



The Effects Of Teaching Methods On Academic Performance In Primary School Science

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Abstract:

The effects of different teaching method on academic achievement of learners were investigated among primary school pupils. A science topic was taught to different groups of selected pupils I their final year using lecture, discussion and discovery methods. The results of three previous terminal examination of each pupil were taken to be the pretests while the post-tests were obtained from scores obtained from standardize evaluation of the teaching process. Participating children were made up of both male and female pupils. The pupils taught with discovery method were noted to improve on their academic achievement than with other methods. Pupils even declined in their academic achievement under lecture teaching method. There was no noticeable disparity in the effects on pupils along gender line. It is recommended that facilities to make teachers adopt appropriate method of teaching be provided by both public and private owners of educational institutions.

Introduction

For effective teaching to take place, a good method must be adopted by a teacher (Wikipedia, 2011). An effective teaching brings about effective learning. The teacher must possess those qualities that bring about effectiveness in learning. Thus, the preparation, the methods and the medium of communicating the learning experiences must be compatible with the learners needs. Methods of teaching therefore can be seen as the means, or techniques or instructional strategies by which the teacher provides or delivers his/her subject matter to the students in the class, based on predetermined instructional objectives in order to promote learning in students' (Efebo, 1990). According to Wikipedia (2011), teaching method comprises the principles and methods used for instruction and that commonly used teaching methods may include class participation, demonstration, recitation, memorization, or combinations of these.

Literature Review*Teaching Methodology and Achievement*

According to Nwankwo (1996) teacher-factor is one of the several factors that affect students' learning. Teachers play a prominent role in a learning process. Teacher's method does influence academic performance of students (Asikhia 2010). Students' academic achievement depends largely on the social situation in which the teacher and students interact during teaching and learning (Le Francois 1991). It is therefore concluded that when teachers employ a variety of methods to maintain a classroom environment conducive to learning, and healthy personal development of individuals, the students will be interested and learn the subject which will result into high achievement when evaluated (Le Francois, 1991).

Instructional strategy and Students Academic Achievement

According to Ochuere (2001) instructional strategies consists of all those things the teacher do in planning, implementing and evaluating instruction. Instructional strategies can therefore be seen as the means, or techniques, or the methods of teaching by which the teacher provides or delivers his/her subject matter to the students in the class, based on the predetermined instructional objectives in order to promote learning in students. The means or strategy is the implementation process which is commonly observed as the teacher teaches his/her class (Efebo, 19990). There are several methods of teaching used in the classroom all over the world. It is essential for any teacher (science teacher in particular) too become acquainted with teaching methods that will enable learners achieve their learning outcomes

(Maduabum 1984). These methods include among others: Lecture method, discussion method, Inquiry/Discovery method, conventional method etc.

Effective Teaching Method

According to Wikipedia (2011) for effective teaching to take place, a good method must be adopted by a teacher. Teacher can learn in school all the basic theories that they can use before practicing their profession, but later they will discover that the best and most effective teaching methods may vary from different situations (Thinking made easy, 2011). It is essential that a teacher should be conscious of attainment of teaching/learning objectives as a goal. As long as the teacher's goal is highly focused on the student's welfare, the result would be a well sounded and balanced personality of highly successful students that they can be proud of. Effective teaching requires the teacher to step out of the realm of personal experience and step into the world of the learners. (Brown, 1997, quoted by Omotere 2011). Studies had revealed that the method presently employed in teaching, in most of our public primary schools is inadequate or not effective (Busari 1991, quoted by Omotere, 2011). An effective teaching brings about effective learning. The teacher must possess those qualities that bring about effectiveness in learning. Thus, the preparation, the methods and the medium of communicating the learning experiences must be compatible with the learners needs. Methods of teaching therefore can be seen as the means, or techniques or instructional strategies by which the teacher provides or delivers his/her subject matter to the students in the class, based on predetermined instructional objectives in order to promote learning in students'. This means or strategy is the implementation process which is commonly observed as the teacher teaches his/her classes i.e. the delivery stage of teaching process (Efebo, 1990). According to Hussain, Anwar & Majoke (2001), teaching is a dynamic, well-planned and systematic presentation of facts, ideas, skills and techniques to students and its focus is to acquire maximum learning experience. Selection of the most suitable teaching strategies is the basic condition for successful teaching/learning process. Awisworth (2006) had asserted that teaching of science requires more understanding and conceptual knowledge of various scientific representation. The teaching /learning techniques must have necessary provision for students' active engagement with explanatory idea and evidence so as to enable them make connection of scientific theories and concepts to real purposes and practices in the world they live (Tyler, 2003). No single teaching method or strategy can encompass all the conditions proposed by experts as prerequisite for learning to take place (Hussain, et al. 2011). They therefore concluded that a combination of two or more learning strategies can

