

Investigating the impact of two error correction strategies on economics achievement of senior secondary school students in Udenu, Enugu State, Nigeria

Robert, Augustine Igwe¹, Otolokpo Chukwuka², J.C. Onuoha³

¹Department of Social Science Education, University of Calabar, Nigeria

^{2&3}Department of Social Science Education, University of Nigeria, Nsukka

¹robertaugustineigwe@unical.edu.ng

²chuksotolokpo@gmail.com

³joseph.onuoha@unn.edu.ng

Abstract

This study examined the impact of two error correction strategies on senior secondary school students' achievement in Economics in Udenu Local Government Area, Enugu State. A quasi-experimental design with non-equivalent pretest and posttest control groups was employed, involving 933 SS2 Economics students (430 males and 503 females). A sample of 120 students from four secondary schools was selected using multi-stage sampling. The Economics Achievement Test (EAT), developed and validated for data collection, showed a reliability index of 0.98 from a trial test in Nsukka. Mean, Standard Deviation, and Analysis of Covariance (ANCOVA) at a 0.05 significance level were used for data analysis. The findings revealed that students taught using the students' correction strategy achieved higher scores than those taught with the teacher correction strategy. Both strategies improved student achievement, but the students' correction strategy was more effective for both male and female students. The study recommended that Economics teachers be trained by the Ministry of Education on using both error correction strategies to enhance student achievement. The major implication is that adopting the students' correction strategy in teaching Economics can significantly boost students' academic performance.

Keywords: Effect, error correction strategy, students, achievement, economics

Introduction

Economics is the study of how individuals and nation make choices about ways to use their scarce resources to satisfy their wants and needs. It studies human behaviour as a relationship between ends and scarce means which have alternative uses. According to Pennington (2015), Economics is the study of how society chooses to use scarce resources to satisfy its unlimited wants and needs. Economics as a school subject has various values to the students which include the cultural values, intellectual training and vocational training. Economics serves as a useful purpose in modern life. It helps one to make wise selection in the several alternatives. Economics is one of the courses in secondary schools as listed in the Federal Republic of Nigeria. According to Nigeria Educational Research Development Council (2013; 12), the objectives of Economics in Secondary School Curriculum when fully implemented should enable students to:

- Understanding basic Economic principles and concepts as well as the tools for sound Economic Analysis.
- Contribute intelligently to discourse on economic reforms and development as they effect or would affect the generality of Nigerians.
- Understanding the structure and functioning of economic institutions.
- Appreciate the role of public policies on national economy.
- Develop the skills and also appreciate the basis for rational economic decisions.
- Become sensitized to participate actively in national economic advancement through entrepreneurship, capital market and so on.

- Appreciate the problems encountered by developing countries in their effort towards economic advancement. (Nigeria educational research development council, 2008; 22).

By the end of the secondary school education, it is expected that students should have acquire the above stated objectives to enable them function effectively at home and in the society.

The achievement of the objectives of Economics curriculum depends largely on what the teacher does in the classroom. The teacher should adopt the most appropriate teaching method, skills and materials in promoting learning. The method adopted should be one that can enable the teacher present the lesson effectively and at the same time give students' maximum opportunity for participating actively in the learning process (Offorma, 2006). In recent times, emphasis on teaching methodology has shifted from the teacher-know-all to students' centered approach. Hence educational activities should be centered on the learner for maximum self-development and fulfillment (Federal Republic of Nigeria (FRN, 2012: 8).

In addition, achievement of objectives of Economics in senior secondary school, the teaching and learning of subject have to be properly done in secondary school not just for those intending to pursue a carrier in Economics, but also generally as a part of education foundation which every student should have before leaving school. Behreman and Richard (2008), opined that a foundation in Economics is considered to be critical for the 21st century students since many of our decisions require an understanding of Economics. It will equip the students in the fundamental areas such as rational decision, policy making, vocational and skill acquisition.

Academic achievement has been described by Adeyemo (2005), as the scholastic standing of a student at a given moment, which states individual abilities. Students' achievement can be explained inform of grades, obtained from tests or examinations on courses taken, Baillargeon (2015:28), defined achievement as the act of accomplishing, it's something accomplished successfully especially by means of exertion, skill, practice or perseverance. In Economics at senior secondary school level, achievement is measured by students' ability to achieve the purpose be to entertain, instruct, inform, admonish or persuade. In Nigeria, the level of students' achievement in senior secondary schools is determined through external examination like West African Examination Council and National Examination Council. The poor achievement of students basically has largely been attributed to poor teaching methods adopted by the teachers as seen in several researches on achievement (Adeyemo, 2015).

