



doi:10.5281/zenodo.15021836

Effect of Immediate Evaluative Feedback on Academic Achievement and Retention in Biology of Senior Secondary School Students in Bali Education Zone Taraba State, Nigeria

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ABSTRACT

This study is on the effect of immediate evaluative feedback on academic achievement and retention of senior secondary school Biology students in Bali Education Zone in Taraba State. The Pre-test and post-test Quasi-Experimental Design was adopted for the study. The population of the study consisted of three thousand nine hundred and twenty-five (3925) secondary school two (SS2) students. A total of one hundred and twenty (120) SS2 students were used as sample for the study of which 60 were males and 60 females. The study was carried out in Bali Education Zone of Taraba State. Two research instruments were used for data collection. The instruments were tagged: Pretest Biology Academic Achievement Test (PBAAT) and Biology Retention Test (BRT). The reliability of the instrument was established using Alpha Cronbach and a reliability coefficient of 0.838 was obtained. Mean and standard deviation were used to answer the research questions while Analysis of Covariance and t-test were used to test the hypotheses at 0.05 level of significance. From the analysis, the findings of the study revealed that immediate evaluative feedback is very effective for the teaching of Biology in secondary schools and that it was very gender friendly especially when this method was compared with the alternative or regular methods. It was recommended among others that Ministry of Education and school heads should ensure that Biology teachers' are trained to use immediate evaluative feedback method of teaching through sponsorship to workshops, seminars and even further trainings.

Keywords: Immediate Evaluative Feedback, Academic achievement, retention

INTRODUCTION

The technique and practice of providing past or current necessary information about a process or system to someone who is dedicated to it in order to improve current or future performance in the system or process is known as immediate evaluative feedback (Buttler and Winnie, 2019). According to Drown (2019), immediate evaluative feedback is also regarded as a process whereby knowledge about the past or present influences the same phenomenon in the present or the future. According to Drown (2019), evaluative feedback gives students the opportunity to assess and enhance their comprehension, application of knowledge and skills, and methods for learning new skills. In the absence of prompt evaluation feedback, students will repeatedly make the same mistakes in their learning, wasting their time and effort without making much progress.

According to empirical data, secondary school students' performance in Nigeria's educational system is still below par. Students continue to receive lower grades at the conclusion of a course of study. There are several possible causes for this, some of which were mentioned in the study's introduction. According to a survey conducted by Kamla and Raj (2010), students' performance in science was previously subpar. The absence of evaluative feedback may be the cause of this subpar academic performance. The West African Examination Council (WAEC), which will provide summative evaluation, only prepared students for the West African School Certificate exam. The results of the end-of-term test were not accessible to those who took it. At the time, WAEC was thought to be the ultimate arbiter.

An additional significant barrier to conducting meaningful tests is the pressure to pass exams and earn a certificate by any means. Students and teachers collaborate in WAEC and NECO exam rooms in order to pass exams. Exam question speculation and forecasting, as well as the use of miracle centers, have replaced the necessity of teaching all of the syllabus's content and providing students with regular assessments to ensure they have mastered the concepts.

Oluwatayo and Fatoba (2012) cite Chinwe as saying that a number of factors contribute to the biology students' failure in the WAEC. Students' lack of interest in biology is one of the other factors that have been found. Laziness is another; some teachers do not have the time to mark students' work, and some may not even administer tests until the end of the term. Much is thought to be accomplished in terms of concept retention if teachers give students immediate evaluative feedback. Thus, the purpose of this study was to determine how immediate evaluation feedback affected the academic performance and retention of biology students in Taraba State's senior secondary schools. When used appropriately, immediate evaluative feedback can help students learn and teach by providing them with a report on their participation in the lesson. According to the 2015–2010 Chief Examiner report from the West Africa Examination Council (WAEC), the consistently low biology test scores of Senior Secondary Certificate Examination students raise questions about the efficacy of the methods biology teachers commonly employ to deliver instructional materials. According to data from the West Africa Examination Council (WAEC, 2010), the percentage of candidates who passed the May/June exam with a successful score in biology has been declining. Of the total number of students who took the exam in 2016, 26% achieved credit level, while 53.13% failed. Additionally, according to data from the National Examination Council (NECO), the fail rate was 55 percent in 2014, 57 percent in 2015, and 55 percent in 2016.

