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Research Article

Effects of Reciprocal and Problem-Solving Instructional Strategies on Students' Academic Achievement in Senior Secondary School Economics in Wukari Education Zone, Taraba State

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Abstract

The study examined the impact of reciprocal and problem-solving instructional strategies on the academic achievement of Senior Secondary School II (SS II) Economics students in Nigeria. The research involved 92 students from four intact classes and used a quasi-experimental, 2x2 factorial pre-test, post-test design. Data were collected using the Economics Achievement Test (EAT), which was validated and found reliable. Descriptive statistics and Analysis of Covariance (ANCOVA) were used for data analysis. The results showed no significant difference in the mean academic achievement scores between students taught Economics using reciprocal and problem-solving strategies, although problem-solving students performed slightly better. There was no significant difference in mean academic achievement scores between male and female students, despite females showing a slightly higher mean gain. No significant interaction effect was found between gender and instructional strategies on students' academic achievement. The study concluded that both reciprocal and problem-solving instructional strategies are effective in enhancing students' academic achievement in Economics, and that gender does not significantly influence achievement or reaction to these strategies.

Keywords: Reciprocal and Problem-Solving Instructional Strategies, Students' Academic Achievement, Economics, Method of Teaching

Introduction

Economics is a crucial social science that helps individuals understand and navigate the complexities of the economic world. In Nigeria, economics education is included in the senior secondary school curriculum to prepare students for future academic pursuits and participation in the nation's economic development. However, students' academic achievement in economics at the senior secondary school level in Nigeria has been a concern due to improper teaching methodologies, lack of engaging learning environments, and the abstract nature of some economic concepts. Traditional teacher-centered approaches often fail to stimulate critical thinking, problem-solving abilities, and deeper understanding of economic principles, leading to disengagement, poor examination performance, and limited application of economic knowledge to real-world situations. To address this issue, educational researchers and practitioners have advocated for student-centered and interactive strategies, such as reciprocal teaching and problem-solving instruction.

An innovative instructional strategy that this study intends to investigate is the problem-solving instructional strategy. Problem-Solving theory and practice suggest that, thinking is more important in solving problem than knowledge, and that it is possible to teach thinking in situations where little or no knowledge of the problem is needed (Boris 2020). Problem-Solving strategy, can be defined as a process of organizing cognitive and effective behavioral processes towards a specific target, and closely related to creativity (Elif, 2018). Problem-Solving is to know what to do when you don't know what to do (Awodun,2020). This means that every step taken to solve problem will definitely lead to resolving the problem in question. Problem-Solving strategy is the process of investigation where the solution is not obvious to the investigator at the initial stage. Generally, Problem-Solving involves defining a problem, collecting information related to the solution process, reasoning through the problem state to the solution checking and evaluating the solution. Problem-Solving strategy is a means by which an individual uses previously acquired knowledge, skills and understanding to satisfy the demands of an unfamiliar situation (Awodun, 2020). According to Provost and Lemons (2016), Problem-solving is the process of making decisions in which students are presented with challenging tasks that cannot be solved automatically. The problem presented is not only about routine problem, but it reaches non-routine problems that needs high level skills. The purpose of problem-solving teaching process is providing environment where students interact with one another and learn how to solve problems by themselves with the guidance of a teacher or peers (Nozari & Siamian, 2014).

Operationally, problem solving instructional strategy is a teaching Strategy in which students use their previous knowledge of a concept in trying to bridge the gap or find information or solution to the present problem with the help or guidance of the teacher or peers. In this strategy, the problem solver thinks out solution to the problem by himself while he/she is assisted by the teacher who only guides by giving hints or suggestion as the need arises. The student must synthesize what they have learned and applied it to new and different situation. The existence of a problem implies that; the individual is confronted by something they do not recognize or cannot apply a model. According to Adegoke (2017), Problem-Solving skills cannot be inherited but can be learned and improved upon. That is to say, humans' effort is always needed in every problem-solving skill that is required to be learnt. Seven (7) steps for effective problem-solving strategies were highlighted to include: identifying the problem, defining goals, brainstorming, assessing alternatives, choosing the solution, active execution of the chosen solution, and evaluation (Awodun, 2020). Considering the nature of Economics in Secondary Schools, instructional strategies that is participatory and interesting is necessary to improve students' academic achievement. The effects of reciprocal and problem-solving instructional strategies on

students' academic achievement in secondary school Economics is part of what the researcher will investigate in this study, as to determine their efficacy.

