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EFFECT OF IMMEDIATE FEEDBACK TIMING ON ACADEMIC ACHIEVEMENT IN BIOLOGYAMONG SENIOR SECONDARY SCHOOL STUDENTS IN NNEWI EDUCATION ZONE, ANAMBRA STATE.

Dr. P. I. Adinna and Okoli O. A.

Department of Educational Foundations;Faculty of Education
Chukwuemeka Odumegwu Ojukwu University, Igbariam.
pi.adinna@coou.edu.ng,angelonyii4@gmail.com,ifejikapatty@gmail.com.
Phone numbers: 08036233925, 08038820745

ABSTRACT

The study investigated effect of immediate feedback timing on academic achievement in biology among senior secondary school student in Nnewi Education Zone, Anambra State**.** The aim of the study were to determine the mean academic achievement of SSII students in biology when assessed using feedback timing and those assessed without feedback timing; and to find out the mean academic achievement of male and female SSII students in biology when assessed using feedback timing and those assessed without feedback timing. The study adopted non-equivalent control group pretest–posttestquasi-experimental design. Population of the study comprised 4,796 (2100 male and 2696) senior secondary school students in SS II in co-educational schools in the area. The sample size of 92 respondents was used for the study; they were selected through multistage sampling technique. The instruments used for data collection were self-developed Biology Achievement Test (BAT) with Bloom's table of specification. The instruments used for data collection were self-developed Biology Achievement Test (BAT) with Bloom's table of specification; The experimental group consisted of 50 students (20 males and 30 females), while the control group comprised 42 students (24 males and 18 females). The data collected for answering research questions were analysed using mean and standard deviation, while the hypotheses were tested at 0.05 level of significance using the Analysis of Covariance (ANCOVA). The findings of the study showed that academic achievement of students in biology when assessed using feedback timing and those assessed without feedback timing; and academic achievement of male and female students in biology when assessed using feedback timing and those assessed without feedback timing. The study concluded that immediate feedback timing has a significant effect on the academic achievement of senior secondary school students in Biology in Nnewi Education Zone, Anambra State. Based on the findings, the study recommended, among others, that, Biology teachers should provide immediate feedback to students after classroom activities, assignments, and tests to help them identify and correct their mistakes promptly; also, school administrators should organize regular workshops and training programmes to equip teachers with effective feedback strategies that improve students' academic achievement.

Introduction

Education is widely recognized as the foundation for national growth and sustainable development. It plays an important role in equipping individuals with the knowledge, skills, attitudes, and values required for meaningful participation in society. The quality of education received by learners determines the level of human capital development, which in turn influences the social, political, technological, and economic advancement of a nation. This explains why governments across the world continue to invest heavily in improving teaching and learning processes in schools. One important factor that contributes to effective teaching and learning is the use of appropriate instructional strategies, including effective feedback. According to Uwah (2023), meaningful learning occurs when teachers adopt instructional practices that actively engage learners and provide them with opportunities to improve their performance.

Secondary education occupies a strategic position in the Nigerian educational system because it serves as the bridge between primary and tertiary education. It prepares students for higher education, vocational training, and responsible citizenship. At this level, students are expected to develop critical thinking, creativity, and problem-solving abilities through effective classroom instruction. The achievement of these objectives depends largely on the quality of teaching methods adopted by teachers. Among the various instructional practices that promote learning, feedback has been identified as one of the most essential components of effective classroom instruction. Feedback helps learners understand their strengths and weaknesses, thereby guiding them towards improved academic performance. According to Okafor (2022), effective feedback enhances students' understanding by identifying learning gaps and providing direction for improvement.

Feedback refers to the information given to learners concerning their performance or learning outcomes after completing an instructional task. It enables students to know whether their responses are correct or incorrect and what they should do to improve. Feedback may be immediate or delayed depending on the time it is provided after a learning activity. Immediate feedback is given instantly or shortly after students complete a task, while delayed feedback is provided after some time has elapsed. Immediate feedback has attracted considerable attention among educational researchers because it allows learners to identify and correct their mistakes before misconceptions become permanent. According to Ali and Fisala (2018), feedback becomes more effective when it is timely, specific, and directly related to students' learning activities.

