was carried out in three selected Schools which consisted of a total number of 148 Senior Secondary School II (SSS2) Biology Students, selected through Multistage Sampling Procedure. The objective was to find out the differences in Academic Performance of Students exposed to Demonstration and Problem - Solving teaching strategies. The instrument used was Biology Performance Test (BPT) which was designed by the researcher. Descriptive statistics of Frequent Count, Mean and Standard Deviation were used to analyze the data collected, while Inferential Statistics of Analysis of Variance (ANOVA) and T-test were used to test the hypotheses. All hypotheses were tested at 0.05 level of significance. Based on findings of the study, it was concluded that Academic Performance of the three groups (Demonstration, Problem – Solving and Conventional strategies) were uniform at the beginning of the experiment during pre-test. On exposure to treatment, students taught using Demonstration teaching strategy performed better followed by Problem- solving and lastly conventional teaching strategy in Biology.

Keywords: demonstration, problem solving, teaching strategies, academic performance, public school.

1. Introduction

Biology is the science that studies living organisms and how they interact with one another and their environment. Biology is an important Science Subject that Senior Secondary School Students offer at Senior Secondary Certificate class. Biology is also a pre-requisite to many fields of learning such as Pharmacy, Agriculture and Nursing. It contributes greatly to scientific growth of nations; it is an integral part of life because it is needed by everyone for successful living.

The primary purpose of teaching at any level of education brings a lot of fundamental change into the learner (Tebabal and Kahssay, 2011). In order to make teaching - learning easier, teachers are expected to apply appropriate teaching methods that match the objectives, bring out result of students' learning experience. Quite remarkably, poor Academic Performance of students may be associated with application of ineffective teaching methods by teachers to impact knowledge to learners (Adunola 2011). To make teaching effective, teachers need to be conversant with most teaching methods and be able to apply them in teaching a specific concept. Some formal methods of teaching widely recognized in literature by professional teachers are Demonstration method, Problem - Solving method, Lecture method, Discussion method, Laboratory method, Self Learning, among others (Omotayo, Ajayi, Fatoba & Ogundola, 2009). All these methods of teaching appear to be very good and effective ways of communicating information to learners. However, effective application of any of the teaching methods depends on professional quality of the teacher (Omotayo, 2009).

One of the teaching methods used in the classroom by the teachers is Conventional method; a teacher centered approach. According to Bilesanmi (2000), Conventional method is a traditional type of teaching. However, Conventional method has been used for educational progress over the years, and there are other teaching methods which when apply can improve Academic Performance of the students in Biology.

Demonstration teaching strategy in Science involves carrying out Science activities to illustrate Science concepts or ideas, it

can be carried out by; teachers alone, the teacher with the students, the student who is knowledgeable in the activity or an invited guest. National Teachers Institute (NTI, 2006).

This method tends to engage the students in activities and requires a type of classroom arrangement where students can clearly view what is being demonstrated. This method tends to engage the students in activities and requires a type of classroom arrangement where students can clearly view what is being demonstrated. The sad thing is that in most Secondary Schools, most teachers may carry out the demonstration without given the students the opportunity to repeat the task, and if the class size is large, students might have difficulty of seeing details of the objects been demonstrated to them.

Problem-Solving can be defined as a method of obtaining an answer or solution to a given problem (Nworgu, 2009). Problem-Solving is related to activity based instruction because learning is attained when students are actively involved. Learning by doing seems to be a good means of learning. Problem-Solving approach enhances students' chances of playing active roles during lesson. This approach appears to be students-centered approach as the students are giving tasks to solve either individually or in-group. When this is done students have the opportunity to think critically in order to proffer solution to the task given to them, thereby facilitating the development of their reasoning power. Problem-Solving tends to give room for learners to receive peer and teachers' support during the lesson and may also arouse the interest of the learners because it is learning by doing. It allows for brainstorming and roundtable discussions.

Despite the fact that Problem-Solving Teaching Strategy enhances critical thinking and arouses the interest of the students, the researcher observed that if the strategy is not supervised by the teacher, some students may not be interested in finding solutions to any problem, and individual differences in terms of ability, interest, experience and emotion may not be easily catered for. Also a single student may dominate the other students in the same group.

Therefore, on this basis the researcher investigated the effects of Demonstration and Problem - solving teaching strategies on

Academic Performance of Biology Students in Senior Secondary Schools in Ekiti State, Nigeria.

2. Statement of the Problem

Methods of teaching in Nigerian Secondary Schools calls for review as most of the teachers in the Public Secondary Schools still believe in impacting knowledge to students through Conventional method of teaching in the classroom. However, Conventional method has been used for educational progress over the years, but there are other teaching methods which could make teaching-learning better which teachers still neglect for Conventional method. Previous researchers in the field of education have observed that many difficulties in Biology seems to be related to teachers' approach to methods of teaching and teachers' experience.

Therefore, Demonstration and Problem - Solving teaching strategies were used to simplify the teaching of the identified concepts of the subject and to find out whether the two teaching strategies Demonstration and Problem – Solving) could influence better Academic Performance in Biology.

3. Purpose of the Study

The study investigated Effects of Demonstration and Problem - Solving Teaching Strategies on Academic Performance of Biology Students in Senior Secondary Schools in Ekiti State, Nigeria. The study examined the difference in Academic Performance of students exposed to Demonstration, Problem - solving and Conventional Teaching Strategies in Biology lessons.

4. Research Question

One research question guided the study:

Is there any difference in Academic Performance in Biology between students exposed to Demonstration and Problem-Solving Teaching Strategies?

5. Research Hypotheses

The following hypotheses were formulated:

1. There is no significant difference in pre-test mean scores of students exposed to Demonstration, Problem - Solving and Conventional Teaching Strategies.
2. There is no significant difference in post-test mean scores of students exposed to Demonstration, Problem - Solving Teaching Strategies and Conventional Teaching Strategies.