All over the country, there is a consensus of opinion about the fallen standard of education in Nigeria (Adebule, 2014), Parents and government are in total agreement that their huge investment on education is not yielding the desired dividend, teachers also complain of students' low achievement at both internal and external examinations in most subjects including economics in the poor achievement of students in Economics. The data collected from Post Primary School Management Board, Obollo- Afor Education zone from 2013 to 2016 showed a high rate of failure. The result stood at 28%, 30%, and 35% respectively. It has been discovered from the above figures that students' academic achievement in Economics is poor and unstable. This may be due to various factors such as Poor teaching method, lack of interest in the subject, and insufficient basic amenities. Osunde and Aduwa (2015) stated that despite the approaches to learning and instruction in Economics at senior secondary school level, the subject is still plagued with poor results and low achievement.

This problem would be one of the main causes of poor achievement of students in Economics in senior Secondary School external examinations. This implies that the mastery of

Economics concepts such as demand, cost and production possibility frontier might not be fully achieved without the use of teacher correction strategy and students' correction strategy in Economics in Udenu Local Government Area. Achievement is solely depending on teacher correction strategy and students' correction strategy.

Error correction strategy is a procedure that details what a trainer or program implementer does when the students engage in an incorrect response during a teaching opportunity (Rodgers & Iwata, 2007). Error correction strategy is the process of providing clear, comprehensive, and consistent corrective feedback on a student's grammatical errors for the purpose of improving the student's ability to write accurately (Lee, 2012). Error correction aims to enhance learning by teaching the learner the appropriate response and increasing the learner's contact with reinforcement contingencies rather than simply extinguishing errors. This procedure is intended to help learners acquire skills faster and with less frustration than simply allowing trial and error. In other words, the teacher gives immediate feedback correction on student's responses to issues. Thus, the learner regains confidence in his/her learning.

Teacher's correction strategy can be defined as a correction students receive from the teachers; students come to distinguish for themselves whether they are performing well or not (Ferris, 2012). Teachers' correction strategy or feedback occurs when the teacher identifies an error and provides the correct form. In this technique, the teacher first tries to identify the error which students have made and writes down the complete correct form afterward (Hartshorn, 2012). While students' correction strategy is when the teacher indicates that an error has been made but leaves it to the students to solve the problem, and correct the errors (Ferris, 2012). Students' correction strategy refers to situations where the teacher indicates that an error has been made but does not provide the correction, thereby leaving the students to diagnose and correct it (Bitchener, 2005). Following a students' correction strategy, teachers do not correct students' papers; rather they mark where an error has occurred or supply the students with short cues so that they get informed about the kind and the location of their errors and get involved in the process of correcting their papers by themselves.

Nigerian students should be properly guided. It is a general consensus among education experts that committing error is natural process in teaching and learning (Edge, 2013). Yingliang (2008) observes that for over 10 years the debate on error correction has continued. The debate has to do with the issue of using error correction to improve students' achievement. In contrary, Scheen (2011), point out that only the students can do the learning necessary to improve achievement, regardless of how much error treatment is provided. Inevitably, most teachers have experienced the frustrations of correcting the same mistakes over and over instead of listening to a feedback because error corrections have both negative and positive effects. Therefore, the present study intends to contribute in the continuing argument or inconsistent reports on the actual effects of error correction strategy on senior secondary school students' achievement in Economics in Udenu Local Government Area. The positive effects of error correction can make learning more effective since it helps Economics students notice the gap between their achievement and the target forms, which elicits uptake or repair. This can enhance learning activities. Moreover, when students understand that making mistakes is a part of the learning process, and that their teachers try to help them learn target forms, they are likely to take risks and build up confidence through practice.