Academic achievement is an important variable in this study, it is determined by the students' performance at the end of instructions basically after the evaluation exercise. Achievement connotes final accomplishment of something noteworthy or task, after much effort. It could mean something accomplished by means of skills or practice (Onah as cited in Hosea, 2015). It also refers to as something accomplished, especially by superior ability, special effort, great courage and perseverance. When a task or work is accomplished successfully by extension, skills or practice it becomes an achievement. Ebiefie (2015) defined achievement as a thing that students have done successfully especially using their own effort and skills. Operationally, achievement is a measure of the performance of an individual student in a subject(s) as symbolized by their score or marks in an achievement test. It could further be referred to as the learning outcome which has to do with the knowledge attained from teaching process. It is attained through persistence and dexterity (Osa-Edoh and Iyamu, 2012). In line with the foregoing, the researchers defined academic achievement as anything encompassing success that is related to education and founded on theoretical and practical learning. Academic achievement explains educational efforts of the students (Ugwuoke, 2014). Ernest-Ehibulu and Opuru (2013), buttressed that the yardstick for measuring students' level of academic achievement is by assessing the academic performance of the individual through tests. Also, Jimoh and Chibueze, (2018) saw academic achievement of students as the translation of the students' performance in the achievement test into scores obtained in a cognitive test. Academic achievement is a measure of knowledge acquired by students through the educational process. In this study, academic achievement usually manifests in test scores, grade point average and or certificate. It can also be defined as the quality of students' work and efforts in school subjects such as Economics. Academic achievement in this study refers to the students' performance in Economics tests and examinations.

However, despite the many benefits students could derive from studying Economics, students' academic achievement and interest in the subject continue to deteriorate yearly. In the West African Examination Council (WAEC) Chief Examiners Reports in the year (WAEC 2019, 2020, 2021 & 2022) respectively, the achievement of students in school subjects including Economics was described as poor. The poor achievement of students in Economics at secondary school level has been attributed to many factors such as; poor graphical analysis, the use of wrong terminologies, failure to expatiate points among others.

In the quest to unravel the reasons behind students' poor academic achievements, researchers such as Idika, Onuoha, Nji and Eze (2018) found out that students' poor academic achievement in Economics could be attributed to teachers' poor knowledge of the subject matter. Ede (2016) outlined other factors that necessitate poor achievement in Economics to include Mathematical Phobia, the use of unqualified teachers in teaching Economics, poor motivation of teachers, inadequate facilities and materials for teaching and learning, gender, distractions from internets and social media. Oleahbiele and Chukwu (2019) added that the persistent use of conventional method of teaching Economics brings about poor academic achievement of students in the subject and therefore recommended the use of innovative teaching Strategies.

Furthermore, WAEC Chief Examiners' Reports (2022), attributed the poor academic achievement of students generally in the West African Senior School Certificate Examination (WASSCE) in Nigeria to shallow knowledge of the subject matter, the use of wrong terminologies, poor graphical analysis, inability to explain listed points to attempt questions, incorrect interpretation of questions. But the most devastating factor is the instructional strategies

adopted by teachers in teaching, this could be attributed to teaching strategies Economics teachers employed in the implementation of economics contents in the classroom. The reports attributed the causes of students' poor achievement in Economics in particular to students' lack of mathematical manipulative skills, deficiency in graphical representation, analysis and application of Economics variables, failure to use correct Economics terminologies in answering questions, and inadequate preparation for the examination are also causes identified by the examiners. Researchers like Inuwa and Yusuf (2012) have found out that low academic achievement could be attributed to teachers' inability to apply innovative teaching strategy to their teaching. For example, the West African Examination Council (WAEC) annual reports shows that less than 50% of candidates passed Economics at credit level and above between 2019 and 2022 in Wukari education zone. This poor achievement of students in Economics could be a factor responsible for students' low interest in Economics, and a very good instructional strategy that is participatory in nature could arouse the student' interest in the subject identified in the literature.

Gender is a moderating variable in this study that the researcher sought to find out its effect on students' achievement in Economics when reciprocal and problem-solving instructional strategies are employed in teaching Economics. Lips (2017) defined gender as a set of role behaviors required of males and females in their thinking, actions and feelings. According to Russell (2012), gender can be seen as a different role, rights, and responsibilities of men, women and the relationship between them. Onah in Uchechukwu and Oluikpe (2017), noted that gender although it originates in objective biological divergences, goes far beyond physiological and biological specifics of the two sexes in terms of roles which they are expected to play. Woolfolk (2013) defined gender as traits and behaviors that a particular culture judges to be appropriate for men and women. Gender in this context is the opportunity of possessing male or female characteristics which also have connections with the behaviors of an individual. In the context of this study, gender is the biological differences between a male and female student either in cognitive, affective and psychomotor skills acquired in a particular class in a learning environment. It could also mean the behaviors of boys and girls towards educational activities in the classroom. Hence, it is essential that teachers use teaching strategy which ensures students' active involvement in learning and provide suitable learning environment to improve achievement of both male and female students who are of different age group/generation.