put together the most favourable conditions for learning and consequently make teaching/learning process meaningful. Thus Lawrenz, wood, Knchoff, Kin and Eisenkraft (2009) had suggested the use of student-centered teaching strategies. Furthermore, it had been recommended that elementary science classes must include activity based learning with hands on experiences for maximum constructional time where the students are manipulating, observing, exploring and thinking about science using concrete materials (Lopez and Schultz,2001).

Learner-centred Teaching Approach

According to Mills (1991) the teaching approach that a teacher adopts is one factor that may affect student's achievement. Therefore the use of appropriate teaching method is critical to the successful teaching and learning of science subject (Wambugu and Chiangeiywo, 2008). Moreover, Omotere (2011) had asserted that the success in the use of any method differs as a result of an intelligent analysis of the objectives, the pupils in class, the curriculum content or the type of subject matter.

Wikipedia (2011) had asserted that the choice of an appropriate teaching method depends largely on the information or skill that is being taught, and it may also be influenced by the aptitude and enthusiasm of the students. This thus means that the interest of the learner is significant in determining the teaching method of choice at a particular time. It had also been concluded that when deciding what teaching method to use, a teacher needs to consider students' background knowledge, environment, and learning goals. One common concept among educator on teaching approach is constructivism. According to Oludipe and Oludipe (2010), active involvement of students is emphasized in constructivism, hence knowledge gained last long in their memory. Learners actively take knowledge, connect it to previously assimilated knowledge and make it theirs by constructing their own interpretation (Check, 1992).

Teaching method as a choice should be able to motivate and prepare the student to learn. In undertaking any process or activity the objective and goal is of paramount consideration. The learner is the target and his/her development is the goal in the teaching/learning process. The attainment of the objective on the part of the learner is also the objective of the teacher. Many educators belief that the use of technology, while facilitating learning to some degree is not a substitute for educational method that brings out critical thinking and a desire to learn (Wikipedia, 2011). Moreover, Osakwele, Onijgin anf Falana (2011) had asserted that the aim of education is to help the child to

develop and that teaching methods and the learners' environment have significant relationship. Teachers are to use techniques which later to multiple learning styles to help students retain information and strengthen understanding (Wikipedia, 2011).

Teaching Methods

There are several methods of teaching used in the classroom world-wide. It is essential for any teacher (generally) or science teacher (in particular) to become acquainted with teaching methods that will enable learners achieve their learning outcomes (Maduakolam, 1984). These methods or strategies include among others: Lecture method, discussion method and Inquiry method etc.

Lecture Method

Lecture method is otherwise called expository or didactic method of teaching because it is a teacher dominated approach, and a direct instructional strategy (Maduabum, 1984, Boridi, 1988). In this approach, the teacher transmits information (content/subject matter) verbally to the students, while the students listen and take notes of facts and ideas deemed necessary (Onwuegbu, 1979, Maduabum, 1984). It is a teacher – talk affair, in some cases no interaction, hence it is called a teacher – centred approach where the teacher is the active transmitter of information and the students the passive learner (NTI, 2000). Lecture method is good for teaching very large classes, to pass a great deal of information within a short time, but neglects the concept of individual differences among learners and their needs, by assuming all learners to be the same (Onwuegbu, 1979, Crowl, Kaminsky and Podell, 1997).

Discussion Method

Discussion method involves the discussion of biology/science topics, issues or concepts by groups of students of the entire class while the teacher merely moderates. According to Maduabum (1992), this method involves the students talking over a subject from various points of view, with the teacher directing the questions properly and elicits more information from the students. The method assumes that students are capable of making reasonable contribution on such topic, theme, unit or situation.

