
A Survey of Immediate Assessment Feedback in Improving Students' Academic Achievement in Basic Science and Technology

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ABSTRACT

This survey examined immediate assessment feedback in improving students' academic achievement in basic science and technology in Mkpato Enin Local Government Area. Survey research design was adopted for the study. The population of the study comprised all JSS 2 students from 16 secondary schools in Mkpato Enin Local Government Area. The sample consisted of 212 students drawn from four purposively selected secondary schools in Mkpato Enin Local Government Area. Two instruments used were students' Questionnaire Feedback ($\alpha=0.78$) and school result sheet. Three research questions and three hypotheses were tested at 0.05 level of significance. Data were analyzed using mean, percentage scores, frequent count, t-test, and Pearson Product Moment Correlation. Result revealed that teachers did not give immediate feedback to most JSS 2 Basic Science and Technology students. There was no significant difference between the mean ratings of male and female Basic Science and Technology students on how frequent feedback was given to students ($t=.878$; $df=210$; $p>.05$). The result further showed that there was significant difference in the academic performance of Basic Science and Technology students that were given immediate and those with delayed feedback ($t=17.665$; $df=210$; $p<.05$) and there was a positive significant relationship between teachers' feedback and students' academic performance in Basic Science and Technology ($r=.180$; $p<.05$). Based on the findings of this study, it is therefore recommended that basic science and technology teachers should always give immediate feedback for this will motivate and improve students' academic achievement in basic science and technology.

Keywords: Achievement, Basic Science and Technology, Feedback, Gender

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I. INTRODUCTION

Finding out what and how much students have learnt when exposed to learning situation (teaching or scientific activity), forms one part of teachers' task. The next task is for the teacher to ensure students get feedback information on how much is their learning progress.

In planning the lesson, specific objectives to be achieved are set by the teacher and means of finding out if the set objectives are realized (evaluation) is also outlined. Classroom assessment is a planned and deliberate approach used by the teacher to find out the magnitude and quality of learning attained by the students. Some assessments of students' learning in Basic Science and Technology can take the form of oral questions, test (written), assignment/homework, practical/experiment, individual activity, group activity, class/group project and out-of-class activity (e.g. field trip, excursion, nature visit, etc).

As students are assessed, they are excited to get the feedback of their involvement in various assessments but unfortunately, their expectations are not always met. See and Gorard (2015) in their study on feedback reported that many teachers were not employing high-level feedback strategies—even though they claimed that they had always done so. In line with this, Agbayahoun (2016) reported that students are not favourable to their teachers' feedback practices. Student claim a lack of adequate, timely feedback (Orrella, 2006). Effective feedback is highly imperative. Higher-level feedback is when teachers inform pupils specifically of where they have gone wrong and how to improve, rather than feedback about the child and the task at hand (See & Gorard, 2015). A critical examination of students' disposition to getting an appropriate and timely feedback from the teacher could amount to frustrations and emotional upset if especially there is little or no hope of getting such feedback.

There are different types of feedback identified in literature (Federation University Australia, 2020). Informal feedback occurs at any times as it is something that emerges spontaneously in the moment or during action. This might occur in the classroom, over the phone, in an online forum or virtual classroom. Formal feedback is usually associated with assessment tasks; formal feedback includes the likes of marking criteria, competencies or achievement of standards, etc. Formative feedback is to monitor student learning to provide ongoing feedback that can be used by instructors to improve their teaching and by students to improve their learning. In some cases, feedback is required before students can progress, or feel capable of progressing, to the next stage of the assessment.

Summative feedback consists of detailed comments that are related to specific aspects of students' work, clearly explains how the mark was derived from the criteria provided and additional constructive comments on how the work could be improved. Student peer feedback enables students learn to give quality feedback, which is highly valued by peers. It also Provides students with regular opportunities to give and receive peer feedback enriches their learning experiences and develops their professional skill set. Student self feedback is the ultimate goal of feedback for learning in which teachers can explicitly identify, share, and clarify learning goals and success criteria; model the application of criteria using samples; provide guided opportunities for self-feedback; teach students how to use feedback to determine next steps and set goals; and allow time for self-feedback/reflection.