There are noticeable differences in the achievement patterns of male and female students in secondary schools over the years. Boys and Girls receive the same education and even though they use the same instructional strategies but their academic achievement differs (Weis et al 2013). This has been a major challenge facing researchers hence, results in academic achievement gap between male and female students in secondary schools. Males tend to perform better than females in mathematics and science subjects in secondary schools (Olasehinde & Olatoye 2014). Females are more inclined to arts subjects than males Chiu & Chow (2015). Researches have shown that there are reliable gender differences in cognitive functioning and achievement of students, such researchers as Titus, Dada and Adu (2016), Falode, Usman, Llobeneke, Mohammed, Godwin & Jimoh (2016), Odinko and Arikpo (2015) have their findings that male students scored higher than their female counterparts in Geography, Economics and Basic Science subjects. The study also showed that gender has no significant effect on students' academic achievement and interest when exposed to instructional strategies. These controversies on the interest, academic achievement and gender, as well as search for appropriate instructional strategies to be adopted in teaching Economics in the secondary schools has necessitated this study.

Theoretical Framework

The Gestalt theory of problem solving, proposed by Duncker and Wertheimer in 1945 and 1959, suggests that problem solving occurs with a flash of insight. Insight occurs when a problem solver moves from not knowing how to solve a problem to knowing how to solve it. During insight, problem solvers devise a way of representing the problem that enables solution. Gestalt psychologists suggest that insight involves building a schema that fits all parts together and reorganizing visual information to solve the problem. It also involves restating a problem's givens or goal in a new way, removing mental blocks, and finding a problem analogue. Problem solving often involves formulating new answers and going beyond the simple application of previously learned rules. Gestalt theory aims to teach students how to represent problems, which is crucial in Economics. Insights contribute to understanding that circumstances affecting a problem will differ from those of another problem. This theory is relevant to this study as it helps students and teachers reorganize visual information and solve problems.

Empirical Review

Studies on Problem-solving Instructional Strategy and Student's Academic Achievement were reviewed such as Onuoha, Okechukwu, Okoye-ogbalu, Onah, and Enebe (2018) who sought to compare the effectiveness of problem-solving and future-wheel instructional strategies on students' achievement in senior secondary school Economics in Nsukka, Nigeria. The research involved 3,395 students, with 600 selected using multi-stage sampling. The results showed that problem-solving strategies led to higher achievement than future-wheel strategies, and gender had a significant interaction effect. The study is related to a previous review that used a quasi-experimental research design but focused on students' achievement, highlighting the need for a more comprehensive study. Another study by Serap, Gamze, and Mustafa (2010) examined the impact of problem-solving instructional strategies on students' Physics problem-solving performance and strategy usage. The research involved 77 second-year Mathematics Education specialist undergraduate students from Buca Faculty of Education, Primary School Education Department. The results showed that teaching problem-solving strategies positively impacted performance and strategy usage. The study, conducted in Nigeria, aimed to bridge the gap between the reviewed work in Physics and the current research in secondary school Economics, focusing on reciprocal and problem-solving instructional strategies.

Umunna and Ebenebe's (2020) study examined the impact of Problem Solving Strategy on academic achievement in reading comprehension compared to a control group. The study used a quasi-non-randomized, pretest-posttest control group design and a reading comprehension Achievement Test. The results showed a significant difference in achievement between students taught with problem-solving strategies and those taught with conventional read and re-read approaches. The present study, which focused on economics, used the same method and ANCOVA to test hypotheses. The study also considered the interaction effect between treatment and gender and students' interest in learning, which was not considered in the reviewed study.

Asrat and Gebremedhin's (2020) study examined the impact of problem-solving teaching methods on physics achievement in Ethiopian elementary school students. The study used a quasi-experimental research design with control and experimental groups. The population consisted of 1,063 grade 8 physics students from four full cycle elementary schools. The study found a significant difference in mean scores between students taught by problem-solving and those taught by lecture. The experimental group demonstrated better performance than the control group. The study suggests that problem-solving teaching methods positively impact students' achievements, promoting active participation and understanding of basic concepts. The current study, conducted in Nigeria, differs from the previous study, which focused on physics, and does not consider the interaction effect between treatment and gender. The study aims to bridge gaps in the literature on problem-solving teaching methods.

Studies on gender and student's academic achievement were also reviewed such as Titus, Dada, and Adu (2016) who studied the correlation between school location and gender in senior secondary school students' economic achievement in Nigeria. The study involved 640 students, with a sample of 640 selected using stratified random sampling. The results showed that students' performance in Economics was below average, particularly those near border towns. Male students scored higher than female counterparts. The present study focused on the effect of reciprocal and problem-solving instructional strategies on students' academic achievement and interest. The study used Economics Achievement Test and Economics Interest Scale as data collection instruments. The results were analyzed using Pearson Product Moment Correlation and Inferential statistics of T-test. Falode, Usman, Ilobeneke, Mohammed, Godwin, and Jimoh (2016) conducted a study on improving secondary school Geography students' positive attitude towards map reading through computer simulation instructional package in Bida, Niger State, Nigeria. The study used a quasi-experimental design and 160 students from co-educational senior secondary schools. The findings showed that computer simulation instructional package improved Geography students' attitude towards map reading, but gender had no significant influence. The present study was more interactive due to the interactive nature of the instructional strategy and students' interaction with their fellow students. The statistical tools used in the reviewed study were helpful in the present study

