

Effects of Formative Assessment with Feed-Back on Achievement of Secondary School Students in Economics in Jaba Local Government Area of Kaduna State

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Abstract

The study examined the effect of formative assessment with feedback on students' performance in economics in Kaduna State, Nigeria. The study adopted a quasi-experimental research design in which three research questions guided the study with three corresponding null hypotheses. A population was made up of eleven government secondary schools in Jaba Local Government Area of Kaduna State, with a total of 1,780 SS II students offering economics. Two intact classes with 97 students in the two selected schools were used as a sample for the study. The instrument used for data collection was the Economics Achievement Test (EAT), which was subjected to scrutiny by experts in economic education, research, measurement, and evaluation from the University of Jos. The test-retest reliability method was used to establish the stability of the instrument, and a reliability coefficient of 0.83 was obtained, which showed that the instrument was reliable for the study. The research questions were answered using the mean and standard deviation, and ANCOVA was used to test the null hypotheses at a 0.05 level of significance. The finding revealed that students' achievement in economics improved after exposure to formative assessment with feedback. It was recommended that school administrators, in collaboration with economics teachers, develop a standard formative assessment template for use by other economics teachers in schools.

Keywords: *Formative assessment with Feedback, Economics, Achievement*

Introduction

Economics is a social science subject that studies human behavior in relation to earnings and scarce means that have alternative uses. It deals with how people make choices about how to use their limited resources in order to live effectively. It is a discipline that has immensely contributed to the advancement of all human interactions and businesses. There is hardly any sphere of human endeavor where economics is not required for effective function (Jacob & Umoh, 2017). For instance, the local, state, and federal governments need a good knowledge of economics to solve their daily problems. Also, individuals, firms, and households need economics to ascertain the inflow of their wealth and to be self-sufficient. In the same vein, farmers, engineers, doctors, lawyers, teachers, businessmen, and women, among others, need economics in one way or another for extraction, production, or distribution purposes. The foregoing implies that the importance of economics cannot be overemphasized. The educational sector is therefore expected to provide adequate training in economics so that schools can provide competent and qualified graduates (Chidi, 2012). It is quite unfortunate that people tend to take the teaching of economics for granted by employing graduates of other fields with paper qualifications to teach economics instead of qualified economics teachers, hence the suggestion of competence-based assessment and certification. Despite the importance of economics to everyday life, there has been a trend of poor performance in economics; for instance, in the year 2019, only 59% of students that wrote WAEC passed in credit and above (WAEC Annual Report 2019).

As reported by the National Teachers Institute (2010), the objectives of teaching and learning economics in secondary school include, among others, raising the potential and competence of students that will take up the challenges of the world or national economic recession, but with the repeated poor performance of students in aspects of economics, this laudable objective may not be achieved. Efforts directed towards a search for causes of poor performance in economics have found causes like lack of motivation, poor teaching strategy by the teacher, environmental factors, inadequately qualified economics teachers, and a lack of adequate teaching and learning aids. In addition, large class sizes, poor academic self-concept, poor cognitive ability and development skills, an unqualified economics teacher, and inadequate learning materials Researchers over the years have sought ways of curbing this problem of poor student achievement in economics. A proliferation of methods has been tried in the recent past to check for this problem. However, the development of economics skills is very important for improving students' achievement in economics. Similarly, educational researchers have come up with another strategy called mastery learning (Bloom, 2019).

Guskey (2015) has opined that the use of guided teaching, individualized instruction, and graded questions will have immense benefits in curbing the problem of poor performance in economics. However, the use of all methods is limited due to some obstacles, which include the attitudes and beliefs of teachers regarding their use, their integration into school practices, the organizational structure of the school, and time flexibility (Olaoye, 2012). Consequently, following an adopted model of instruction designed by Glaser and Ntiko (2013) and a formative model involving remediation may be useful. Formative assessment is a process that allows the design of

instruction for each unit to include a set of alternative instructional materials and a procedure or correction keyed to each item. A formative assessment procedure employs formative tests.