Constructive feedback is specific, issue-focused and based on observations and this type of feedback can take the forms of negative feedback, positive feedback, negative feed-forward and positive feed-forward (Federation University Australia, 2020). Ahea et al. (2016) identified other type of feedback known as E-Feedback techniques which are developed to improve the students learning process. Email Feedback which is a simple but effective way of providing students the feedback. This can be used to basically provide generic comments to a whole group of students and in sending electronic versions of the feedback forms of individual feedback to a particular student.

Audio and Video Feedback, which is widely known as podcast in academic arena is used in amalgamation with other types of feedback by the teachers to provide a good quality feedback very quickly, rather as they would in a physical meeting with a student. Screencasts is another variant of E-feedback that is a new grown technology which leads teachers to exhibit to students how things should be done. A screencast records the activities on a computer screen, so it is predominantly beneficial for demonstrating, delivers a model answer for a particular kind of problem and provides useful feedback on common problems which students encounter in course works. Recycling written comments which are Individualised written feedback and important in helping students to learn. It describes methods of "recycling" comments that lecturers find themselves repeatedly making on common matters in student course works using specialised soft-wares and standard word-processing packages (Ahea et al., 2016).

The problem now is which one is found comfortable to most teachers: giving out assessment or providing feedback? It may be difficult to find any of the classroom teachers who would not give an assessment (e.g. test) even if it is one assessment per term of an academic calendar. Others give exercise/class work, assignments/homework, among others. As teachers with a good number of years of teaching experience, education consultant and supervisor at various levels of education in Nigeria, we could observe that quite majority of teachers employ a lot more of assessment tools but it is highly disheartening to note that most teachers' failure at any level of education in Nigeria, hinges on their inability to provide necessary feedback to learners on their academic weaknesses and strengths after being exposed to such rigorous process of their assessments. Some teachers care less about the feedback; some either provide not at all or delay the feedback unnecessarily.

The need for an appropriate and up-to-date feedback is emphasized in previous studies. Bajaj et al. (2018) observed that feedback provided during formative assessment guides students to close the gap between their current and desired performance and enhances their learning and satisfaction. Poulos and Mahony (2008) clarified the role of effective feedback that it is not only enhancing learning and teaching but also facilitating the transition between school and university. Students need feedback for their immediate assessment of their academic improvements/performance and future diagnosis with respect to career choice.

The problem of low academic performance among students has led experts and all stakeholders in education to research into possible causes of this disheartening problem (Nwadinigwe & Azuka-Obieke, 2012). One of the probable causes is lack of appropriate and timely feedback. There is a vast amount of research that identifies the characteristics of effective feedback and feedback that is not effective or has a negative effect on learning (Wiggins, 2012; Thurlings, Vermeulen, Bastiaens & Stijnen, 2013). Many teachers claim to provide their students lots of feedback, however, the real question is whether the students receive, understand and act on it.

There are conflicting reports on gender achievement in the fields of research. In the study carried out by Soltani and Nasrl (2010), girls performed better than boys in science subjects. Babayemi (2014) found in his study that male students achieved significantly better than female in Basic Science. In a related research conducted by Babayemi and Ahmed (2019), these researchers also showed that male performed better in academic achievement than their female counterparts in Basic Science.

Since there are conflicting reports from various studies, there should therefore be further research on gender achievement in science. Despite previous efforts of researchers, the problem of low academic performance still persists. There is then a necessity to carry out further research to attempt solution to these worrisome reports. Therefore, this study investigated effectiveness of immediate assessment feedback in improving students' academic achievement in Basic Science and Technology.