While the negative effects can hinder students' activities rather than facilitate learning since error correction may create barriers between teachers and their students and raise the students' level of anxiety. Truscott (2008), notes, some errors are more important than others; therefore, teachers should use error correction selectively in terms of its importance in order to

promote learning. Allwright and Bailey (2013), investigated the relative effects of implementing various feedback types and strategies and have suggested that providing students with a variety of corrective feedback can help them acquire correct forms. Schulz's (2001), stated that despite the provision of various types of corrective feedback that attempt to guide students to the target achievement, students can be dissatisfied with Economics class because of mismatches between students' and teachers' expectations. Students' beliefs and perceptions may be essential to effective learning. Brown, (2009), found that students' perceptions and interpretations towards teaching methods have the greatest influence on their achievement. Understanding students' perceptions can be the first step toward leading them to acquire correct forms. Brown (2009: 46), points out that those Economics teachers and their students may have similar or disparate notions of effective teaching". Therefore, it is important for teachers to know their students' preferences for corrective feedback in order to maximize its potential positive effect on learning episode.

The present study is therefore geared towards the determination of the effect of two modes of error correction strategies which are teachers' correction strategy and students' correction strategy on senior secondary school students' achievement in Economics. However, review of studies on gender differences in Economics has remained a controversial one because while the researcher report that boys perform better in Economics, Others report that no significant difference exists in Economics achievement of boys and girls (Erinosho, 2005). Gender in the context of this study refers to the socially, culturally constructed characteristic roles which are ascribed to male and female in any society that could affect students' achievement and interest in Economics. Could the use of two modes of error correction strategy (teachers' correction strategy and students' correction strategy) enhance the achievement of male and female students in Economics?

Purpose of the study

The purpose of the study was to compare the effects of two modes of error correction strategy (teachers' correction strategy and students' correction strategy) on secondary school student's achievement and interest in economics. Specifically, the study sought to:

1. Compare the mean ($\bar{X}$) achievement scores of students taught Economics using teachers' correction strategy and those taught using students' correction strategy.
2. Compare the mean ($\bar{X}$) achievement scores of male and female students taught economics using teachers' correction strategy and those taught Economics with students' correction strategy.
3. Determine the interaction effect of method and gender on students' achievement in Economics.

Research questions

The following research questions were formulated to guide the study:

1. What are the mean ($\bar{X}$) achievement scores of students taught Economics using teachers' correction strategy and those taught using students' correction strategy?
2. What are the mean ($\bar{X}$) achievement scores of male and female students taught economics using teachers' correction strategy and those taught Economics with students' correction strategy?
3. What is the interaction effect of method and gender on students' achievement in Economics?

Hypotheses

Three null hypotheses were formulated for this study and were tested at 0.05 level of significance

1. there is no significant difference in the mean ($\bar{X}$) achievement scores of students taught Economics using teachers' correction strategy and those taught using students' correction strategy
2. there is no significant difference in the mean ($\bar{X}$) achievement scores of male and female students taught economics using teachers' correction strategy and those taught Economics with students' correction strategy
3. there is no significant difference in the interaction effect of method and gender on students' achievement in Economics

Methodology

The study employed quasi-experimental research design. Specifically, it employed non-equivalent pretest-posttest control group design since intact classes were used. This design suits the study because there is no randomization of subject rather intact classes are used as experimental and control groups (Ali, 2006). The population of the study was 933 SS2 Economics students comprising of 430 male and 503 female students. A sample of 120 students from four secondary schools selected through multi-stage sampling techniques was used for the study. The main instrument for the study was Economics Achievement Test (EAT) was developed, validated and used for data collection. The instrument (EAT) was trial-tested on 30 research subjects other than the ones used for the study in Nsukka local government area using Kuder-Richardson (K-R20) and reliability indices of 0.98 was obtained.

Two instructional strategies were used for the study the use of teachers' correction strategy in teaching of Economics and the use of students' correction strategy in teaching of Economics. The use of teachers' correction strategy lesson plans was identical to the students' correction strategy lesson plans in terms of contents been taught, instructional objectives and method of evaluation. The only difference between them was in the instructional activities (teacher's performance and student's performance activities). This was where the use of teachers' correction strategy employed practical illustrations and activities during the instruction whereas the use of students' correction strategy proceeded normally without employing the use of the teachers' correction strategy in teaching during the class instructions.