6. Methodology

The study adopted quasi experimental research design. A population of all Biology Students in SSSII (SSS2) in all public Senior Schools in Ekiti State were used for the study, sample of 148 Senior Secondary School II Biology students were selected from three selected schools using Multistage Sampling Procedure.

The instrument used for data collection was Biology Performance Test (BPT) which was designed by the researcher. The instrument was subjected to face and content

validity, reliability was ensured through test re-test method. Scores obtained from the administration of the test was correlated using Pearson's Product Moment Correlation Analysis, and the reliability coefficient of 0.72 was obtained. Data collected were analyzed using Descriptive Statistics of Frequency Counts, Mean and Standard Deviation and Inferential Statistics of Analysis of Variance (ANOVA) and t - test was used to test the hypotheses. All hypotheses were tested at 0.05 level of significance.

7. Results

Question One: Is there any difference in Academic Performance of Biology students exposed to Demonstration and Problem-Solving teaching strategies?

Table 1: Mean and Standard Deviation - Effects of Demonstration and Problem-Solving Teaching Strategies on Senior Secondary School Students' Academic Performance in Biology

Methods	N	Pretest		Posttest		Mean Difference	Ranking
		Mean	SD	Mean	SD		
Demonstration	49	5.90	1.86	43.08	3.41	37.18	1 st
Problem-Solving	51	6.10	2.55	27.55	4.64	21.45	2 nd

Table 1 showed that students exposed to Demonstration and Problem-Solving Teaching Strategies had mean scores of 5.90 and 6.10 respectively prior to treatment; hence, Academic Performance of Students in the groups was uniform at the beginning of the experiment during pre-test. On exposure to treatment, students exposed to Demonstration Teaching Strategy had higher mean score of 43.08 than their counterparts exposed to Problem-Solving Teaching strategy with a post-test mean score of 27.55. This implies that there is significant difference in Academic Performance of Biology student exposed to Demonstration and Problem-Solving Teaching Strategies.

8. Testing of Hypotheses

Hypothesis 1: There is no significant difference in the pre -test mean scores of Students exposed to Demonstration, Problem-Solving and Conventional Teaching strategy.

In order to test hypotheses, Students' scores in Biology Performance Test in pre-test in Demonstration, Problem - Solving and Conventional group were collated and computed using ANOVA. The results are presented in table 2.

Table 2: Analysis of Variance (ANOVA) showing the Pretest Mean Scores of Students by Treatment

Source	SS	Df	MS	F	P
Between Groups	2.141	2	1.070	0.206	0.814
Within Groups	752.312	145	5.188		
Total	754.453	147			

p>0.05

Table 2 showed that ($F_{2,145}=0.206, p>0.05$). Null hypotheses were not rejected. This implies that there is no significant

difference in performance of students in various groups before the treatment, in order words; Academic Performance of Student in the group was uniform at the beginning of the experiment during pre-test.

Hypothesis 2: There is no significant difference in post- test mean scores of students exposed to demonstration and Problem-Solving Teaching Strategies in Biology lessons.

Table 3: t-test showing Post-test Mean Scores of Students in Demonstration and Problem-Solving Groups

Group	N	Mean	SD	Df	T	P
Demonstration	49	43.08	3.41	98	19.014*	0.000
Problem-Solving	51	27.55	4.64			

*p<0.05

Table 3 showed that ($t_{98}=19.014$, $p<0.05$). Null hypotheses were rejected. This implies that there is significant difference in Academic Performance of students exposed to Demonstration and Problem - Solving Teaching Strategy in Biology lessons.

10. Discussion

The findings of the study showed that teaching of students with Demonstration Teaching Strategy had an edge to improved Students' Academic Performance in Biology over Problem - Solving and Conventional Teaching Strategies in Ekiti State. The outcome is in line with Al-Rawi, (2013) who found Demonstration Teaching Strategy effective using tools and laboratory equipments for experiments in Science than Problem - Solving and Conventional Teaching Strategies.

The findings also reviewed that there is significant difference in post-test mean score of student exposed to Demonstration, Problem - Solving and Conventional Teaching Strategies in Biology lessons. The result implies that Demonstration Teaching Strategy enhance students understanding and better Academic Performance in Biology over Problem - Solving and Conventional strategy of teaching. The result is line with Bonney (2015) who showed that when a concept is Demonstrated to students, it help them to understand and remember new concepts, especially when students can clearly view what is being demonstrated , than asking students to solve problems on their own without any guidance.

The result is also in consonance with Ali, Hukamdad, Akhter, and Khan (2010) who discovered that use of Problem-Solving Teaching Strategies enhance Academic Performance of the student in Biology as well as found to be more effective than Conventional Teaching Strategies in Biology lessons especially when teachers try to convey complex topics such as those that occur in sequential steps.

11. Conclusion

Based on the findings of the study, it could be concluded that the Academic Performance of the three groups (Demonstration, Problem - Solving and Conventional Teaching strategies) were uniform at the beginning of the experiment during pre-test. On exposure to treatment, students taught using Demonstration

teaching strategy performed better followed by Problem-solving and lastly conventional strategy in Biology lessons.

12. Recommendations

The following recommendations were made based on the findings and conclusion of the study.

1. Teachers should impact knowledge properly in students through appropriate teaching methods when teaching Biology to improve their Academic Performance.
2. Demonstration Teaching Strategy should be employ in teaching of Biology to enhance students' understanding of the subject.
3. Teachers should make use of step by step approach when transferring knowledge of Biology through Problem-Solving Teaching Strategy to foster students' knowledge orientation and competency in Biology.

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