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**ASSESSMENT OF ACADEMIC PERFORMANCE AND
INTEREST IN ALGEBRAIC PROCESS USING THINK-
PAIR-SHARE STRATEGY AMONG SECONDARY
SCHOOL STUDENTS IN KATSINA ZONAL
EDUCATION QUALITY ASSURANCE.**

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BY

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Abstract

This study Assess the Academic Performance and Interest in Algebraic Process using Think Pair Share Strategy among Secondary School Student's in Katsina Zonal Education Quality Assurance of Katsina state, Nigeria. Two Objectives and Research Question were generated to guide the investigation. Also, Two Hypotheses were postulated and tested at 0.05 level of significant. The study sample was 164 SSII students' which were selected from the population of seventeen thousand five and seventy two (17572) students of all public senior secondary school Katsina zonal education quality assurance using intact classroom. The study was adopt quasi-experimental design and two instruments Algebraic Process Performance Tests (APPT) and Mathematics Interest Questionnaire (MIQ) was developed and adopted which is valid and reliability coefficient obtained are 0.703 and 0.725 respectively using Cronbach alpha. Descriptive statistics (mean, standard deviation and mean rank) were used to address the research questions and inferential statistic (independent samples t-test and Mann Whitney U-test) was used to test the hypotheses at $\alpha = 0.05$. The findings of the study led to the conclusion that, students taught algebra using Think-Pair-Share strategy performed significantly higher than their counterparts taught using lecture method. It was recommended that, the think Pair Share strategy should be incorporated into the teaching and learning of Mathematics at the Senior Secondary School level.

Keys: Think Pair Share strategy, Algebraic Process, Interest.

Introduction

The science curricula materials advocated the teaching of science education through investigative approaches. These approaches include strategies like cooperative learning, constructivism and guided discovery. All these approaches emphasize active learning by the learner. The cognitive factor of students and teachers, the availability of learning resource, and instructional strategies adopted by the teacher have been identified as some of the factors that determine the performance of students in Mathematic (Nwosu as cited in Salihu, 2015).

The main objective of teaching mathematics at secondary school level in Nigeria is to produce persons who will be numerate, orderly, logical, accurate and precise in thought. It is emphasized that certain content in the syllabus be covered, and specific concepts and skills be mastered by secondary school students. Four basic goals for teaching mathematics have been identified as: utilitarian, personal development, economic growth, and cultural values (Yara & Otieno, 2010). Mathematics involves a logical expression of the relationships that exist among the measurable quantities of time and space in the universe, presented in compact and simple codes (Elaine, 2013).

Mathematics is a logical way of thinking that aims at solving personal and societal problems; and it has timely improved our communication, accommodation, production and recreational activities. Thus, Mathematics remains the master key to effectively unlock the secrets of other bodies of knowledge.

Rizqi and Surya (2017) reported that, one of the purposes of Mathematics learning in school is to train students in thinking and reasoning in reaching conclusions, develop the ability to solve problems, and develop the ability to provide information or communicate ideas through speech, writing, pictures, graphs, maps, diagrams, etc. The teaching and learning of mathematics is essential in both primary and secondary school Mathematics as it makes available to students a vital source of visualization which aids the understanding of statistics, arithmetic and algebraic concepts (Mamali, 2015).

Algebra is defined as the domain consisting of operating on and with the letters, transformation of expressions with letters, formal and generalized understanding of rules and properties of operations, and using the letter for representing, proving and generalizing (Banerjee & Subramaniam, 2012). Algebra as a gatekeeper of mathematics is one of the areas of mathematics in which students have major problems (Akinsola, & Awofala, 2008) and the understanding of many mathematical concepts is prerequisite to learning algebra.

Algebra has a wide range of applications in engineering and technology for simulation study and product development. However, students generally find it difficult to learn and apply. With a view to make the course interesting and to increase its applicability in real life domain, a new strategies need to be merged in teaching-learning process. Therefore, there is need to look for a teaching strategy that will address the individual learners' needs especially in understanding the real life application and concept assimilation of mathematics such as Think-pair-share strategy.

Think-pair-share is a cooperative discussion strategy developed by Frank Lyman and his colleagues in Maryland in 1981. It gets its name from the three stages of student action, with

emphasis on what students are to be doing at each of those stages. Think-pair-share (TPS) is a collaborative learning strategy where students work together to solve a problem or answer a question about an assigned reading.

According to Lyman in Abdurrahman (2015) think-pair-share is a strategy designed to provide students to think on a given topic by enabling them to formulate individual ideas and share the ideas with another student. To implement the think-pair-share cooperative strategy, the teacher poses a question, preferably one demanding analysis, evaluation, or synthesis, and gives students about one minute to think through the appropriate responses to the teacher's questions in the teaching and learning process. Students then turn to a partner and share their responses. During the third step, student's responses can be shared within a four-person learning team, within a larger group, or with an entire class during a follow-up discussion (Abdurrahman, 2015).

Think-Pair-Share activity is very effective and popular for use by instructors of large classes. This technique engages the entire class, motivate students and promote higher-level thinking. The use of the strategy unites the cognitive and social aspects of learning, promoting the development of thinking and increase academic performance.