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Odinko and Arikpo (2015) conducted a study on the effect of gender on primary five pupils' achievement in Basic Science using computer-assisted instruction in Ibadan, Oyo State, Nigeria. The study used a pre-test, post-test control group non-randomized quasi-experimental design with 2x2x2 factorial design. The results showed that those exposed to computer-assisted instruction had higher post-achievement mean scores in Basic Science than those in the conventional group. However, there was no significant main effect of gender on pupils' achievement in Basic Science. The interaction effect of treatment and gender did not influence the achievement of participants in Basic Sciences. The present study uses reciprocal and problem-solving instructional strategies, while the reviewed study used computer-assisted instruction. The data collected was analyzed using ANCOVA, Sidak test, and graphical illustrations. The study also used interest as a variable, but the review study did not consider interest. The present study adopted the same research design but differed in focus, instrument, and subject choice.

Statement of the Problem

Research indicates that conventional teaching strategies often lead to poor academic achievement, especially in Economics. This is not challenging for 21st-century learners, but there is a need for a positive change in students' interest and academic achievement. The subject was designed as a learner-centered and activity-oriented curriculum, but many teachers still deliver lessons through a "talk and chalk" approach, resulting in a lack of interest and enthusiasm. This approach is inconsistent with social science teaching's emphasis on learner-centered pedagogy, leading to high failure rates in Economics in Senior Secondary School Examinations. To address this issue, a study is needed to investigate the effects of reciprocal and problem-solving instructional strategies on students' academic achievement and interest in Economics lessons.

As a result of ineffectiveness of conventional strategy, it is therefore essential to carry out this study in Economics to find out the effects of reciprocal and problem-solving instructional strategies on students' academic achievement and interest, and if efficacious to be recommended as an appropriate instructional strategy for Economics lessons. The rationale for the choice of the above instructional strategies is due to the fact that, researchers like Ede and Uchenna (2018),

Alli (2019), Serap, Gamze and Mustafa (2010) have proven it to be effective in other subjects like English, Language, Physics, Econometric, but none to the best of the researcher's knowledge has been conducted in Economics as a subject area. Hence the need for this study.

Research Objectives

The general purpose of this study was to compare the effects of reciprocal and problem-solving instructional strategies on students' academic achievement in senior Secondary School Economics in Wukari Education Zone, Taraba State. Specifically, the study sought to find out:

1. The difference in the mean ($\bar{x}$) academic achievement scores of students taught Economics using the reciprocal and problem solving strategies.
2. The difference in the mean ($\bar{x}$) academic achievement of male and female students in Economics.
3. The interaction effect of gender and two strategies on students' academic achievement in Economics.

Research Questions

The following research questions guided the study.

1. What is the difference in the mean ($\bar{x}$) academic achievement scores of students taught Economics using the reciprocal and problem solving strategies?
2. What is the difference in the mean ($\bar{x}$) academic achievement scores of male and female students in Economics?
3. What is the interaction effect of gender and two strategies on students' academic achievement in Economics?

Hypotheses

The following null hypotheses were formulated to guide the study and were tested at 0.05 level of significance.

Ho_1: There is no significant difference in the mean ($\bar{x}$) academic achievement score of students taught Economics using reciprocal and problem solving strategies.

Ho_2: There is no significant difference in the mean ($\bar{x}$) academic achievement scores of male and female students in Economics.

Ho_3: There is no significant interaction effect of gender and the strategies on mean academic achievement scores of students' in Economics.

Methodology

This study used a quasi-experimental research design, involving a two by two (2x2) factorial pre-test, post-test design. The design involved random assignment of intact classes to treatments, not individual students. Nworgu (2015) defined quasi-experimental design as an experiment that does not involve random assignment of subjects to experimental and control groups. The study included 975 Senior Secondary School II Economics students from 30 public secondary schools in Wukari Education Zone, Taraba State, Nigeria. The population consisted of 181 SS II Economics students in Ibi Local Government Area and 794 SS II Economics students in Wukari Local Government Area. The study was chosen because the students were not preparing for external examinations, allowing time for the researcher during experimental sessions.

Sample and Sampling Technique

The study involved 92 SS II Economics students from four intact classes from four secondary schools. A multistage sampling procedure was used, with four Co-educational Secondary Schools randomly selected from 30 public schools in Wukari Education Zone and two intact classes from Ibi LGA. Gender was an intervening variable in the study. One intact class was sampled from each school using simple random sampling. The instructional strategies were assigned to the selected classes in order of their numbers, with the two strategies being Reciprocal and Problem-solving.

Instrument for Data Collection

The research used Economics Achievement Test (EAT) to assess the learning outcomes of SS II Economics students before and after an experimental treatment with each answer earning one mark. The EAT, consisting of 30 multiple-choice questions with response options, was developed by the researcher. Lesson plans were designed based on reciprocal and problem-solving instructional strategies.