Formative assessment is an assessment designed to be used to monitor learning progress during instruction. The primary aim is to provide continuous feedback and remediation to both students and teachers (Afemikhe, 2015). They consist mostly of specially prepared tests for each segment of instruction. They serve as first-aid treatments for simple learning problems (Gronlund, 2011). Formative tests are usually mastery tests that provide measures for all the intended learning outcomes of the segment. They are usually teacher-made.

Gronlund (2011) has identified some benefits of the formative assessment model, including the fact that it helps plan corrective action for overcoming learning deficiencies. It also aids in motivating learners and increases retention and transfer of learning. The application of formative procedures has been found effective in reducing variations in the rate at which students master economics as an area of learning. The realization of repeated poor performance of students in economics and the devastating effect on students, teachers, and the nation at large, as well as the limitation of other measures that had been suggested and used by some researchers in the recent past to curb poor achievement of students in economics, requires that a study be conducted on the effect of formative assessment and feedback on students' achievement in economics in secondary schools.

Another factor that could influence students' achievement in economics is gender. Gender involves the biological, psychological, social, and cultural properties of being male or female (Bulus & Mshelia, 2021). It centered on the extent to which females and males perform differently in different subjects. Guilford (2016) found that boys do better in tasks requiring economic ability, while girls do better in tasks requiring verbal ability. The fact that boys have shown better performance in economics than girls has been challenged by recent studies. This aspect of gender difference in economic achievement as such intrigued economic educators and psychologists (Philip, 2008). According to Muhammed (2016), adolescent boys and girls show no more difference in achievement in economics than they do in general intelligence. Basically, their scores are comparable. However, he noted that in their early teens, girls' achievement begins to decline in relation to boys until the end of secondary education. Continuing, he observed that in most cases, girls not only fail to continue their studies, but their rate of success in all economic work is generally lower than that of boys.

Furthermore, literature about gender and academic performance in economics comes with different views and findings. Studies (Paul, 2005; Bichi, Suleiman. & Ali, 2019; Bulus & Mshelia, 2021) conducted have shown that boys perform better than girls. However, other studies suggest that girls perform better than boys (Pope & Justin, 2010; Hydaa & Mertz, 2009; Agbenyeku, 2012). Some studies, like Oloyede (2011), Ugbe and Dike (2012), and Atomatofa (2013), found that girls performed at the same level as boys in economics and mathematics. This means that the gender gap remains inconclusive in economics and other subjects, hence the need to find out the effect of formative assessment with feedback on the achievement of students

based on their gender differences.

Objectives of the study

The aim of the study was to determine the effect of formative assessment with feed-back on students' achievement in Economics at the secondary school level. The specific objectives were to:

1. determine the achievement mean score of students in Economics in the experimental and control groups.
2. find out the differences in the achievement mean scores of male and female students in Economics after exposure to formative assessment with feedback.
3. ascertain the interaction effect of treatment and gender on students' achievement in Economics

Research Questions

The following research questions were formulated for the study:

1. What are the pre-test and post-test achievement mean scores of students in Economics in the experimental and control groups?
2. What are the achievement mean scores of male and female students in Economics after exposure to formative assessment with feed-back?
3. What is the interaction effect of treatment and gender on students' achievement in Economics?

Hypotheses

The following hypotheses were formulated and tested at 0.5 level of significance.

1. There is no significant difference in the post-test achievement mean scores of students in Economics in the experimental and control groups.
2. There is no significant difference between the achievement mean scores of male and female students in Economics after exposure to formative assessment with feed-back.
3. There is no significant interaction effect of treatment and gender on students' achievement in Economics.

Methodology

The study adopted a quasi-experimental design. Specifically, the non-equivalent group design This is because the groups were not formed by randomization. The school administrator will not allow the researcher to group the students randomly. The population for this study was 1,780 (800 males and 980 females) senior secondary two students offering Economics in all the 11 public senior secondary schools in Jaba-Kaduna State. A total of 97 (51 female and 46 male) senior secondary students in two public schools constituted the sample for this study, and they were used in their intact classes. The EAT was administered to all the students in both the experimental and control groups before the commencement of the treatment. This will ascertain the level of achievement of students in both experimental and control groups. Students in the experimental group were taught Economics through formative assessment procedures and remediation. At the end of each unit of instruction, a formative test for that unit was administered

to the students in the experimental group. The scripts were marked and given back to the students as feedback. The students were allowed to see their scores and discovered their mistakes.

