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Effects of Evaluative Feedback on Performance and Retention of Secondary School Students in Biology

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ABSTRACT This paper investigated the effects of evaluative feedback on performance and retention of secondary school students in Biology. The research design was a two-group Pre-test-Post-test comparative experimental research. The sample consisted of 120 SS II Biology students selected from four Senior Secondary Schools in four local government areas of Ekiti State, based on stratified random sampling techniques. The strata recognized schools in the local government areas and the experimental and control groups. The instrument for collecting data was a 30-item Biology achievement test drawn from the concepts of population, reproduction and ecology. The validity of the instrument was ensured using experts while the reliability coefficient was estimated at 0.78 using split-half method. Pretest was administered on the students for the purpose of homogeneity while the Post-test was administered after the experiment. Two hypotheses were tested at 0.05 level of significance. Data collected were analyzed using means, standard deviation and t-test. The result indicated that, there was significant difference in the performance of students who were given evaluative feedback and those who were not given evaluative feedback. Similarly the group given immediate evaluative feedback had better retention than those without immediate evaluative feedback. It was recommended that teachers should constantly give feedback to students on any test administered to promote test wiseness, better performance and retention in Biology.

INTRODUCTION

Several studies have been carried out to determine the effect of feedback regarding test scores on the individual' subsequent test performance. For example, Anastasi and Urbina (2007), quoting Bridgeman (1974), reported the investigation carried out on seventh-grade students and found that feedback of scores had significant positive effects on the students but when similar test was given to students without feedback it had negative effects on them.

In recent years, attention has been focused on problems relating to evaluation of instructional programmes, teaching, learning, teachers, students and even the entire school systems. But none of these proved to be the most potent promoter of good performance of learning.

Evaluation in schools involves the use of variety of standardized and local tests. According to Balogun (2001) and Kolawole (2004) a test is an assessment instrument used to determine how much of the instructional objectives provide information to the students about what is expected of them in the educational programme being provided.

Standardised test can help to determine the quality of students' learning if they measure the right outcomes. But too often, the teacher made-test represents a competitive guessing game between the teacher and their students (Hanna 1984). On this basis, Yonder and Janini (1997) reported a continuing decline in students assessment test scores in certain subjects. The assumption prior to the study was that if many students were scoring lower on a prominent standardized test, then schools and teachers were not doing their jobs adequately. The need then arises for a serious look into how the test is administered to students and what happens after the administered test. Is any feedback given? What is the effect of the feedback? If there is no evaluative feedback, what is the impact of such omission on students' performance?

Aghenta (1982) carried out a survey which showed that students' performances in the sciences were poor in the past. The reason for this poor performance could be traced to lack of evaluative feedback. Students were only prepared for the West African School Certificate Examination conducted by the West African Examination Council (WAEC) who will give summative evaluation. Those who were given end of term test were not allowed to have access to the result. It was believed then that WAEC is the final judge.

The drive to pass examinations and obtain a certificate by all means is another great handicap to teachers to conduct meaningful test. Teacher

and students work together on WAEC examination hall to pass examination. The need to teach all the content of the syllabus and give students' periodic test for proper mastery of concepts is replaced by speculations and forecast of examination questions and miracle centers.

According to Chinwe (1999), many factors are responsible for unshakable failure of students in Biology in the WASCE. Among the factors identified are students' lack of interest in Biology, lack of evaluative feedback and their ignorance of the importance of Biology. It could be observed also that some teachers are lazy; they do not have time for marking students' work. Some may not even conduct test until the end of the term. Ordinarily, teachers are expected to conduct periodic or monthly tests for continuous assessment (C.A.) mark score and provide the student feedback on the tests. It is believed that if teachers provide students with immediate evaluative feedback, much would be achieved in terms of retention of Biological concepts and consequently enhance students' test wiseness and performance in Biology. The question remains, to what extent will this assumption hold with regards to this study?