Validation of Instruments

The Economics Achievement Test (EAT) underwent face and content validations. Face validation involved experts from the University of Nigeria, Nsukka checking wordings, language expressions, marking scheme, hypotheses, research questions, and lesson plans for SS II Economics Students. Content validity was assessed using test blue print, considering percentage weighting and objectives of each concept. The EAT was tested and analyzed based on total scores from trial testing. The final version of the EAT was based on test items satisfying psychometric quality, with item difficulty not considered. Lesson plans were face validated by three experts from the University of Nigeria, Nsukka, examining content coverage, clarity of objectives, adequacy of materials, students' activities, and appropriateness of evaluation items. The cognitive level of Bloom's taxonomy was replaced with a revised version, content levels should be given percentages, and problem-solving instructional strategies should be included. The final version of the instruments, lesson plans, and research questions was created.

Reliability of the Instruments

This study used the EAT to pilot-test on thirty students from Government Day Secondary School Kumbo, SS II in Taraba State. The K-R 20 method was used to establish an internal consistency coefficient of 0.71 for the EAT instrument. The researcher conducted an experiment in four sampled schools, involving four Economics teachers as research assistants. The first week involved training the assistants and administering a pre-test. After the training, a microteaching exercise was conducted to assess the usage of the research instruments and lesson plans. The researcher assigned the assistants to two groups: one taught Economics using Reciprocal Instructional Strategy and the other taught Economics using Problem Solving Instructional Strategy. After three weeks of treatment administration, the researcher administered EAT to all students in both groups, aiming to determine the effect of treatments on the subjects. To control extraneous variables, the researcher assigned two different schools to each group, eliminated experimental bias, and designate two sessions per week during treatment administration. The teacher variable was ensured by preparing lesson plans, discussing them extensively, and administering and scoring pre-tests and post-tests. The effect of pre-test on post-test was minimized by an interval of four weeks. The researcher also used four different schools to avoid interaction between students in the experimental groups.

Method of Data Analysis

The study used SPSS version 20 to analyze data, using descriptive statistics of mean and standard deviation to answer research questions. ANCOVA was used to test hypotheses at a 0.05 level of significance, considering group variations between experimental groups, which could have been a limitation of the study.

RESULTS

Research Question One

What is the difference in the mean academic achievement scores of Students taught Economics using the reciprocal and problem solving strategies?

Table 1: **Mean and standard deviation of achievement scores of students taught Economics using the reciprocal and problem solving strategies**

Strategies		Pretest		Post-test		
	N	$\bar{x}$	SD	$\bar{x}$	SD	Mean Difference
Reciprocal	38	8.16	1.94	20.97	3.49	12.81
Problem Solving	54	7.80	2.65	21.48	3.08	13.68

Results in Table 1 shows the mean achievement scores of students taught Economics using the reciprocal and problem solving strategies. Students who were exposed to reciprocal strategy had a mean achievement score of ($\bar{x}$ = 8.16, SD = 1.94) at the pretest and a mean achievement score of ($\bar{x}$ = 20.97, SD = 3.49) at the posttest with a mean difference of 12.81, whereas those exposed to problem solving strategy had a mean achievement score of ($\bar{x}$ = 7.80, SD = 2.65) at the pretest and a mean achievement score of ($\bar{x}$ = 21.48, SD = 3.08) at the posttest with a mean difference of 13.68. The result shows that the academic achievement of students exposed to the two strategies improved with mean differences of 12.81 and 13.68 for those exposed to reciprocal strategy and problem solving strategy respectively. The students exposed to problem solving strategy performed slightly better than those exposed to reciprocal strategy.

Hypothesis One

$H0_1$: There is no significant difference in the mean academic achievement score of students taught Economics using reciprocal and problem solving strategies.

Table 2: Analysis of covariance (ANCOVA) of the difference in the mean achievement score of students taught Economics using reciprocal and problem solving strategies

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Dec. (at œ = 0.05)
Corrected Model	30.202[a]	4	7.551	.708	.589	.032	
Intercept	3874.146	1	3874.146	363.200	.000	.807	
PRETEST	23.508	1	23.508	2.204	.141	.025	
Strategy	4.436	1	4.436	.416	.521	.005	NS
GENDER	.181	1	.181	.017	.897	.000	NS
Strategy * Gender	.234	1	.234	.022	.883	.000	NS
Error	928.004	87	10.667				
Total	42587.000	92					
Corrected Total	958.207	91					

Note: S = Significant, NS = Not Significant, Dec. = Decision

The result in Table 2 shows that an F-ratio of (F (1, 92) = .416, p=.521, η^2_p = .005) was obtained for the difference in the mean achievement score of students taught Economics using reciprocal and problem solving strategies. Since the associated probability value of .521 is greater than the 0.05 level of significance at which the null hypothesis was set to be tested, the null hypothesis, which stated that there is no significant difference in the mean academic achievement score of students taught Economics using reciprocal and problem solving strategies, is accepted. Thus,

the inference drawn is that there is no significant difference in the mean academic achievement score of students taught Economics using reciprocal and problem solving strategies. This can be construed to mean that the two strategies proved to be effective in teaching students in Economics. The result further showed an effect size of (η^2_p = .005), which indicates that only 0.5% of the variance in achievement of students in Economics can be explained by the two strategies.