Teacher usually leads the discussion on the topic; he throws it open for deliberation by the students. It can be in form of probing question, exploration like “what do you think about” approach to get good information of ideas, concepts and issues from learners. Usually the

interaction and flow of information between student and student, and student teacher and among class members, used to be encouraged. Discussion method helps the students to maintain a high degree of mental alertness to develop clear thinking and good communicative skills, also students learn to identify different areas in the subject and be able to ask questions or discuss them in order to achieve the lesson objectives (Iwu, Ike and Okoge, 2002). But it is time consuming and painstaking in terms of planning and preparing the questions and expected reactions from the students.

Inquiry Method

Inquiry method is a type of teaching method in which the learner is given the opportunity to discover things by himself. It is student-centred, hence it is called heuristic method. The Psychologists who are the proponents of this method believe that it is mainly through problem solving and effort, leading to discovery that students learn about scientific concepts. It increases retention of information discovered, and develops manipulative skills and attitudes in learners, which constitute of a fundamental objective of science teaching/learning. However, it is time consuming, expensive and discouraging sometimes when the students don't discover anything. (Efebo, 1990, Maduabum, 1984).

Statement of Problem:

Experience has shown that greater number of teachers is not equipped for teaching jobs as they lack the necessary skills or techniques of realizing this aim (Onwuegbu, 2001). The teacher is expected to adopt the most suitable methods that will promote learner's learning style and mental levels. Unfortunately, students' achievement in biology in the recent past has not been impressive. Many factors including faulty instructional materials might be responsible. This study is to be embarked upon to determine the relative differential effect of three teaching methods (Lecture, Discussion and Inquiry method) on students' performance in biology with the hope of determining which one is more effective and will yield better results.

Purpose of the Study

This study seeks to compare the relative effect of the three common teaching methods on academic scores of children in school.

To ascertain whether gender is a factor in academic performance of students using different teaching methods.

To determine which of the teaching methods is relatively more relative in teaching selected biology topics.

Research Questions

The following questions will be addressed in carrying out this research work.

Does any teaching method help student in learning better than the other.

Does any teaching method relate to gender effective e learning in classroom.

Which of the three teaching methods under investigation is relatively more effective on students learning process?

Which of the three teaching methods is more effective in assisting students' relative memory?

Research Hypothesis

- H₀₁ There is no significant difference in student's scores under the three teaching method.
- H₀₂. There is no significant difference between the pre-test and post-test scores of students under Lecture method.
- H₀₃. There is no significant difference between the pre-test and post-test scores of student under discussion method.
- H₀₄. There is no significant difference between the pre-test and post-test scores of student under inquiry method.
- H₀₅. There is no significant difference in the academic score of female and male students in the different teaching methods.

Scope Of The Study

This research work is directed at final year primary school pupils Alvan Model School Owerri in the study of primary school science. As a result of time and financial restrains, this study could not be replicated in other schools.

Significance Of The Study

There must be effective teaching in order to achieve the objectives of learning. The goals of education can only be achieved among children when teaching method is appropriate and

learning process is productive. This research work will go a long way to determine method that could be appropriately employed to achieve the goal of education of children. This would therefore produce a guide for education planner, curriculum developers and those involved in execution of educational plans in nation's education industry.

Research Methodology

Design of the Study

This study is an experimental research which adopted the non-randomized control pre-test/post-test design due to the use of intact classes.

Population

The population of this study was designed for all the final year pupils of Alvan Model School, Owerri. Imo State.

Sample and Sampling Technique

The sample of the study consisted of 21 students from 3 classes of Holy Ghost College, Owerri. Simple random sampling technique by toss of coin was used to draw the sample, while balloting was used to assign to the classes (A, B, & C), the methods used in teaching the students. Hence, the "A" class was assigned lecture method, "B" class – discovery –method and "C" Class discussion – method.

Instrumentation

Teaching Method

The teaching methods used were Lecture method, Inquiry method and discussion method with the Lesson Plan on each of the methods.