Immediate feedback is an instructional practice in which teachers provide prompt responses to students' answers, assignments, tests, classroom discussions, or learning activities. This form of feedback enables learners to recognize errors immediately, understand the correct concepts, and make necessary adjustments while learning is still taking place. According to Anya (2024), immediate feedback increases students' motivation, strengthens retention of knowledge, promotes active participation in classroom activities, and improves overall

academic achievement. It also creates opportunities for meaningful interaction between teachers and students, making the learning process more engaging and learner-centred.

Academic achievement refers to the level of success attained by students in their educational pursuits as measured through examinations, tests, assignments, classroom exercises, and other evaluation techniques. It reflects the extent to which learners have achieved the stated objectives of instruction within a particular period. High academic achievement is often regarded as evidence of effective teaching, efficient learning, and proper utilization of instructional strategies. In subjects such as Biology, academic achievement is very important as it shows how well students understand biological concepts, processes, principles, and their applications in everyday life. Biology involves the study of living things, their structures, functions, and relationships with the environment (Iroh, 2020). Good academic achievement in Biology helps students develop a better understanding of topics such as cells, reproduction, genetics, ecology, and human health. It also encourages students to develop interest in science and participate actively in classroom activities. However, as noted by Eze (2023), students' academic achievement is influenced by several factors, including teachers' instructional methods, classroom environment, learning resources, students' motivation, parental involvement, and assessment practices. Among these factors, the quality and timing of feedback remain significant predictors of students' learning outcomes.

The importance of immediate feedback in the teaching and learning process cannot be overemphasized. Immediate feedback enables students to recognize their mistakes promptly and correct them before they become deeply rooted. It also reinforces correct responses, increases learners' confidence, and encourages continuous improvement. When teachers provide immediate feedback during classroom instruction, students remain actively involved in the learning process and become more willing to participate in subsequent learning activities. Obi (2022) observed that students who receive immediate feedback demonstrate greater academic confidence, improved classroom participation, and higher academic performance than those who receive delayed feedback.

Research has shown that learners perform better when they receive prompt information about their learning progress. Immediate feedback allows teachers to identify areas where students experience difficulty and provide additional explanations before proceeding to new concepts. It also assists teachers in evaluating the effectiveness of their instructional methods and making necessary adjustments to improve learning outcomes. According to Yusuf and Bello (2021), prompt corrective feedback minimizes repeated errors, enhances students' understanding of difficult concepts, and contributes significantly to improved academic performance in secondary schools.

Despite the recognized benefits of immediate feedback, many secondary school teachers still rely on delayed feedback practices. In many schools, students complete class exercises, assignments, and examinations but receive corrections several days or even weeks later. This delay often reduces the effectiveness of feedback because students may have forgotten

the learning task or repeated the same errors before receiving corrections. In some cases, large class sizes, heavy teaching workload, inadequate instructional materials, and poor assessment practices prevent teachers from providing timely feedback to students. According to Umeh (2024), delayed feedback weakens students' interest in learning, reduces motivation, and limits opportunities for correcting misconceptions during instruction.

In Nnewi Education Zone of Anambra State, concerns have continued to emerge regarding students' academic achievement in internal and external examinations. Despite the efforts of teachers, school administrators, parents, and government agencies to improve learning outcomes, many students still experience challenges in mastering classroom concepts and achieving expected academic standards. While factors such as inadequate instructional materials, poor study habits, teacher quality, and classroom environment have received considerable attention, the role of immediate feedback in improving students' academic achievement appears to have received relatively limited empirical investigation within the education zone. Again, gender is considered also considered as a factor that influences immediate feedback. As noted by Uzowulu (2023), male and female students may differ in their reactions to corrective information, confidence levels, and willingness to participate after receiving feedback. Immediate feedback can help both genders identify mistakes, improve understanding, and develop confidence in learning. However, when teachers provide promptfeedback, both male and female students are likely to improve their academic engagement.