Purpose of the Study

The main purpose of this study is to determine the effect of immediate evaluative feedback on academic achievement and retention among senior secondary school Biology students in Bali Education Zone in Taraba State. In specific terms, the study is intended to;

1. Find out mean difference between the academic achievement of Biology students who were given immediate evaluative feedback and those students who were not given immediate evaluative feedback.
2. Find the mean academic scores of male and female students in Biology who were given immediate evaluative feedback and those not given.

Research Questions

The following research questions were raised to guide the study;

- i. What is the mean difference in the academic achievement scores of students who are given immediate evaluative feedback and those of them who were not given immediate evaluative feedback?
- ii. What are the mean academic achievement scores of male and female students in Biology who are given immediate evaluative feedback and those who are not given immediate evaluative feedback?

Research Hypotheses

The study was guided by the following null hypotheses, all of which were tested at the 0.05 level of significance.

H₀₁: There is no significant difference between the mean academic achievement scores of Biology students who will be given immediate evaluative feedback, and those who will not be given immediate evaluative feedback.

H0₂: There is no significant interaction effect of immediate evaluative feedback and gender on student academic achievement scores.

RESEARCH METHOD

A quasi-experimental design was used for the pre-test and post-test. Since it is impossible to meet all the requirements for a true experimental design, a quasi-experimental design was employed in this investigation. The target population were SS II students in Bali Education which stood at three thousand nine hundred and twenty five (3925) while the population of the SS2 in public senior secondary is one thousand five hundred and seven (1507) Thus the population for the study is one thousand five hundred and seven (1507). Multiple-stage sampling techniques were used to select the sample, which included 110 SSII biology students. Data was gathered using two research tools, the Biology Retention Questionnaire (BRQ) (Appendix 1) and the Pretest Biology Academic Achievement Test (PBAAT), each of which had 50 items. The researcher was able to obtain a logical validity index of 0.89. The instrument is consistent and dependable because the reliability coefficient was .838; this indicates that there is a strong positive correlation between the PBAAT's first and second administrations. Standard deviation and means were used to analyze the data. At the 0.05 level of significance, the hypotheses were tested using Analysis of Covariance (ANCOVA).

RESULT AND DISCUSSION

This section presents the analysis and interpretation of the data generated from this study in line with the research questions and hypotheses formulated and tested. Discussions of findings are also presented in this section.

Research Question One: *What is the mean difference in the academic achievement scores of Biology students who were given immediate evaluative feedback and those of them who were not given immediate evaluative feedback?*

Data answering this research question are contained in Table 1.

Table 1: Descriptive mean statistics on academic achievement scores of Biology students given immediate evaluative feedback and those who were not given immediate evaluative feedback.

Group	N	Pre-test		Post-test		Mean Gain
		Mean	Std. Dev	Mean	Std. Dev	
EG	50	20.18	5.97	42.5	4.57	22.36
CG	60	17.08	3.39	29.70	5.08	12.62

Results of Table 1 shows that the posttest performance mean scores of students given immediate evaluative feedback (EG) is 42.54 with standard deviation of 4.57, while that of those not given immediate evaluative feedback (CG) is 29.70 with standard deviation of 5.08. The difference between the pretest and posttest performance mean scores of students given immediate evaluative feedback is 22.36 and that of the students not given immediate evaluative feedback is 12.62. This shows that the posttest mean scores are significantly higher than the pretest scores for both the two study groups especially among students given immediate evaluative feedback. This therefore implies that students given immediate evaluative feedback performed better than their counterparts who were not given immediate evaluative feedback.