S/No.	Group class	Instructional strategy used	No. of Students in each Group		Total No. of Students
			Male	Female	
1	A	Lecture	12	15	27
2	B	Discovery	6	9	15
3	C	Discussion	6	15	21
Total	3 Classes	3 Methods	24(Males)	39(Females)	63(Students)

Table 1: Shows the distribution of the sample

Pre-tests

The pre-test score was obtained from the previous three terminal examinations of the participating students.

Post-tests

The Biology Achievement test (BAT), made up of two parts A & B served as the instrument for data collection. Part A collected information as regards class and gender of the respondents, while part B contained items of the BAT. The BAT is a 20 item multiple choice teacher-made test, with answer options A to E with only one correct option as the answer to a question. Each question score five (5) marks for the right answer and zero (0) point for wrong answer. Thus 100mark was the maximum score obtainable while zero (0) the minimum.

Procedure

A copy of validated pre-planned lesson notes for each instructional strategy was given to the regular Primary science teacher of the sample school who did the actual teaching experiment after being trained by the researcher to ensure variation on each method, and to guard against other bias before commencement of the treatment Post-test session. Pre-test was determined from their previous results before the main treatment started to determine the equivalence of the groups. Treatment session: the regular biology teacher followed the principles outlined for each strategy as contained in the validated preplanned lesson notes.

Group A- Lecture/Expository Strategy

Subjects in this group were verbally presented with information on the entire content of the biology topic to be learned 'Animal Nutrition'. The concept of food, balanced diet and food substances. There was no use of instructional aids like charts, real specimens nor was there any teacher-student or student-students' interaction in this group. No practical was conducted for the students.

Group B – Discovery Strategy

Students in this group were placed under 1 group because they were few and provided with instructional material. These include real life specimens of different kinds of food materials needed for the lesson. They were given every information and series of examples of concepts to be learned. They were given opportunity to perform on their own. They carried out practical activities on grouping of food items according to their classes. As they carried out these activities, they learned from their mistakes. The teacher guided them a bit with the use of probing questions drawing their attention to the

instructional materials (placed on their tables) and by class discussion at the end of the activity, featuring contributions and further questions. The teacher was guided by lesson plan.

Group C – Discussion Strategy

Students in this group were taught with the provision of instructional materials placed before them at the centre of table as they sat around/circular form). The teacher as the organizer directs the discussion as he points and assigns issues to be discussed. Students starting from the points express their views about the issues raised. The teacher ask a lot of questions in this section in order to know the students level of knowledge about the discussing matter and the students learn mostly from the contributions of their fellow students and after their contributions the teacher summarizes the whole matters. Teacher was guided by lesson plan.

Administration Of Instrument

The teaching session which was the actual teaching experiment lasted for thirty minutes at the end of which the Biology Achievement test (BAT) was given to the students. The post-test items and mode of administration and scoring were the same as those of the pre-test. The information obtained from the instrument was analyzed using the mean average, and highest and lowest score.

Method Of Data Analysis

The data were based on the responses to the test collected from the respondents. The responses obtained from the data were analyzed in the average score, mean score. The analysis was therefore calculated in raw scores to the highest score. This was for easy interpretation and possible comparison.

The pre-test score and post-test scores for each of the students were analyzed to determine correlation. This asserts whether the performance of students under this investigation reflects the relative performance of the students before the commencement of this investigation.

Results

The analysis of past-test scores of student that participated in the various groups showed remarkable differences (see Table 1). The post-test scores were highest were higher for

students in group C (under discovery method: Highest score/Average scores were 85/68). It was lowest for students in group A (under Lecture method: Highest score/Average scores were 60/53). The discussion method group of students had scores analysis that put them at the middle. (75/63). Students under discovery method performed better than students under discussion and Lecture method.

Categories	Group A Lecture Method Mean Scores	Group B Discussion Method Mean Scores	Group C Discovery Methods Mean Scores
Highest Score	60	75	85
Lowest score	45	50	50
Average score	53	63	68
Median	55	70	65

Table 1: Post-test Mean Scores of different groups

The result from this study showed that pre-test performance of students in group A (Lecture Method) was higher than performance at post-test. At the pre-test, the highest score/Average score was 77/56 while at post-test, this was 60/53. Students performed poorer than they were doing in normal class when lecture method was used (see table 2). However the lowest score for the group at the post-test was higher than for the pre-test.