It is against this background that the present study seeks to examine the effect of immediate feedback on the academic achievement of secondary school students in Nnewi Education Zone, Anambra State. The study is expected to determine whether the prompt provision of feedback during classroom instruction significantly influences students' learning outcomes. The findings of the study will provide useful information to teachers, school administrators, curriculum planners, educational policymakers, parents, and researchers on the importance of immediate feedback as an effective instructional strategy for improving academic achievement among secondary school students which brings about greater achievement.

Statement of the Problem

Academic achievement is one of the major indicators of the effectiveness of teaching and learning in secondary schools. For students to perform well academically, teachers are expected to adopt appropriate instructional strategies that promote understanding and improve learning outcomes. One of such strategies is the provision of immediate feedback during classroom instruction and assessment. Immediate feedback enables students to identify their mistakes, understand the correct responses, and make necessary improvements while learning is still in progress. It also motivates learners, reinforces correct knowledge, and encourages active participation in classroom activities.

However, the problem observed in many secondary schools is the inadequate use of immediate feedback by teachers during teaching and assessment. In many cases, students

complete class exercises, assignments, tests, and examinations without receiving prompt corrections or explanations. The delay in providing feedback often causes students to repeat the same mistakes, lose interest in learning, develop misconceptions, and perform poorly in subsequent academic tasks. This problem is largely associated with teachers' instructional practices, heavy workload, large class sizes, and poor assessment culture, thereby reducing the effectiveness of the teaching-learning process.

The inadequate use of immediate feedback has contributed to poor academic achievement among some secondary school students, reduced classroom participation, poor retention of knowledge, and unsatisfactory performance in both internal and external examinations. These challenges not only affect students' academic success but also hinder the achievement of educational goals in Nnewi Education Zone, Anambra State. It is against this background that this study seeks to investigate the effect of immediate feedback on the academic achievement of secondary school students in Nnewi Education Zone, Anambra State.

Purpose of the Study

The main purpose of this study was to examine the effect of immediate feedback timing on academic achievement in Biologyamong senior secondary school student in Nnewi Education Zone, Anambra State. Specifically, the study sought to:

1. Determine the mean academic achievement scores of SSII students in biology when assessed using feedback timing and those assessed without feedback timing
2. Find out the mean academic achievement scores of male and female SSII students in biology when assessed using feedback timing and those assessed without feedback timing

Research Questions

The following questions guided the study:

1. What isthe mean academic achievement scores of SSII students in biology when assessed using feedback timing and those assessed without feedback timing?
2. What is the mean academic achievement of SSII students in Biology when assessed using feedback timing and those assessed without feedback timing?

Hypotheses

1. There is no significant difference in the mean academic achievement scores of SSII students in Biology when assessed using feedback timing and those assessed without feedback timing
2. There is no significant difference between the mean academic achievement scores of male and female SSII students in Biology when assessed using feedback timing and those assessed without feedback timing

Research Design

The study adopted non-equivalent control group pretest–posttestquasi-experimental designbecause it was investigating the effect of feedback timing on academic achievement of students in biology in the Senior Secondary schools in Nnewi Education Zone. Creswell (2024) defined quasi-experimental research as a method that involves the use of intervention and outcome measurement without random assignment of subjects. This consists of two groups of respondents with feedback timing as instruction model and conventional method groups. The experimental design is presented below thus;

E: O_1 X O_2

C: O_1 X O_2

The symbols are explained as follow:

E = experimental group.

C = control group

O_1 = first observation or pre-test

O_2 = second observation or post-test.

X = treatment or experimental variable.

~X = control variable (No Treatment)

Area of the Study

The study was carried out in Nnewi Education Zone. Nnewi Education Zone is one of the education zones in Anambra State, Nigeria, under the administration of the Anambra State Post Primary Schools Service Commission (PPSSC). The zone is located in the southern part of the state and comprises secondary schools in Local Government Areas such as Nnewi North, Nnewi South, Ekwusigo, and Ihiala. The zone is known for its commitment to improving the quality of secondary education through effective teaching, supervision, and monitoring of schools.