Research Question Two: *What are the mean academic achievement scores of male and female students in Biology who were given immediate evaluative feedback and those who are not given immediate evaluative feedback?*

Data answering this research question are contained in table 2.

Table 2: Descriptive statistics on mean academic achievement scores of male and female students in Biology given immediate evaluative feedback and those not given immediate evaluative feedback.

Group	Gender	N	Pretest		Posttest		Mean Gain
			Mean	Std. Dev	Mean	Std. Dev	
EG	Male	28	28.75	6.94	41.39	4.54	12.64
	Female	22	29.18	6.93	40.23	4.61	11.05
Mean difference			0.43		1.16		1.59
CG	Male	32	22.45	5.84	28.84	5.06	6.39
	Female	28	25.75	5.39	27.45	5.41	1.7
Mean difference			3.3		1.39		4.69

From Table 2, it can be seen that the posttest mean performance scores of male students given immediate evaluative feedback is 41.39 with standard deviation of 4.54, while that of the female is 40.23 with standard deviation of 4.61. The difference between the pretest mean and posttest mean scores of the male students given immediate evaluative feedback is 12.64 and that of the female is 11.05. The difference in the posttest mean scores of the two sexes is 1.16. The implication was that male students given immediate evaluative feedback performed better than their female counterparts. Though the difference was not significantly high.

It can also be seen that the posttest mean performance scores of male students given immediate evaluative feedback is 28.84 with standard deviation of 5.06, while that of the female students is 27.45 with standard deviation of 5.41. The difference between the pretest and posttest mean scores of male students given immediate evaluative feedback is 6.39 while that of the female students is 1.7. The difference between the posttest mean scores of the both sexes is 1.39, in favour of the male students. The pretest and posttest mean differences show that male students given immediate evaluative feedback performed better than their female counterparts. Though the difference is not significantly high.

Hypothesis One

H0₁: There is no significant difference between the mean academic achievement scores of Biology students who will be given immediate evaluative feedback and those who will not be given immediate evaluative feedback.

Table 5: Analysis of Covariance (ANCOVA) on mean academic achievement scores of Biology students given immediate evaluative feedback and those not be given immediate evaluative feedback

Source of Variation	Sum of Squares	df	Mean Square	F	Sig
Corrected Model	19656.895 ^a	3	6552.298	278.944	.000
Intercept	149878.125	1	149878.125	6380.591	.000
Tests	15295.005	1	15295.005	651.137	.000
Groups	3176.045	1	3176.045	135.210	.000
Test * Groups	1185.845	1	1185.845	50.484	.000
Error	4603.980		106		23.490
Total			174139.000		110
Corrected Total			24260.875		109

a.R Squared=.810 (Adjusted R Squared = .807)

The outcome of the Analysis of Covariance (ANCOVA) on Table 5 revealed significant difference exist in the mean performance scores of students given immediate evaluative feedback and the students taught the same concepts without immediate evaluative feedback. Reason being that the p value of 0.000 in the test versus group is lower than the 0.01 alpha level and its computed F value of 50.484 is greater than the 3.000 F critical value. Looking at the descriptive statistics, the pretest and the posttest scores of those given immediate evaluative feedback are 20.18 and 42.54, while the pretest and posttest scores of those without immediate evaluative feedback are 17.080 and 29.700 respectively. This shows that the posttest

mean scores are significantly higher than the pretest scores for both the two study groups especially among the immediate evaluative feedback. Therefore, the null hypothesis which state that there is no significant difference in the mean performance scores of students given immediate evaluative feedback and the students taught same concepts without immediate evaluative feedback, is hereby rejected.

Hypothesis Two:

H0₂: There is no significant interaction effect of mode instructional approaches and gender on student academic achievement scores.

Table 6: Analysis of Covariance (ANCOVA) on mode instructional approaches and gender on student academic achievement scores.