The pre-test was administered to both the teachers' correction strategy and students' correction strategy before the experiment commenced after they have administered the pre-test, the regular Economics class teachers in the various schools started the experiment. Each teacher used the appropriate instructional procedure developed from the test blue print for his group. Their guiding principle was five days training received during the pre-experimental conference which was conducted for them by the researcher. During the training, the researcher discusses with them what should be required of them during the experiment. The experiment was done during the normal school hours using the school time- table for classes. The duration for the experiment was four weeks. At the end of the experiment, the teachers administered the post- test to the subjects in the two groups. The pre-test and post-test achievement questions were the same in contents for both groups but later rearranged. The students were not informed about the test in advance. The data collected from the pre-test and posttest on the two instruments namely Economics Achievement Test was kept separately for the two groups. It was used in answering the research questions and also testing the hypotheses for the study. Since the participating intact classes were non-equivalent groups, Analysis Covariance

(ANCOVA) was used for data analysis to take care of the initial differences between the groups in order to eliminate the errors of non-equivalence.

Results

Research Question 1: What is the mean ($\bar{x}$) achievement scores of students taught Economics using teachers' correction strategy and those taught using students' correction strategy?

Table 1: Mean achievement scores of students taught economics using teachers' correction strategy and those taught using students' correction strategy

Correction Strategy	N	Pre-test		Post-test		Mean Gain Score
		Mean	SD	Mean	SD	
Teacher Correction	62	41.66	11.65	59.29	15.22	17.63
Student Correction	58	42.05	11.26	73.69	11.77	31.64

The data presented on Table 1 showed that students taught Economics using teachers' correction strategy had mean and standard deviation achievement score of 41.66 (11.65) in pre-test while students taught with students' correction strategy had pretest mean and standard deviation achievement score of 42.05 (11.26) respectively. This suggested that at pretest level students in both teachers' and students' error correction strategies almost had the same achievement. The post-test mean and standard deviation achievement of students taught using the teachers' correction strategy and students' correction strategy are 59.29 (15.22) and 73.69 (11.77) respectively. This implied that students taught Economics with students' correction strategy had better achievement than their counterparts taught using the teachers' correction strategy. Thus, the students' correction strategy enhances students' achievement in Economics more than the teachers' correction strategy.

HO₁: There is no significant difference in the mean ($\bar{x}$) achievement scores of students taught Economics using teachers' correction strategy and those taught with students' correction strategy.

Table 2: ANCOVA summary table of the difference in the mean ($\bar{x}$) achievement scores of students taught economics using teachers' correction strategy and those taught with students' correction strategy

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	6905.338	2	3452.669	18.929	.000
Intercept	26290.061	1	26290.061	144.132	.000
Pretest	692.026	1	692.026	3.794	.054
Strategy	6057.738	1	6057.738	33.211	.000
Error	21341.162	117	182.403		
Total	554934.000	120			
Corrected Total	28246.500	119			

Table 2 showed the F value as 33.21 and the probability value as .000. The probability value of .000 of this finding was less than the alpha value of .05. Therefore, the null hypothesis was rejected and thus, there is a significant difference in the mean achievement scores of students taught Economics using teachers' correction strategy and those taught with students' correction strategy in favour of the students' correction strategy. This implied that students taught Economics with students' correction strategy had better achievement compared with their counterparts taught with the teachers' correction strategy.

Research question 2: What is the mean ($\bar{X}$) achievement scores of male and female students taught economics using teachers' correction strategy and those taught Economics with students' correction strategy?

Table 3: Mean achievement scores of male and female students taught economics using teachers' correction strategy and those taught with students' correction strategy

Strategy Correction	Gender	N	Pre-interest score		Post-interest score		Mean gain
			Mean	SD	Mean	SD	
Teacher	Male	36	42.94	10.16	57.22	15.64	14.28
Correction	Female	26	39.88	13.45	62.15	14.44	22.27
Student	Male	30	41.77	9.00	74.80	11.45	33.03
Correction	Female	28	43.21	12.79	72.50	12.19	29.29