The remediation was done through class discussion of each of the questions in the formative test. During the discussion, students were allowed to brainstorm and come up with answers by themselves. Where the students fail to supply the correct answer, the teacher helps out. The students were allowed to rework the questions they failed after correction, as in the case of statistics. This was done to be sure that the students had actually realized their mistakes and also to ascertain whether identified learning difficulties had been corrected. In the situation where many students did not get all the questions correctly, after the corrections, that particular topic is retaught and its corresponding formative test is retaken. The remediation process was conducted on all four topics in the study. The students in the control group were taught conventionally. There were no formative tests, feedback, or remediation procedures. These students did not do any assignments throughout the period of the study. At the end of the research, the posttest was administered to the two groups. The aim of the posttest was to determine the students' level of achievement in the four units of instruction taught in the study. The results of the posttest were compared with those of the pretest to determine the gain in the scores of the students in both the experimental and control groups. The significant difference between the mean scores of the independence samples was also determined using ANCOVA.

Results

Research Question One

What are the pre-test and post-test achievement mean scores of students in Economics in the experimental and control groups?

Table 1
Pretest and posttest achievement of Students in the experimental and Control Groups

Group	N	Pre-test		Post-test		Mean Gain	\bar{x} - difference
		Mean	SD	Mean	SD		
Experimental	49	33.39	11.15	62.20	13.85	28.81	16.58
Control	48	26.81	10.05	39.04	11.58	12.23	

Table 1 reveals the pre-test and post-test mean score of Economics students in the experimental and control groups. From the result, in the experimental group, the post-test mean score ($\bar{x} = 62.20$, $SD = 13.85$) is higher than the pre-test mean score ($\bar{x} = 33.39$, $SD = 11.15$) with a mean gain of 28.81, indicating that there was improvement in the achievement of students after treatment. Also, for the control group the mean score was 26.81 and a standard deviation of 10.05 in the pretest. However, in the post-test the mean score of students rouse to 39.04 and standard deviation of 11.58. The findings show that students in the experimental group had a higher mean score (62.20) after exposure to formative assessment with feedback than those in

the control group (39.04) who were not given treatment with a mean difference of 16.58. This means that at the pre-test the students in both groups had a poor performance, but after the intervention the experimental group performed better than the control group. It can be deduced that exposure to formative assessment with feedback do improve student's achievement in Economics.

Research Question Two

What are the achievement mean scores of male and female students in Economics after exposure to formative assessment with feed-back?

Table 2

Result of Post-test Achievement of Male and Female Students in Economics in the Experimental Group

Group	Gender	N	Mean	SD	\bar{x} - Difference
Experimental	Male	24	65.04	15.25	5.56
	Female	25	59.48	12.04	

Table 2 shows the mean and standard deviation result of the post-test mean scores of male and female students in the experimental group. The mean scores for experimental group yielded, male (\bar{X} = 65.04; SD =15.25) and female (\bar{X} = 59.48; SD = 12.04) with a mean difference of 5.56. This implies that male students slightly performed better than their female counterparts in Economics when exposed to formative assessment with feedback.

Research Question Three

What is the interaction effect of treatment and gender on Economics students' achievement?