1.1 Statement of The Problem

Frequent and meaningful feedback is a cornerstone of learning. Without it, assessment becomes only a measure of failure rather than a tool of learning. However, it is highly disheartening that most teachers are not really giving feedback the attention it deserves. Previous studies showed that when feedback is given at the appropriate time without being unnecessarily delayed, students can use it to judge their academic progress and maintain adjustment where necessary. As some literature showed that some teachers give regular feedback, some other teachers do not give at all and some other teacher delayed. Therefore, this study investigated using immediate assessment feedback in improving students' academic achievement in Basic Science and Technology in Mkpato Enin Local Government Area.

1.2 Research Questions

1. How frequent does the teacher give feedback to JSS2 Basic Science and Technology students in Mkpato Enin Local Government Area?
2. What difference exists in the academic performance of Basic Science and Technology students that were given immediate and delayed feedback?
3. What is the relationship between feedback and students academic performance in Basic Science and Technology?

1.3 Hypotheses

The following hypotheses were tested at 0.05 level of competence

1. There is no significant difference in the mean ratings of male and female Basic Science and Technology students on how frequent feedback was given to students.
2. There is no significant difference in the academic performance of Basic Science and Technology students that were given immediate and delayed feedback.
3. There is no significant relationship between feedback and academic performance of students in Basic Science and Technology.

2. METHODOLOGY

This study used a descriptive survey research design. This research was carried out in Mkpato Enin Local Government Area of Akwa Ibom State. Mkpato Enin is one of the Ibibio speaking Local Governments Area in Akwa Ibom State, Nigeria. The Local Government Area has four clans and 87 villages. It is bounded by Oruk Anam Local Government Area in the North, Eastern Obolo Local Government Area in the south, Onna Local Government Area in the East and Ikot Abasi Local Government Area in the West. Mkpato Enin has an area of 322.352 square kilometer (124,461 square mile). The total population of Mkpato Enin is 178,036 based on the 2006 census. The area is rich in oil and natural gas, timber and palm produce. The people of Mkpato Enin are mainly traders and farmers. Mkpato Enin has 16 public secondary schools, a Federal Government Girls College and a state university.

The population of the study comprised all JSS2 students from 16 secondary schools (State Secondary Education Board, Uyo; Analysis of Student enrolment by gender by class as at February, 2022) in Mkpato Local Government Area. The study comprised of 1694 JSS2 students (male and female). A total sample size of 212 students was used for this study. Four secondary schools were randomly selected from 16 secondary schools in Mkpato Local Government Area. Intact classes were involved in the study.

The instruments that were used in collecting data for this study were Students' Questionnaire on Feedback (SQF) and School Result Sheet (SRS). The instrument (SQF) and (SRS) were made up of two sections, A and B. For section A contained the personal data of the respondents which are name of schools, gender and age. Section B of SRS contained 7-item questionnaire of likert type in which the respondents are requested to indicate their opinion using Very Often = 1, Often = 2, Sometimes = 3, Never = 4 and scored accordingly. SRS contained second term examination results (score) for both male and female respondents that participated in the study.

Students' Q

uestionnaire on Feedback was developed by the researcher. The instrument initially contained 10 items. It was validated through expert review by two lecturers from the Department of Science Education, Akwa Ibom State University. 7 items survived scrutiny and were used for the purpose of this study. They scrutinized the items to see whether it met the objectives of the study and would achieve what they intended to achieve. Their corrections and suggestions helped in producing the final copy of the instrument. The instrument was then administered for reliability. The reliability of Students' Questionnaire on Feedback was based on using (30) students drawn from schools which were not part of the study. The instrument was administered and the reliability index calculated using Cronbach Alpha formula was 0.78

For the administration of the questionnaire, the researcher obtained permission from the school principal of the selected secondary schools to carry out the study. Questionnaires were delivered by hand to the respondents to read and carefully select the appropriate options. All students who were present in class were each given a questionnaire to respond to. The researcher vividly explained the reason they should sincerely respond to the questions contained in the instrument. All questionnaires distributed to students were returned resulting in 100% response rate. This made it possible to collect adequate information and opinions from the respondents within a short period of time. The whole data collection period was one week but data from each school was collected in a day. The data collected were analyzed using mean score, percentages, frequency count, t-test to test the hypotheses at .05 level of significance and Pearson Product Moment Correlation.