Research Questions

The following research questions were raised to guide the study:

i. What is the performance of the experimental and control group in Pre-test?
ii. What is the performance of the experimental and control group in Post-test?
iii. Will there be any difference between the performance of students who are given immediate evaluative feedback and those who are not given in Biology?
iv. Will there be any difference between retention of students given immediate evaluative feedback and those who were not given?

Research Hypotheses

The following hypotheses were tested at 0.05 level of significance:

HO_1: There is no significant difference between the performance of students who were given immediate evaluative feedback and those who were not given immediate evaluative feedback.

HO_2: There is no significant difference in the retention of students who were given immediate evaluative feedback and those who were not given immediate evaluative feedback

METHODOLOGY

Research Design

A pre-test—post test design of comparative research was adopted in this study. The design made use of the treatment groups as in the pattern below:

0_1 X_1 0_2
0_3 X_2 0_4

where

0 = pretest and post test

0_1 and 0_3 = pretest for those given immediate evaluative feedback and those without immediate evaluative feedback respectively

0_2 and 0_4 = Post test for those given immediate evaluative feedback and those without immediate evaluative feedback.

X_1 = Treatment l for group l – Experimental group

X_2 = treatment ll for group ll – Control group

Sample and Sampling Techniques

The sample for the study consisted of 120 SS II Biology students selected from four Senior Secondary Schools in four local government areas of Ekiti State, based on stratified random sampling technique. The strata recognized the local government areas, and experimental and control groups. The experimental group consisted of 60 students (urban = 30, rural = 30) while control group consisted of 60 students (urban = 30, rural 30).

Research Instrument

The research instrument was a 30-item multiple choice achievement test drawn from the concepts of population, reproduction and ecology in Biology.

Validity and Reliability of the Instrument: Copies of the constructed achievement test were given to three experts in Biology, and Test and Measurement for the purpose of ensuring its face and content validity as well as suitability for the target sample. For reliability of the instrument, a pilot study was carried out in two schools outside the local government areas used for the real study.

The reliability coefficient was estimated at 0.78 using Split-half and corrected using Spearman-Brown correction formula.

Administration of the Instrument: The researchers administered a pretest to the two groups two weeks before the commencement of the real treatment. Administration of the treatment followed later. The two groups were taught the concepts of population, reproduction and ecology for four weeks. At the completion of each concept, a test was administered to both groups but immediate feedback was provided for the experimental group while none was provided for the control group. Items in pretest were reorganized and administered to both groups after the completion of the experiment. The responses of the students were marked, scored and collated for data analysis. After two weeks, the items in the test were re-arranged and re-administered to both the experimental and control groups for the purpose of retention.

Data Analysis

The data were analyzed using means, standard deviation and t-test and tested at 0.05 level of significance.

RESULTS

Question 1: What are the performances of students who are given immediate feedback and those who are not given in pre test?

Table 1 shows that the mean scores of the experimental and control groups in pretest were 6.48 and 6.08 respectively; while their standard deviation were 2.22 and 2.25 respectively. The scores of the experimental group ranged from 4.26 to 8.70 while that of control group ranged from 3.83 to 8.33.

Table 1: Means and standard deviation of students' scores in Biology for pre test.

Variables	*N*	$\bar{x}$	*S.D.*
Immediate feedback	60	6.48	2.22
Without feedback	60	6.08	2.25

Maximum Score = 30

Question 2: What are the performances of the group with immediate feedback and those without feedback in post test.

Table 2 shows that the means scores of the experimental and control groups in post test were 20.9 and 19.6 respectively; while their standard deviation were 1.77 and 2.46 respectively. The scores of the experimental group ranged from 18.1 to 22.6 while that of control group ranged from 17.2 to 22.1.

Table 2: Means and standard deviation of student s' scores in Biology for post test

Variables	*N*	$\bar{x}$	*S.D.*
Immediate feedback	60	20.9	1.77
Without feedback	60	19.6	2.46

Maximum Score = 30

Testing the Hypotheses

$H0_1$: There is no significant difference between the performance of students who were given immediate evaluation feedback and those who were not given in Biology.