Population of the Study

The population of the study comprised 4,796 senior secondary school students in SS II in co-educational schools in the 49 public secondary schools in Nnewi Education zone, Anambra State (Post Primary Schools Service Commission, Nnewi, 2024).

Sample and Sampling Technique

The sample size of 92 students was used for the study, as it provided a good balance between representation and manageability. The study's focus on SS2 Biology students was deliberate, as this group was considered to be at a critical stage in their academic journey.

The study used a multistage sampling technique. First, purposive sampling was used to select public secondary schools that meet the study requirements. Next, simple random sampling was used to select the participating students from the chosen schools. This technique was suitable because it gave every eligible student an equal chance of being selected, reduced selection bias, and ensures that the sample fairly represented the target population.

Instrument for Data Collection

The instruments used for data collection were self developed Biology Achievement Test (BAT) with Bloom's table of specification. Biology Achievement Test (BAT) consisted 50 objective test developed based on the second term scheme of work for SSII which was taught to the students. Each BAT item represented a level which gave a total of 6-7 test items for a topic making a total of 50 test items from the 8 different topics taught.

Reliability of the Instruments

The instrument was trial-tested with 20 students in Onitsha Education Zone because it has the same educational settings; and a reliability coefficient yielded of biology achievement test was 0.76. To this end, it was accepted that the instrument was reliable and consistent in measuring what it sought to measure.

Experimental Procedure

A Biology Achievement Test (BAT) was used to obtain information. It was administered as pretest and post test.The study lasted for ten (10) weeks. During the first week, the researcher conducted training for two research assistants who were biology teachers in the selected schools, on the application of feedback timing using researcher-prepared lesson plans. The next eight (8) weeks were dedicated to the actual field experiment, while the last week was used for data collection and scoring.The experimental group consisted of 50 students (20 males and 30 females), while the control group comprised 42 students (24 males and 18 females).

Control of Extraneous Variable

Extraneous variables that may introduce bias to the study were controlled through the following procedures:

Experimental bias: Experimental bias represents a significant source of extraneous variables impacting this study. It arises when the experimenter assumes the role of investigator. To counteract this, the researcher invited research assistants..

Teacher Variables: The researcher arranged training sessions for two research assistants to mitigate the teacher variable concern. This training effectively standardized the teaching methods across all participants, thus minimizing the potential impact of individual teacher effectiveness on the study's outcomes.

Participant Variable: To mitigate potential effects stemming from participant differences such as age or ability, an intact group was utilized. This approach effectively minimized age discrepancies among participants.

Method of Data Collection

Biology Achievement Test (BAT)was administered to the students before the lesson. At the end of the exercise, a parallel test (using same BAT but re-arranging the items) was administered. The scores for both the experimental and control group were recorded accordingly. The test items in both the pre-test and post-test were scored two marks each for the Biology Achievement Test (BAT). The maximum mark was 100 while the lowest mark was zero (0).

Method of Data Analysis

The data collected for answering research questions were analysed using mean and standard deviation, while the hypotheses were tested at 0.05 level of significance using theAnalysis of Covariance (ANCOVA).

Results

The results of this study were presented in tables according to the research questions and hypotheses that guided the study.

Research Question 1

What is the mean academic achievement scores of students in Biology when assessed using feedback timing and those assessed without feedback timing?

Table 1:

Mean and SD of pre-academic achievement and posttest academics achievement test scores of students in Biology

Variable	**Pre achievement**			**Post achievement**		**Mean**
Method of Teaching	**N**	**X**	**SD**	**X**	**SD**	**gain**
Feedback Timing	50	54.20	10.45	64.58	8.967	10.38
Without Feedback timing	42	52.79	7.44	54.93	7.69	2.14

The finding in Table 1 revealed that Biology students assessed using feedback timing had a pretest academic achievement mean of 54.20 and a post academic achievement mean of 64.58. The difference between the pretest and posttest academic achievement was 10.38. The Biology student assessed without feedback timing had pretest-academic achievement mean of 52.79 and posttest academic achievement mean of 54.93. The difference between

the pretest and posttest academic achievement was 2.14. Notwithstanding, for each of the groups, the posttest academic achievement means were greater than the pretest-academic achievement means with group assessed Biology using feedback timing having a higher mean gain. This implied that assessing Biology using feedback timing had more effect on students' academic achievement.