Table 3 showed that male and female students taught with the teacher correction strategy had pretest mean and standard deviation achievement scores of 42.94 (10.16) and 39.88 (13.45) respectively while male and female students taught with students' error correction strategy had pretest mean and standard deviations of 41.77 (9.00) and 43.21 (12.79) respectively. This implied that at pretest level the students taught Economics with teachers' error correction and students' error correction strategies had almost the same achievement level. Nonetheless, the posttest mean and standard deviation achievement scores of male and female students taught using teachers' error correction strategy are 57.22 (15.64) and 62.15 (14.44) respectively while male and female students taught Economics with the students' error correction mode had posttest mean and standard deviation achievement scores of 74.80 (11.45) and 72.50 (12.19) respectively. This indicates that male students taught Economics with students' error correction strategy with posttest mean score of 74.80 had better achievement compared to their male counterparts taught with teachers' error correction mode who had posttest mean score of 57.22. Also, the posttest mean achievement score of female students taught Economics with the students' error correction mode is 72.50 which is higher than the posttest mean score of 62.15 of female students taught with teachers' correction strategy. These findings implied that though both the teachers' error correction strategy and students' error correction strategy enhance students' achievement in Economics, the students' error correction strategy is relatively more efficacious in enhancing male and female students' achievement in Economics in senior secondary schools.

HO₃: There is no significant difference in the mean ($\bar{X}$) achievement scores of male and female students taught Economics using teachers' correction strategy and those taught Economics with students' correction strategy

Table 4: ANCOVA summary table of the difference in the mean achievement scores of male and female students taught economics using teachers' correction strategy and those taught economics with students' correction strategy

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1032.783	2	516.392	2.220	.113
Intercept	25220.542	1	25220.542	108.431	.000
Pretest	874.795	1	874.795	3.761	.055
Gender	185.183	1	185.183	79.60	.001
Error	27213.717	117	232.596		
Total	554934.000	120			
Corrected Total	28246.500	119			

Table 4 revealed the F value as 79.60 and the probability value as 0.01. The probability value of 0.01 of this finding was less than the alpha value of .05. Therefore, the null hypothesis was rejected. Thus, there was a significant difference in the mean ($\bar{X}$) achievement scores of male and female students taught Economics using teachers' correction strategy and those taught Economics with students' correction strategy in favour of the students' correction strategy. This implied that the students' error correction strategy enhances students' achievement in Economics more than the teachers' correction strategy.

Research Question 3: What is the interaction effect of method and gender on students' achievement in Economics?

Table 5: The mean interaction effect of methods and gender on students' achievement in economics

Strategy Correction	Gender	N	Pre-interest score		Post-interest score		Mean gain
			Mean	SD	Mean	SD	
Teacher	Male	36	42.94	10.16	57.22	15.64	14.28
Correction	Female	26	39.88	13.45	62.15	14.44	22.27
Student	Male	30	41.77	9.00	74.80	11.45	33.03
Correction	Female	28	43.21	12.79	72.50	12.19	29.29

Table 5 showed that male and female students taught with the teacher correction strategy had pretest mean and standard deviation achievement scores of 42.94 (10.16) and 39.88 (13.45) respectively while male and female students taught with students' error correction strategy had pretest mean and standard deviations of 41.77 (9.00) and 43.21 (12.79) respectively. This implied that at pretest level the students taught Economics with teachers' error correction and students' error correction strategies had almost the same achievement level. Nonetheless, the posttest mean and standard deviation achievement scores of male and female students taught using teachers' error correction strategy are 57.22 (15.64) and 62.15 (14.44) respectively while male and female students taught Economics with the students' error correction mode had posttest mean and standard deviation achievement scores of 74.80 (11.45) and 72.50 (12.19) respectively. This indicated that male students taught Economics with students' error correction strategy with posttest mean score of 74.80 had better achievement compared to their male counterparts taught with teachers' error correction mode who had posttest mean score of 57.22. Also, the posttest mean achievement score of female students taught Economics with the students' error correction mode is 72.50 which is higher than the posttest mean score of 62.15 of female students taught with teachers' correction strategy. These findings implied that though both the teachers' error correction strategy and students' error correction strategy enhance students' achievement in Economics, the students' error correction strategy was relatively more efficacious in enhancing male and female students' achievement in Economics in senior secondary schools. Hence, there was interaction effect of strategy and gender in students' achievement in Economics when exposed to teachers' error correction strategy and students' error correction strategy.