3. FINDINGS

Research Question 1: How frequent does the teacher give feedback to JSS 2 Basic Science and Technology students in Mkpato Enin Local Government Area?

Table 1: Teachers' Feedback to JSS 2 Basic Science and Technology students

S/n	Items	VO	O	ST	N	Mean	Std. D
1.	Assignment/Homework	22 10.4%	58 27.4%	95 44.8%	37 17.4%	2.31	.879
2.	Test	14 6.6%	44 20.8%	97 45.8%	57 26.9%	2.07	.860
3.	Practical/Experiment	9 4.2%	22 10.4%	100 47.2%	81 38.2%	1.81	.788
4.	Individual Activity	4 1.9%	9 4.2%	77 36.3%	122 57.5%	1.51	.671
5.	Group Activity	2 0.9%	9 4.2%	65 30.7%	136 64.2%	1.42	.622
6.	Class/Group Project	3 1.4%	10 4.7%	46 21.7%	153 72.2%	1.35	.640
7.	Out-of-Class Activity	3 1.4%	7 3.3%	54 25.5%	148 69.8%	1.36	.620
		Weighted Mean=1.69					

Table 1 reveals the weighted mean score of 1.69 out of the maximum 4.00, which is lower than the standard mean of 2.50. This means that the teachers did not give immediate feedback to most JSS 2 Basic Science and Technology students. This implies that teachers delayed feedback on students' instructional activities and performance.

Research Question 2: What difference exists in the academic performance of Basic Science and Technology students that were given immediate and delayed feedback?

Table 2: Mean and Standard Deviation of Academic Performance by Feedback

Feedback	N	Mean	Std. D
Immediate Feedback	87	58.22	14.807
Delayed Feedback	125	44.45	17.315

Table 2 shows that JSS 2 Basic Science and Technology students that were given immediate feedback had higher performance mean score (\bar{x} = 58.22) than JSS 2 Basic Science and Technology students whose feedback was delayed (\bar{x} = 44.45). This difference in their academic performance was statistically significant (see table 6). This means that there was difference in the academic performance of Basic Science and Technology students that were given immediate and delayed feedback

Research Question 3: What is the nature of relationship between teachers' feedback and students' academic performance in Basic Science and Technology?

Table 3: Pearson Product Moment Correlation (PPMC) of the Relationship between Teachers' Feedback and Students' Academic Performance in Basic Science and Technology

Variables	Mean	Std. D	r
Feedback	22.93	2.53	.180
Academic Performance	50.10	17.65	

Table 3 revealed that there was positive relationship between teachers' feedback and students' academic performance in Basic Science and Technology ($r=.180$). This means that if Basic Science and Technology teachers would adopt an appropriate feedback strategy, students' academic performance will improve. The correlation matrix is shown in table 4.

Table 4: Correlation Matrix Showing the Relationship between Teachers' Feedback and Students' Academic Performance in Basic Science and Technology

Variables		Feedback	Academic Performance
Feedback	Pearson Correlation	1	.180**
	Sig. (2-tailed)		.009
	N	212	212
Academic Performance	Pearson Correlation	.180**	1
	Sig. (2-tailed)	.009	
	N	212	212

Table 4 further showed that teachers' feedback and students' academic performance in Basic Science and Technology are positively related. Students' academic performance in Basic Science and Technology will improve if Basic Science and Technology teachers would adopt and practice regular (immediate) feedback.

Hypothesis I: There is no significant difference in the mean ratings of male and female Basic Science and Technology students on how frequent feedback was given to students.