Research Question Two

What is the difference in the mean academic achievement scores of male and female students in Economics?

Table 3: **Mean achievement scores of male and female students in Economics**

Gender		**Pre-test**		**Post-test**		
	N	$\bar{x}$	**SD**	$\bar{x}$	**SD**	**Mean Difference**
Male	59	8.05	2.51	21.22	3.42	13.17
Female	33	7.76	2.14	21.36	2.95	13.60

The result in Table 3 shows the mean academic achievement scores of male and female students in Economics. The male students had a pretest mean academic achievement score of ($\bar{x}$ = 8.05, SD = 2.51), and a posttest mean academic achievement score of ($\bar{x}$ = 21.22, SD = 3.42). The mean difference for the male students was 13.17. The female students on the other hand had a mean academic achievement score of ($\bar{x}$ = 7.76, SD = 2.14) at pretest and a mean achievement score of ($\bar{x}$ = 21.36, SD = 2.95) at posttest. The mean difference for the female students was 13.60. Female students taught Economics had a slightly higher mean gain on their academic achievement than their male counterparts, according to the finding.

H0$_2$: There is no significant difference in the mean academic achievement scores of male and female students in Economics.

The result in Table 2 also shows the significant difference in the mean academic achievement scores of male and female students in Economics. The result shows that an F-ratio of (F (1, 92) =. 017, p=.897, η^2_p = .000) was obtained. Since the associated probability value of .897 is greater than the threshold of 0.05 set as the level of significance, the null hypothesis, which stated that there is no significant difference in the mean academic achievement scores of male and female students in Economics, is not rejected. Thus, inference drawn is that the difference in the mean academic achievement scores of male and female students in Economics is not statistically significant. The result further showed the effect size of (η^2_p = .000), which indicates that 0% variance in achievement of students' in Economics can be explained by gender. This implies that gender is not a significant factor in determining academic achievement of students in Economics.

Research Question Three

What is the interaction effect of gender and two strategies on students' academic achievement in Economics?

Table 4: **Interaction effect of two strategies and gender on students' academic achievement in Economics**

Strategies	**Gender**	**Post-test**		
		N	$\bar{x}$	**SD**
Reciprocal	Male	23	20.96	3.70
	Female	15	21.00	3.27
Problem Solving	Male	36	21.39	3.28
	Female	18	21.67	2.70

The result in Table 4 shows the interaction effect of gender and two strategies on students' academic achievement in Economics. The posttest mean achievement score of male students exposed to reciprocal strategy was ($\bar{x}$ = 20.96, SD = 3.70). The female students exposed to reciprocal strategy had a posttest mean achievement score of ($\bar{x}$ = 21.00, SD = 3.27). The result in Table 7 also shows that male students exposed to problem solving strategy had a mean achievement score of ($\bar{x}$ = 21.39, SD = 3.28) at the posttest. At the posttest also, female students exposed to problem solving strategy had a mean achievement score of ($\bar{x}$ = 21.67, SD = 2.70). The result shows a slight mean difference between male and female students exposed to reciprocal strategy in favor of the male. Similarly, the result shows a slight mean difference between male and female students exposed to problem solving strategy in favor of the female. This prompted further analysis of the interaction effect using an inferential statistic.

Hypothesis Three

$H0_3$: There is no significant interaction effect of gender and two strategies on the mean academic achievement scores of students' in Economics.

The result in Table 2 shows that an F-ratio of (F (1, 92) = .002, p = .883) was obtained for the interaction effect of gender and two strategies on the mean academic achievement scores of students' in Economics. Since the associated probability value of .883 is greater than the threshold of 0.05 set as the level of significance, the null hypothesis, which stated that there is no significant interaction effect of gender and two strategies on the mean academic achievement scores of students' in Economics, is not rejected. Thus, the inference drawn is that the interaction effect of gender and two strategies on the mean academic achievement scores of students' in Economics is not statically significant. Figure 2 also revealed that there was no significant interaction effect of gender and two strategies on the mean academic achievement scores of students' in Economics. This is evident as the lines drawn against gender and the two strategies do not intersect at any point on the graph. The graph is shown below.