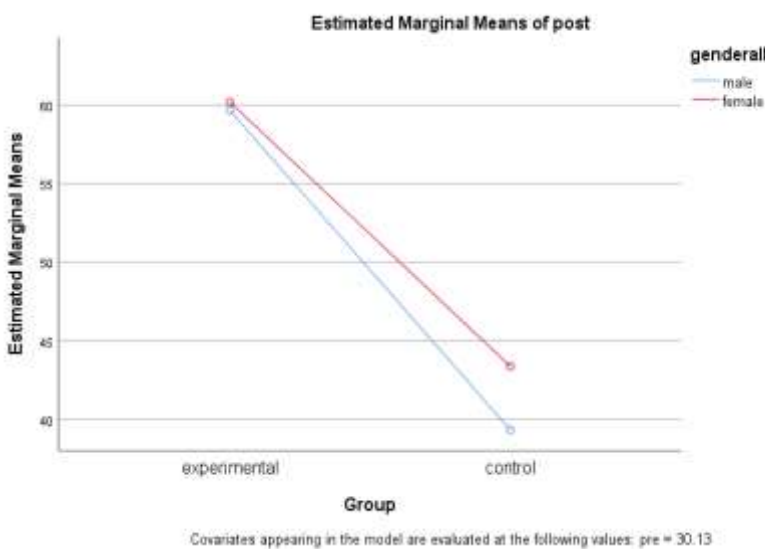


Figure 1: Showing interaction effect of Treatment and Gender on Achievement

Figure 1 presents the profile plot showing the interaction effect of treatment and gender on students' achievement in Economics. The interactive pattern shows that the plots for male and

female students did not intercept. Since the two lines are not crossed there is no likelihood of an interaction effect between treatment and gender on the achievement of students in Economics. It further shows that the plot is extrapolated, therefore the intersection could not hold; which mean that the interaction effect between treatment and gender is not attainable.

Hypothesis One

There is no significant difference in the post-test achievement mean scores of students in Economics in the experimental and control groups.

Table 3

ANCOVA Result on Posttest Achievement Mean Scores of Experimental and Control Groups

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	17850.603 ^a	2	8925.302	78.674	.000	.626
Intercept	9728.853	1	9728.853	85.757	.000	.477
Covariate	4841.922	1	4841.922	42.680	.000	.312
group	7757.545	1	7757.545	68.381	.000	.421
Error	10663.953	94	113.446			
Total	278268.000	97				
Corrected Total	28514.557	96				

a. R Squared = .626 (Adjusted R Squared = .618)

An analysis of covariance (ANCOVA) was conducted to determine if a significant difference exists in the posttest achievement of students in Economics in experimental and control groups. Table 3 shows that $F(1, 94) = 68.38$, $p < 0.05$, and since the p-value of 0.000 is less than the 0.05 level of significance, the null hypothesis was rejected, indicating that there was a significant effect of formative assessment with feedback on students achievement in Economics . The result further reveals an adjusted R squared value of .618, which means that 61.8 percent of the variation in the dependent variable, which is achievement, is explained by variation in the treatment, while the remaining is due to other factors not included in this study. Hence, it was deduced that formative assessment with feedback can help improve students' achievement in Economics.

Hypothesis Two

There is no significant difference in the achievement mean scores between male and female students in Economics after exposure to formative assessment with feed-back

Table 4

ANCOVA Result on Posttest Mean Achievement Scores of Experimental Group in Economics based on Gender

Source	Type III Sum of Squares	df	Mean Square	F	P-value	Partial Eta Squared
Corrected Model	2602.875 ^a	2	1301.437	9.066	.000	.283
Intercept	6590.063	1	6590.063	45.909	.000	.500
Covariate	2224.114	1	2224.114	15.494	.000	.252
Gender	.542	1	.542	.004	.951	.000
Error	6603.084	46	143.545			
Total	198804.000	49				
Corrected Total	9205.959	48				

a. R Squared = .283 (Adjusted R Squared = .252)

The data were subjected to analysis of covariance (ANCOVA) with male and female students in the experimental group. The main effect of gender yielded $F(1, 46) = 103, P > 0.05$. Since the p-value of .951 is greater than the 0.05 level of significance, the null hypothesis was retained. This indicates that the achievements of male students in Economics do not significantly differ from those of female students. It means that students' achievement in Economics is not affected by gender.

Hypothesis Three

There is no significant interaction effect of treatment and gender on students' achievement in Economics.

Table 5
Interaction effect of Treatment and Gender on Students' Achievement in Economics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	18042.390 ^a	4	4510.598	39.626	.000	.633
Intercept	8270.552	1	8270.552	72.658	.000	.441
Pre-achievement	4648.198	1	4648.198	40.835	.000	.307
Treatment	7503.167	1	7503.167	65.917	.000	.417
Gender	113.502	1	113.502	.997	.321	.011
Treatment* Gender	74.016	1	74.016	.650	.422	.007
Error	10472.167	92	113.828			
Total	278268.000	97				
Corrected Total	28514.557	96				

a. R Squared = .633 (Adjusted R Squared = .617)