Categories	Pre –Test Mean Scores	Post – Test Mean Score
Highest	77	60
Lowest	32	45
Average	56	53

Table 2: Lecture Method: Group Scores of Pupils

The group score of students at the discussion group (Group B) was higher during post-test than at pre-test. Students performed better under Discussion method than they were doing in the normal class. Post-test scores for this group (B) showed highest/Average scores of 75/63 and pre-test scores of 69/61.

Students in this group were shown to perform better than usual classroom performance.

(See Table 3)

Categories	Pre-Test Mean score	Post-Test Mean score
Highest	69	75
Lowest	40	50
Average	61	63

Table 3: Discussion Method: Group Scores of Pupils

The differences between the scores of students in Pre-test and Post-test under Discovery method of teaching was more pronounced than in discussion method. The highest/Average scores in the post-test was 85/68 while at pre-test this was 75/59. Students did better under discovery method of teaching relative to their usual classroom academic performance (See Table 4).

Categories	Pre-Test Mean scores	Post-Test Mean scores
Highest	74	85
Lowest	41	50
Average	59	68

Table 4: Discovery Method: Group Scores of Pupils

Considering the Average scores of Students under the three methods of teaching, students perform best under discovery method (score of 68) followed by discussion method (score of 63) and coming last is the Lecture method (Score of 53). Students has higher tendency to perform best under teaching using discovery method. Students has higher tendency for higher academic scores when taught under discovery method. The highest score achieved by the entire students in the Pre-test was 77. However under discovery method, highest score was 88.

Teaching Methods	Male Mean score		Female Mean Score	
	Pre-test	Post-test	Pre-test	Post-test
Lecture	49.05	53.75	61.30	55.00
Discussion	64.90	65.00	59.70	69.00
Discovery	53.80	62.50	62.40	70.00

Table 5: Gender Effect on Teaching Method and Academic Achievement

In this research study, generally gender does not play significant factor in the relationship of teaching method and academic achievement. However with the discussion method, females improved relatively higher than male with post-test/pre-test

score 69.0/59.7 and 65.0/64.9 respectively. Also, the lecture method did not go well with female as with male children.

Discussion, Conclusion And Recommendation:

Discussion

The students performed best under the discovery method in this investigation. This finding is in agreement with finding of Ndudi and Nkpa (2003) who found that two expository and discovery methods were superior to the traditional method of teaching. This finding in this research also correlate with those of Ajewole (1990) Michael and Eugene (1981), Odubunmi and Balogun (1991) and Johnson and Lawson (1998). They had confirmed that students in the discovery group archived significantly higher than those in the Lecture group.

The result of this investigation also shows that the lecture method was negatively responded to by the pupils as their post-test score was lower than pre-test. This is to show that lecture method cannot be appropriately employed in the teaching of science in primary school. According to Omotere (2011) the use of lecture method is not appropriate in the foundation classes, This might be because, science which is alien to their cultural background is just being introduced, and thus the most motivational method of teaching should be employed in arousing their interest to learn.

Both discussion and discovery teaching method are good for teaching the students in science. This is because there is significant improvement in academic achievement of the pupils under both teaching method.

The response of both gender divides under the different teaching methods does not indicate any difference along gender line. This is similar to finding of Ajewole (1990), Eze (2000) and Eze (2003) who had asserted that interaction effects between instructional strategies and gender were not significant.

Conclusion

Effective learning that could arise from effective teaching would arise when the teaching/learning process is learner-based. Learners need a deliberate motivational teaching strategy that could drive them into proper understanding of concepts. The choice of teaching method could play a significant role in improving academic achievement of school children. Learner participatory method had been found to be more effective teaching technique the other methods.

Recommendation

In order for educational objectives to be achieved among school children, it hereby recommended as follow:

Educator should strive to employ learner-based techniques in teaching/learning process in science teaching especially in primary schools

Education process providers, both private and public should endeavour to provide learner-focused learning environment in the classroom.

Education process providers both private and public should endeavour to provide materials requirements for teaching strategy for their students in order for the goals of education to be achieved.

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