Source of Variation	Sum of Squares	df	Mean Square	F	Sig
Corrected Model	5115.407 ^a	3	1705.136	69.893	.000
Intercept	125253.701	1	125253.701	5134.121	.000
Gender	122.470	1	122.470	5.020	.000
Groups	4930.870	1	4930.870	202.115	.000
Gender * Groups	25.098	1	25.098	1.029	.000
Error			2586.011	106	24.396
Total			131350.000		110
Corrected Total			7701.418		109

a.R Squared = .664 (Adjusted R Squared =.655)

Results of the ANCOVA statistics showed that there is no significant difference in the mean achievement scores of male and female given immediate evaluative feedback and those taught the same concepts without immediate evaluative feedback. Reason being that the p value of 0.313 of the Gender versus groups is greater than the 0.05 and its computed F value of 1.029 is lower than the 3.000 F critical value. The descriptive statistics showed that among the student given immediate evaluative feedback male and female achievement scores are 41.39 and 40.23 for male and female respectively on the other hand students taught without immediate evaluative feedback male and female scores are 28.84 and 25.75 respectively. This shows that among each of the study groups the male and female scores are the same in terms of their mean achievement. Therefore, the null hypothesis which state that there is no significant difference in the mean achievement scores of male and female students given immediate evaluative feedback and those taught the same concepts without immediate evaluative feedback, is hereby accepted and retained.

DISCUSSION OF FINDINGS

The purpose of the study was to find out how senior secondary school biology students in Taraba State's Bali Education Zone fared academically and in terms of retention after receiving immediate evaluation feedback. The research questions were addressed using mean and standard deviation, and the impact of immediate evaluative feedback on academic achievement and retention among biology students in secondary school was evaluated using analysis of covariance. The following subheadings provide discussion of the study's findings.

Effect of immediate evaluative feedback on Students' achievement in Practical Chemistry

According to the study's findings, students who received immediate evaluative feedback (EG) outperformed those who did not receive it for the same concepts (CG). It was discovered that students who received immediate evaluative feedback had significantly higher post-test and post-posttest mean scores than their peers who were taught the same concepts but did not receive immediate evaluative feedback. Thus, this suggests that the two treatments are not equally effective. The results showed that giving students immediate evaluation feedback improves their academic performance in biology. The results of this study support those of Udoukpong and Okon (2012), who found that, after correcting for initial differences, there was a significant difference in the achievement levels of members of four

treatment groups in their posttest scores. The researcher also claimed that the formative test with remediation and evaluative feedback performed better than the other three groups. Similar to this, Emaikwu's (2012) research supported this conclusion by demonstrating that while students' performance was significantly impacted by their evaluations, there were no differences in how they perceived the source of the feedback. In a related study, Oluwatoyi and Fatoba (2010) found that students who received immediate evaluative feedback performed significantly better than the control group, and that there was a significant difference between the two groups.

Effect of immediate evaluative feedback on Students' Retention

The findings of this study demonstrate that students who received immediate evaluative feedback had significantly higher post-posttest mean retention scores than students who did not receive immediate evaluative feedback on the same concepts. This suggests that students who received immediate evaluative feedback were better able to retain the concepts they had learned than those who were taught the same concepts without it. This finding is consistent with that of Oluwatoyi and Fatoba (2010), who found a significant difference in the mean retention scores of the groups that received immediate evaluative feedback and those that did not, indicating that their students had better retention. Additionally, the results are consistent with a study by Emaikwu (2012) that found that students who received prompt evaluative feedback did better in terms of retention than those who did not.

CONCLUSION

Based on the study's findings, it can be said that instantaneous evaluation feedback is highly effective in teaching biology in secondary schools and is gender-neutral, particularly when compared to other or conventional teaching methods.

RECOMMENDATIONS

On the basis of this study, the researcher put forward the following recommendations:

1. Biology teachers should be trained to use the immediate evaluative feedback method of instruction by the Ministry of Education and school administrators through sponsorship of workshops, seminars, and even additional trainings.
2. For the effective teaching and learning of biology and other subjects, school heads and supervisors should make sure that all schools implement the use of immediate evaluative feedback.

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