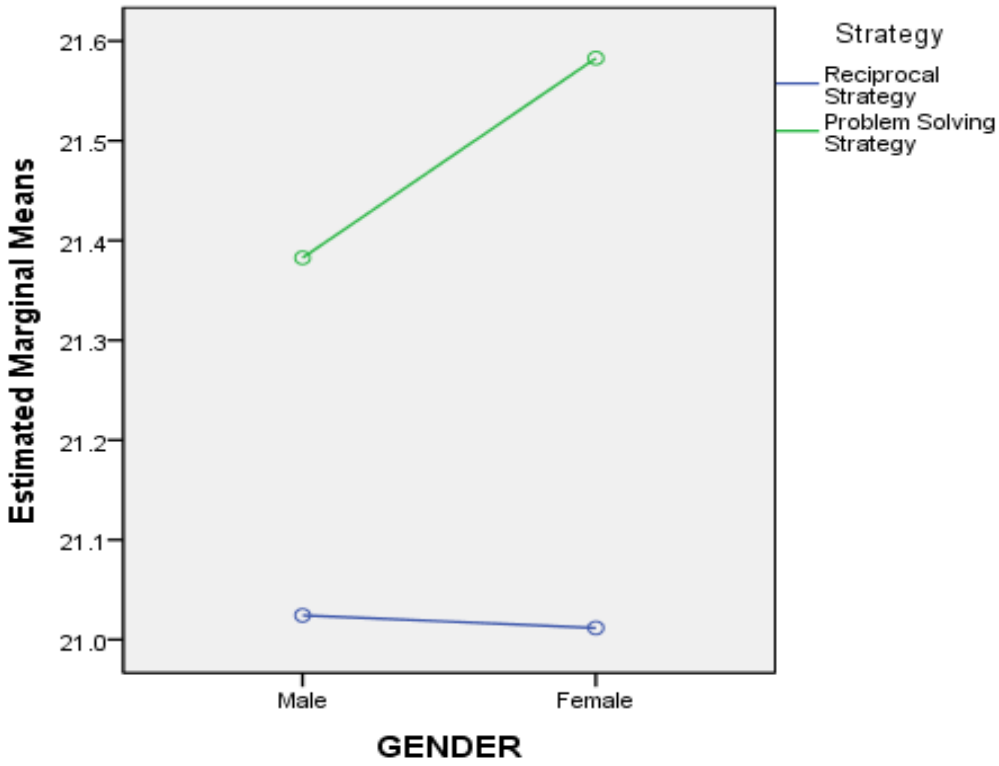

Fig. 1. Interaction effect of gender and two strategies on the mean academic achievement scores of students' in Economics

Summary of Findings

From data analysis and interpretation of results, the following findings emerged.

1. The result of the study showed that students exposed to problem solving strategy performed slightly better than those exposed to reciprocal strategy. However, there is no significant difference in the mean academic achievement score of students taught Economics using reciprocal and problem solving strategies.
2. The result showed that female students taught Economics had a slightly higher mean gain on their academic achievement than their male counterparts. However, the difference in the mean academic achievement scores of male and female students in Economics is not statistically significant.
3. The result showed a slight mean difference between male and female students exposed to reciprocal strategy in favor of the male. Also, the result shows a slight mean difference between male and female students exposed to problem solving strategy in favor of the female. However, the interaction effect of gender and two strategies on the mean academic achievement scores of students' in Economics is not statically significant.

Discussion of Findings

Effect of Reciprocal and Problem-Solving Instructional Strategies on Students' Academic Achievement in Secondary Schools Economics.

The finding of the study revealed that the academic achievement of students exposed to the two strategies improved, however, students exposed to problem-solving strategy had a slightly higher mean academic achievement scores than those exposed to reciprocal strategy. The result of the study revealed no significant difference in the mean academic achievement scores of students taught Economics using reciprocal and problem solving instructional strategies as shown in the result represented in Table 2. This implies that the reciprocal and problem solving instructional strategies are both effective in enhancing the academic achievement of secondary school Economics' students. The findings of the study may be as a result of students' active participation in the Reciprocal and Problem Solving Instructional Strategies. This encourages collaboration in teaching and learning process.

The finding of the study is consistent with that of Ede and Uchenna (2018), who carried out research on the effects of reciprocal teaching method on undergraduate students' academic achievement in Econometric concept and found, among other things, that reciprocal teaching method has effect on students' achievement in Econometric concept. The result is also in consistent with Ogunyebi (2018), who carried out a study on the effects of reciprocal instructional strategy on junior secondary school students' performance in Basic Science and found, among other things, that there was a significant difference between the post-test mean scores of students exposed to reciprocal instructional strategy and conventional strategy in favour of the reciprocal strategy. In terms of problem solving instructional strategy, the finding of this study is consistent with that of Serap, Gamze, and Mustafa (2010), who revealed that the teaching of the problem solving instructional strategy had a positive effect on the Physics problem solving performance and strategy used. The findings of this study therefore provide empirical evidence that reciprocal and problem solving instructional strategies are effective in enhancing the achievement of secondary school Economics students.

Influence of Gender on students' Academic Achievement in Secondary School Economics.