Table 5: T-test Analysis of Ratings on Feedback of Basic Science and Technology students by Gender

Gender	N	Mean	Std. D	Df	t	P-value	Remark
Male	77	22.73	2.60	210	.878	.381	N.S
Female	135	23.04	2.49				

Table 5 revealed that there was no significant difference between the mean ratings of male and female Basic Science and Technology students on how frequent feedback was given to students ($t=.878$; $df=210$; $p>.05$). Thus, hypothesis 1 was not rejected.

Hypothesis 2: There is no significant difference in the academic performance of Basic Science and Technology students that were given immediate and those with delayed feedback.

Table 6: Table 5: T-test Analysis of Academic Performance by Feedback

Feedback	N	Mean	Std. D	Df	t	P-value	Remark
Immediate Feedback	87	58.22	14.807	210	6.038	.000	Sig.
Delayed Feedback	125	44.45	17.315				

Table 6 revealed that there was significant difference in the academic performance of Basic Science and Technology students that were given immediate and those with delayed feedback ($t=6.038$; $df=210$; $p<.05$). Thus, hypothesis 2 was rejected.

Hypothesis 3: There is no significant relationship between teachers' feedback and students' academic performance in Basic Science and Technology.

Table 7: Pearson Product Moment Correlation (PPMC) of the Relationship between Teachers' Feedback and Students' Academic Performance in Basic Science and Technology

Variables	Mean	Std. D	N	Df	r	P-Value	Remark
Feedback	22.93	2.53	212	210	.180	.009	Sig.
Academic Performance	50.10	17.65	212				

Table 7 showed that there was a positive significant relationship between teachers' feedback and students' academic performance in Basic Science and Technology ($r=.180$; $p<.05$). Hence, hypothesis was rejected.

4. DISCUSSION

The results from this study showed that teachers did not give immediate feedback to most of JSS2 Basic Science and Technology students; there was difference in the academic performance of Basic Science and Technology students that were given immediate and delayed feedback; there was positive relationship between teachers' feedback and students' academic performance. The result further showed that there was no significant difference between the mean ratings of male and female students on how frequent feedback was given to students.

Brookes (2010) presented the findings from an empirical study that sought to evaluate students' perceptions of the potential of podcasts to deliver formative feedback and the impact on their learning experience. Results identified that most students perceived that podcasts have a positive impact on their academic performance and can be an efficient way to provide formative feedback.

Brown et al. (2016) explored students' beliefs about the role and purpose of feedback and the relationship of those beliefs to self-reported, self-regulation, self-efficacy, and achievement. Results showed that feedback exists to guide next steps in learning and thus contributes to students' self-regulation, academic self-efficacy, and increased grade point average. Harks et al. (2013) concluded that process-oriented feedback was perceived as more useful than grade-oriented feedback and that the perceived usefulness of feedback had a positive effect on changes in achievement and interest.

In essence, feedback of all kinds is an important issue in education. It can play a significant role in encouraging and motivating learners to achieve better learning. Timing of feedback is decisive in learners' success to modify their ways of learning and correcting their mistakes. The teacher should be proficient in the provision of this feedback. He should realize the suitable time that fits his students and provide them with immediate feedback. Generally, feedback has to be given as soon as possible after the completion of the learning task.

5. CONCLUSION

Based on the findings of this study, it revealed that teachers did not give immediate feedback to most of JSS2 Basic Science and Technology students; there was difference in the academic performance of Basic Science and Technology students that were given immediate and delayed feedback; there was positive relationship between teachers' feedback and students' academic performance. The result further showed that there was no significant difference between the mean ratings of male and female students on how frequent feedback was given to students. Feedback that is timely and frequently immediate could motivate the students, help ameliorate the problem of poor performance and enhances high level of academic gains. Teachers of Basic Science and Technology should be encouraged to use variety of feedback methods (sometimes discussions on students' progress and other times, question-and-answer). This can help identify and help weak students to overcome their weaknesses or problem areas.

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