Table 3 shows that there is significant difference ($P < 0.05$) in the mean- scores of those who were given immediate feedback and those who were not given in Biology achievement test. The mean scores of students with immediate feedback and without feedback were 20.9 and 19.6 respectively, while the standard deviation was 1.77 and 2.46 respectively. The calculated t-value was 3.13 while the table value was 1.96 at 0.05 level of significant. These results show that the experimental group performed better than the control group. Hypothesis 1 is therefore rejected.

$H0_2$: There is no significant difference in the retention of students who were given immediate evaluative feedback and those who were not given in Biology achievement test.

Table 4 shows that there is significant difference in the mean scores of those who were given immediate evaluative feedback and those who were not given three weeks after the treatment in

Table 3: t-test comparison between the performance of student with immediate evaluative feedback and those without feedback in Biology achievement test

Variables	*N*		*S.D.*	*df*	*t-cal*	*t-tab*
With immediate evaluative feedback	60	20.9	1.77	118	3.13	1.96
Without feedback	60	19.6	2.46			

$P < 0.05$ (Significant Result)

Table 4: t-test comparison of retention capacity of students who were given immediate feedback and those who were not given, after three weeks of treatment

Variables	*N*		*S.D.*	*df*	*t-cal*	*t-tab*
With immediate evaluative feedback	60	19.6	2.43	118	9.67	1.96
Without feedback	60	15.5	2.05			

P< 0.05 (Significance Result)

Biology achievement test. The mean scores were 19.6 and 15.5 respectively while the standard deviation were 2.43 and 2.05 respectively. The t-calculated value was 9.67 while the table value was 1.96 at 0.05 level of significance. The t-calculated value is greater than the table value at 0.05 level of significance. Hypothesis 2 is therefore rejected.

DISCUSSION

The focus in this study was to determine the effects of evaluative feedback on performance and retention of secondary school students in Biology. The results in table 1 showed the mean scores of 6.48 and 6.08 for the group with immediate evaluative feedback and those without evaluative feedback respectively. It could be inferred then that the two groups had little knowledge of the concepts of population, reproduction and ecology in Biology. However, the mean scores of both the experimental and control groups in the post test showed appreciable increase in performance with the group with immediate evaluative feedback having better performance, mean score=20.9 as against those without evaluative feedback with the mean score=19.6. This is in line with Anastasi and Urbina (2007) that evaluative feedback could enhance better students' subsequent test performance.

Hypothesis one was to find out whether evaluative feedback would have effect on performance of students in Biology. The results in table 3 showed that there was a significant difference between the performance of students given immediate evaluative feedback and those who were not given with the experimental group performing better than the control group. This agrees with Aghenta (1982); Anastasi and Urbuna (2007) who found out that feedback of scores had significant positive effect on the students' subsequent performance. The implication is that students given immediate evaluative feedback after test might be motivated to read more and prepare well for the subsequent test while those who were not given feedback might not be motivated to read further or prepare well for the subsequent test.

Hypothesis two was to find out whether evaluative feedback would facilitate higher retention of the biological concepts. The results in table 4 showed that there was a significant difference between the performance of students given immediate evaluative feedback and those who were not given. Those who were given immediate feedback scored higher in achievement test than those who were not given feedback. It shows that given feedback enhances higher retention on the part of the students. This agrees with Hoit (1990); Duyilemi (2001) and Fatoba (2004) that students' retention power would be higher if given evaluative feedback.

CONCLUSION

From the results of this study, it could be concluded that evaluative feedback had positive effect on students' performance and retention in Biology achievement test.

RECOMMENDATIONS

Based on the results and conclusion of this paper, the following recommendations were made:

1. Students should be given immediate evaluative feedback after each test to promote test wiseness and better performance in Biology
2. Teachers should not keep students' marks to themselves but should be made available to the students for the purpose of self-evaluation.
3. Teachers should give immediate feedback to the students in order to promote retention of the content learned in Biology.

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