The findings of this study on the effect of gender on student's academic achievement in secondary school Economics (when both strategies are used) showed that female students had higher mean academic achievement scores than the male students. The result also revealed that there is no significant difference for both boys and girls on mean achievement scores. The result of the study revealed that gender does not significantly influence the mean achievement scores of secondary school students in Economics. This implies that gender is not a significant factor in determining the achievement of secondary school students in Economics. This may be as a result of the fact that both male and female students in Economics were exposed to same learning and testing condition during experiment. This provides a plane ground for both male and female students in Economics to achieve high scores irrespective of their gender.

This study's findings are consistent with those of Falode, Usman, Ilobeneke, Mohammed, Godwin and Jimoh (2016) who carried out a research on improving secondary school Geography students' positive attitude towards map reading through computer simulation instructional package in Bida, Niger State, Nigeria. The study also considered gender on students' attitude and discovered no gender bias. According to the researchers, there was no significant difference in the performance of male and female students. The result of this study also agree with those of Odinko and Arikpo's (2015) finding that there was no significant difference between the mean achievement scores of male and female students taught Basic Science using computer assisted instruction. However, the result is not in agreement with Odagboyi (2015), who investigated the effect of gender on the achievement of students in Biology and found out that there was a significant difference in the mean scores of male and female students. This implies that boys performed better than girls. This controversy has remained unresolved as research findings have cumulatively indicated contradicting evidence of the academic achievement of students in Economics due to gender.

Interaction effect of treatment and Gender on Students' Academic Achievement in Secondary School Economics

The finding of the study revealed that the interaction effect of two instructional strategies and gender on the mean achievement scores of secondary school students in Economics is not statistically significant. This implies that gender does not influence reactions to any of the instructional strategies. The lack of significant interaction effect of two instructional strategies and gender could be as a result of exposing both male and female students in secondary school Economics to the same treatment conditions at the same time.

The result of this study is supported by the result in Figure 2, which revealed that there was no significant interaction effect of two instructional strategies and on the mean achievement scores of secondary school students in Economics. This is because the lines drawn against the two instructional strategies and gender do not intersect at a point. The result is also consistent with Onuoha et al., (2018), who examined the effects of reflection method on the Economics students' achievement in senior secondary schools, and found among other that interaction effect of reflection method and gender on students' achievement in Economics subject was not statistically significant. This means that reflection method did not favour one group of students (i.e. male or female). This shows that reflection method is not gender bias. Hence, the findings of this study have added to the empirical evidence that there is no significant interaction effect of two instructional strategies and gender on the mean academic achievement scores of students, especially those in Economics.

Conclusion

Based on the findings of the study on the effect of reciprocal and problem solving instructional strategies on students' academic achievement and interest in secondary school Economics, it is therefore concluded that the reciprocal and problem solving instructional strategies are both effective in enhancing the academic achievement and interest of secondary school students in Economics. The study also concludes that gender do not significantly influence the mean achievement scores and mean interest rating scores of secondary school students in Economics. This implies that gender is not a significant factor in determining the achievement and interest of secondary school students in Economics. More so, the study concludes that gender do not influence reaction to reciprocal and problem solving instructional strategies among students in Economics.

Educational Implication of the Findings of the Study

Based on the conclusions from the findings, educational implications of the findings are stated as they concern to teachers, students and curriculum planners.

1. The implication of these findings to the teachers is that teachers will be encouraged to use reciprocal and problem solving instructional strategies in teaching Economics since it has proved to enhance students' academic achievement and interest.
2. The students of Economics would from the findings of the study find that both males and females can do well in the subject Economics and would stop thinking that Economics is reserved either for males or females. Thus, the findings of the study would help reduce gender stereotipism in the teaching and learning of Economics in secondary schools. Moreover, the findings of this study would encourage the students to face the challenges involve in studying Economics without thinking that Economics is a difficult subject.
3. To the curriculum planners, since innovative instructional strategies have been introduced in educational system, the findings of this study will encourage them to incorporate the reciprocal and problem solving instructional strategies in the Economics curriculum and other innovative technique.

Recommendation

On the basis of the findings and implications of this study, the following recommendations were made:

1. Government should organize workshops, conferences and seminars for Economics teachers. This will help in sensitizing them on the use of reciprocal and problem solving instructional strategies in teaching students in secondary school Economics.
2. Curriculum planners should incorporate the use of reciprocal and problem solving instructional strategies in teaching Economics during curriculum planning. This would help in developing a flexible curriculum that will support the use of reciprocal and problem solving instructional strategies in secondary schools. Consequently, students in Economics class would not be left out during instructions as the study revealed that reciprocal and problem solving instructional strategies enhance their achievement.
3. Students should be made to understand their roles by the teacher during reciprocal and problem solving based Economics instruction. This is because, reciprocal and problem solving instructional strategies are learner-cantered instructional approach. Therefore, getting students to understand their roles would facilitate the efficacy of reciprocal and problem solving instructional strategies in Economics instructions.

4. Quiz competition should be organized more often by schools to provide opportunities for students to compete among themselves irrespective of their gender.
5. Parents, guardians and caregivers should avoid segregation when it comes to providing education opportunities for children regardless of their sex.

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