HO₄: There is no significant interaction effect of method and gender on students' achievement in Economics

Table 6: Summary of ANCOVA for the interaction effect of method and gender on students' achievement in economics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	7481.823	4	1870.456	10.359	.000
Intercept	25503.721	1	25503.721	141.246	.000
Pretest	824.730	1	824.730	4.568	.035
Strategy	5543.877	1	5543.877	30.703	.000
Gender	66.920	1	66.920	.371	.544
Strategy * Gender	503.137	1	503.137	2.786	.003
Error	20764.677	115	180.562		
Total	554934.000	120			
Corrected Total	28246.500	119			

Table 6 showed the F value as 2.79 and the probability value as 0.00. Since the probability value of 0.00 of this finding was less than the alpha value of .05. Therefore, the null hypothesis was rejected. Thus, there was a significant interaction effect of methods and gender on students' achievement in Economics. This implied that the two modes of error correction are gender biased in influencing students' achievement in Economics.

Discussion of findings

The data presented in Table 1 revealed that students taught Economics with students' correction strategy had better achievement than their counterparts taught using the teachers' correction strategy. Thus, the students' correction strategy enhances students' achievement in Economics more than the teachers' correction strategy. Further analysis using ANCOVA for hypothesis 1 revealed that there was a significant difference in the mean achievement scores of students taught Economics using teachers' correction strategy and those taught with students' correction strategy in favour of those exposed to the students' correction strategy. This implied that students taught Economics with students' correction strategy had better achievement compared with their counterparts taught with the teachers' correction strategy. The finding of this study was coherent with that of Montgomery and Barker (2007) who found that the innovative teaching methods and activity-oriented teaching methods such as constructivism, cooperative learning and error correction strategy had positive effects on students' academic achievement.

Table 3 showed that though both the teachers' error correction strategy and students' error correction strategy enhanced students' achievement in Economics, the students' error correction strategy was relatively more efficacious in enhancing male and female students' achievement in Economics in senior secondary schools. Also, Table 4 indicated that there was a significant difference in the mean ($\bar{x}$) achievement scores of male and female students taught Economics using teachers' correction strategy and those taught Economics with students' error correction strategy in favour of the students' correction strategy. This implied that the students' error correction strategy enhances male and female students' achievement in Economics more than the teachers' correction strategy. This finding was in line with Ejimonye (2015) who found that gender had no significant influence on the achievement of students in Economics when exposed to concept mapping instructional strategy. The finding of the study was also in agreement with the finding of Nworgu, Ugwuanyi and Nworgu (2013) that gender was not a significant factor in students' achievement.

The finding in Table 5 showed that though both the teachers' error correction strategy and students' error correction strategy enhanced students' achievement in Economics, the

students' error correction strategy was relatively more efficacious in enhancing male and female students' achievement in Economics in senior secondary schools. In Table 6 the finding also revealed that there was an interaction effect of method and gender on students' achievement in Economics when exposed to teachers' error correction strategy and students' error correction strategy. This implied that the two modes of error correction are gender biased in influencing students' achievement in Economics. The findings were consistent with that of Ejimonye (2015) who documented that there was no significant interaction effect of treatment and gender on students' achievement in Economics when exposed to concept mapping instructional strategy. The findings were also coherent with Okeke (2013) and Okonkwo (2014) who found that there was no significant interaction effect of gender and methods on students' achievement when students were exposed to project-based method and cooperative learning instructional strategies respectively.

Conclusion

The study revealed that students taught Economics with students' correction strategy had better achievement than their counterparts taught using the teachers' correction strategy. Thus, the students' correction strategy enhances students' achievement in economics more than the teachers' correction strategy. The students' error correction strategy is relatively more efficacious in enhancing male and female students' achievement in economics in senior secondary schools. It was concluded that the two modes of error correction strategy such as teachers' error correction and students' error correction strategies when adopted in teaching and learning of economics would promote students' achievement in the subject matter.

Recommendations of the study

Based on the findings of the study the following recommendations were made.

1. Economics teachers should be encouraged by the government through its relevant ministries to adopt teachers' and students' error correction strategies in teaching and learning of related concepts in Economics for better academic achievement of the students in the subject matter to be guaranteed.
2. The Government should organize seminars, workshops and symposia for the in-service teachers on the use of the two modes of error correction strategy for effective teaching and learning of Economics in senior secondary schools.
3. Curriculum planners should emphasize the use of teachers' error correction and students' error correction strategies among other innovative methods of instruction to promote students' achievement and interest in Economics in senior secondary schools.

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