Research Question 2

What is the mean achievement scores of male and female students in Biology when assessed using feedback timing and those assessed without feedback timing?

Table 2:

Mean and SD of pretest achievement and post test achievement of male and female students in Biology

Variable	Gender	N	Pre test achievement		Post test achievement		Mean gain
			X	SD	X	SD	
Feedback timing	Male	20	55.20	9.047	66.60	7.789	11.40
	Female	30	53.53	11.395	63.23	9.652	9.70
Without feedback timing	Male	24	53.75	6.860	55.33	7.505	1.58
	Female	18	51.50	8.176	54.39	8.125	2.89

Result in Table 2 showed that male students had a pretest achievement mean score of 55.20 and a post achievement mean score of 66.60. The difference between pretestachievement and posttest achievement mean score for male students had a pre achievement mean scores for male students was 11.40. The female students had a pretestachievement mean score of 53.52 and a posttest achievement mean score of 63.23. The difference between pre achievement and post achievement score for female was 9.70. Invariably, for each of the groups, the posttest achievement mean score was greater than the pretest achievement mean score with male students having higher mean gain. This implied that male students achieve higher than female students in Biology.

Test of hypotheses

Hypothesis 1

There is no significant difference in the mean academic achievement score of student assessed Biology when assessed using feedback timing and those assessed without feedback timing.

Table 3

Analysis of covariance (ANCOVA) of the significant difference in the mean score of academic achievement of students assessed Biology using feedback timing and those assessed without feedback timing.

Source	Type III sum of squares	of	Mean square	F	Pvalue
Corrected Model	6141.985[a]	2	3070.993	116.245	0.000
Intercept	1134.677	1	1134.677	42.950	0.000
Pretest achievement	4015.733	1	4015.733	152.006	0.000
Group	1687.969	1	1687.969	63.894	0.000
Error	2 351.232	89	26.418		
Total	341616.000	92			
Corrected Total	**8493.217**	**91**			

Significant at 0.05 level

[a.]R squared=.723(adjusted R squared=.717) Dependent Variable=Post Achievement

The finding from Table 3 indicated that with regards to the group assessed in biology using feedback timing and those assessed biology without feedback timing, an F-ratio of 63.894 was obtained with associated probability value of .000. Since the associated probability value of .000was less than 0.05 level of significance, the null hypothesis of non significant difference in the mean academic achievement score of students assessed biology using feedback timing and those assessed without feedback timing was rejected. There is a significant difference in the mean achievement scores of students assessed in biology using feedback timing and those assessed without feedback timing

Hypothesis 2

There is no significant difference between mean academic achievement of male and female students assessed Biology using feedback timing and those assessed without feedback timing.

Table 4:

Analysis of Covariance (ANCOVA) of the significant difference in the mean academic achievement of male and female assessed Biology using feedback timing and those assessed without feedback timing.

Source	Type III sum of squares	of	Mean square	F	Pvalue
Corrected Model	4465.698[a]	2	2232.849	49.341	0.000
Intercept	945.536	1	945.536	20.894	0.000
Preachievement	4459.057	1	4459.057	98.536	0.000
Gender	11.682	1	11.682	.258	0.613
Error	4027.519	89	45.253		
Total	341616.000	92			
Corrected Total	**8493.217**	**91**			

Significant at 0.05 level

[a.]R squared=.526(adjusted R squared=.515) Dependent Variable=Post Achievement.

Table 4 showed that with respect to mean academic achievement of male and female students in Biology assessed using feedback timing and those assessed without feedback timing an F-ration of .258 was obtained with associated probability value of 0.613 .Since the associated probability value of .613 was greater than 0.05 level of significance, the null hypothesis of no significant difference in the mean score of academic achievement of male and female students assessed with feedback timing and without feedback timing was not rejected. Therefore, there is no significant difference in the mean achievement score of male and female students assessed biology using feedback timing and those assessed without feedback timing.