An analysis of covariance (ANCOVA) was conducted to determine if there is an interaction effect of treatment and gender on the achievement of students in Economics. Table 8 shows the main effect of treatment for the experimental group, which yielded a mean of 62.20 with a standard deviation of 13.85, while the control group had a mean of 39.04 and a standard deviation of 11.58; $F(1,92) = 65.92$, $p < 0.05$. Since the p value of 0.000 is less than the 0.05 level of significance, the null hypothesis was rejected, indicating that there was a significant effect of treatment on the achievement of students in Economics. Again, the main effect of gender yielded a mean of 65.04 and a standard deviation of 15.25 for males, while female students have a mean of 59.48 and a standard deviation of 12.04; $F(1,92) = .997$, $p > 0.05$; since the p-value of 0.321 is greater than the 0.05 level of significance, the null hypothesis was retained, indicating that there was no significant effect of gender on the achievement of students in Economics when exposed to formative assessment with feedback. The result also revealed that there was no statistically significant interaction effect of treatment and gender on achievement, which yielded $F(1, 92) = .650$, $P = 0.422$.

Discussion

The study examined the effect of formative assessment with feedback on the achievement of secondary students in Economics. The findings of the study on the achievement mean score of students before the exposure of the experimental group to treatment showed that the students in the experimental group recorded a mean score slightly higher than those in the control group, although both groups performed poorly. The finding is consistent with the finding of Dandekar (2020), who observed an enhancement in marks in short answer questions (SAQ).

The finding on the posttest mean score of students in the experimental and control groups was in favour of the experimental group. It was found that the experimental group had a higher mean score than the control group. This implies that formative assessment with feedback favoured students in the experimental group. The finding could be explained by the fact that economics students respond well to the self-paced assessment, which allowed them to trial-test their abilities, learn from their mistakes, and surpass their capacities in a developmental process. These further informed teachers to adjust their assessment methodology, identify pupil weaknesses, and develop strategies that will help in elaborating on these weaknesses. This was fondly supported by Wakjissa and Mohammed (2022), whose finding indicated that formative assessment methods that are used in the classroom positively impact students' performance. It was also in agreement with the work of Bichi, Suleiman and Ali (2019), whose study revealed that there was a positive impact on learners' achievement in mathematic instruction in secondary schools and that the five key formative assessment strategies improved learners' acquisition of problem-solving skills before and after the intervention.

The finding was also consistent with the finding of Dandekar (2020), whose result also showed that students assessed by formative assessment had better academic performance; thus, it helps in the enhancement of learning. Students exposed to formative assessment questions learned how to respond to the demands of these questions, and the choice of responses made

them outstanding. Through these processes, students developed mental skills in assessment methods and are therefore placed at an advantage level ahead of those who were not exposed to those formative assessment trainings.

The finding also revealed that there is no gender difference in Economics achievement between males and females after exposure of the experimental group to formative assessment with feedback. The finding showed that males did not perform better than females in Economics. This research work is in agreement with Okheruate and Oyaklirome (2019), who found that there is no significant difference in the scores of boys and girls exposed to formative assessment with feedback. The finding also showed that there is no interaction effect between treatment and gender on students' achievement in Economics. The interaction pattern showed that the plots for male and female students did not intercept.

Conclusion

The conclusion made was based on research findings that students who are exposed to formative assessment with feedback tend to achieve higher; therefore, frequent use of formative assessment with feedback should be employed at all levels of learning. Teaching of Economics should be done in a friendly manner to enable both genders to achieve well in the instructional process. It was discovered that gender has no influence on students' achievement in Economics.

Recommendations

The following recommendations were made based on the finding of the study.

1. The researchers recommended that workshops and seminars be organized for Economics teachers across the state on how to effectively use formative assessment with feedback as our instructional strategies to improve student's achievement level across all senior classes in each school in the state.
2. Teachers should always ensure that prompt feedback are given to students either orally or hard copies, while students areas of weakness should be attended to through remediation or remedial classes.
3. Teacher objectives in formative assessment with feedback processes are the key in building student's confidence in Economics. These teachers should try not to influence the decision of students when teaching Economics to them.
4. Teachers should be mindful of the instructional strategies to use when teaching a class that students have individual differences.

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