Discussion Of Findings

Academic achievement of students in biology when assessed using feedback timing and those assessed without feedback timing

The finding showed that assessing SSII Biology students using feedback timing had more effect on student' academic achievement. This highlights the fact that Feedback timing allows students to quickly know their strengths and weaknesses, which helps them correct mistakes and improve understanding of biological concepts. Okeke (2019) supports this idea by stating that when learners receive immediate responses to their performance, they are able to adjust their learning strategies and retain knowledge more effectively, leading to higher achievement. Without feedback timing, students may continue with misconceptions and lose the opportunity to build mastery of the subject.

Gender and Academic Achievement of Students in Biology When Assessed Using Feedback Timing and Those Assessed Without Feedback Timing

The study found that Male students achieved higher than female students in Biology. Though, there is no significant difference in the mean achievement score of male and female students assessed Biology using feedback timing and those assessed without feedback timing. This finding shows that male students scored higher than female students in Biology, but the difference in their performance was not statistically significant. This means that although males had slightly better results, the gap was not wide enough to conclude that gender strongly determined achievement in Biology. In regards to this, Okoye (2020) explained that differences in academic achievement between male and female students are often small and influenced by other factors such as teaching methods, classroom environment, and study habits rather than gender alone.

Conclusion

Immediate feedback timing has a positive effect on the academic achievement of Senior Secondary School II students in Biology in Nnewi Education Zone, Anambra State. Students who were assessed using immediate feedback timing performed better than those assessed without feedback timing, indicating that timely feedback helps learners identify and correct errors, understand biological concepts, and improve their learning outcomes. More so, although male students recorded higher mean achievement scores than female students, the difference was not statistically significant. This implies that gender does not significantly influence students' achievement in Biology when immediate feedback timing is used. Therefore, immediate feedback timing can be considered an effective assessment strategy for improving students' academic achievement in Biology, irrespective of gender. Its use should be encouraged among Biology teachers to provide students with timely information about their performance, address misconceptions promptly, and promote better understanding and mastery of Biology concepts.

Recommendations

1. Biology teachers should provide immediate feedback to students after classroom activities, assignments, and tests to help them identify and correct their mistakes promptly.
2. School administrators should organize regular workshops and training programmes to equip teachers with effective feedback strategies that improve students' academic achievement.
3. Curriculum planners should encourage the integration of immediate feedback practices into Biology teaching and assessment methods in secondary schools.
4. The Anambra State Ministry of Education should provide adequate instructional resources and assessment tools that enable teachers to give timely and effective feedback to students.

REFERENCES

Ali, M. A., &Fisala, R. O. (2018). Effective classroom feedback and students' learning outcomes in secondary schools. *Journal of Educational Practice and Development*, 10(2), 45–58.

Anya, C. C. (2024). Immediate feedback as a strategy for enhancing students' academic achievement in secondary schools. *African Journal of Educational Research*, 18(1), 73–87.

Eze, P. N. (2023). Determinants of academic achievement among secondary school students in Nigeria.*Nigerian Journal of Educational Psychology*, 15(3), 102–116.

Obi, I. C. (2022). Teachers' feedback practices and students' classroom participation in public secondary schools. *Journal of Curriculum and Instruction*, 13(2), 66–79.

Okafor, J. E. (2022). Instructional strategies and effective learning among secondary school students. *West African Journal of Education*, 14(1), 51–64.

Umeh, A. C. (2024). Assessment practices and the challenges of delayed feedback in secondary education. *International Journal of Educational Assessment*, 9(1), 28–42.

Uwah, S. O. (2023). Student-centred instructional practices and meaningful learning in Nigerian secondary schools. *Journal of Educational Studies and Innovation*, 11(4), 84–97.

Yusuf, A. A., & Bello, M. S. (2021). Corrective feedback and academic performance of secondary school students in science subjects. *International Journal of Educational Research and Development*, 12(3), 119–133.