Academic performance is a situation when students are required to maintain a satisfactory record and meet the obligations of the courses in which they are enrolled (Harvard University, 2015). The problem of poor performance of students could be attributed to poor foundation in Mathematics from junior classes. As a result, the students at senior classes find it difficult to handle with the idea at this level. This difficulty could be connected with poor teaching methods employed by teachers. These poor teaching methods could lead to lack of retention on the part of the learner.

However, students' interest could be aroused and released through an appropriate teaching method. Learning could be made more effective, lasting and enjoyable and topics that are abstract to students could be made clearer, easier and meaningful for better achievement of the concept learnt.

Interest is a subjective feeling of intentness or curiosity over something, the interest in a particular thing is a feeling manifested in an activity (Usman, & Nwabueze, (2011).

Statement of the Problem

Many students struggle to learn mathematics and often do not achieve success through their learning. This may stem from the fact that; they do not construct appropriate understanding of fundamental mathematics concepts through their learning strategies. Reports from the WAEC Chief examiners (Mathematics) from May/June 2011 to May/June 2018 SSCE shows the weaknesses of students in Algebra theme ranging from word problems leading to simple linear equation, algebraic graph, reading/answering from the graph, interpretation/solution to word problems, translation of word problems into mathematical expressions, inequality and graphical solutions to quadratic equations. Mathematics result analysis from those periods (May/June 2011 to May/June 2018 SSCE) also shows that students' performance in mathematics has been fluctuating.

Algebra as a bridge between themes in mathematics is one of the areas of mathematics in which students have major problems. The knowledge of Algebra and its correct application help both individuals and nations to solve everyday problems. In spite of the role played by Algebra in the development of science and the current efforts in mathematics instruction, there is still persistent poor performance of students in that area (Usman & Musa 2019) meanwhile, due to students' poor performance in algebra, it appears that various interactive tasks, approaches, and instructional methods are required for teaching and learning algebraic processes in classrooms (Azuka, Jekayinfa, Durojaiye & Okwuoza, 2013). This has been shown to be inefficient and has not produced the anticipated outcomes. This research work was designed to assess the academic Performance and Interest in Algebraic process using Think-Pair-Share Strategy among Secondary School Students in Katsina Zonal Quality Education Assurance.

Objectives of the Study

The main objective of this study is to assess academic performance and interest in Algebraic process using think-pair-share strategy among secondary school students in Katsina zonal education quality assurance. Specifically, the study intends to:

1. examine the difference between the Academic Performances of Students taught Algebra using Think Pair-Share Strategy and those taught using lecture Method.
2. determine the difference between the mean rank interest scores of students taught Algebra using Think Pair-Share Strategy.

Research Question

The study was guided by the following research questions:

1. What is the difference between the mean performance scores of students taught Algebra using Think Pair-Share Strategy and those taught using lecture method?
2. What is the difference between the mean rank interest score of students taught Algebra using Think Pair-Share Strategy?

Research Hypotheses

H₀₁: There is no significant difference between the mean performance scores of students taught Algebra using Think Pair-Share Strategy and those taught using lecture method.

H₀₂: There is no significant difference between the mean rank interest score of students taught Algebra using Think Pair-Share Strategy.

METHODOLOGY

The study employ a quasi-experimental research design which has to do with pre-test, post-test, post-posttest and non-equivalent control group. It is a non-equivalent control group quasi-experimental design because intact classes were used for the different experimental treatments and control groups. Pre-test was initially administered to the Students in the two groups before the treatment. Think-pair-share strategy was used in the first group; while the Lecture Method of

teaching were adopted in the second group which serve as control. At the end of the six-week treatment, a post-test was conducted in these two groups. The two groups (experimental and control groups) was pre-tested using Algebraic Processes Performance Test (APPT), in order to identify and determine their equivalence (ability) level. 164 students was used in this study and the teaching last for six weeks.

The study sample of 164 SSII students' which were selected from the population of seventeen thousand five and seventy two (17572) students of all public senior secondary school Katsina zonal education quality assurance using intact classroom. Two instruments Algebraic Process Performance Tests (APPT) and Mathematics Interest Questionnaire (MIQ) was developed and adopted which is valid and the reliability coefficient obtained are 0.703 and 0.725 respectively using Cronbach alpha. Descriptive statistics (mean, standard deviation and mean rank) were used to address the research questions and inferential statistic (independent samples t-test and Mann Whitney U-test) was used to test the hypothesis at $\alpha = 0.05$.

RESULTS AND DISCUSSION

Research Question 1: What is the difference between the mean performance scores of students taught Algebra using Think Pair-Share Strategy and those taught using lecture method?

Table 1: Mean and Standard Deviation of Algebraic Performance Posttest Score for Think-Pair-Share Strategy and Lecture.

Group	N	Mean	Std. Dev.	Mean difference
Experimental Group	71	21.42	3.500	6.917
Control Group	93	14.51	3.5749	

In order to answer this research question, the scores of student's performance on Algebraic process performance test were analyzed using mean and standard deviation.

Table 1 showed that the mean score of the experimental group (think-pair-share strategy) and that of control group (lecture) were 21.42 and 14.51 respectively with the mean difference of 6.917.

Hence, the students taught algebraic process using think-pair-share strategy performed better than those taught using control group.

Research Question 2: What is the difference between the mean rank interest score of students taught Algebra using Think Pair-Share Strategy?

Table 2: Mean Ranks of students' Interest Scores toward Algebra between the Experimental Group and Control Group.

Group	N	Mean Rank	Sum of Ranks	Mean Ranks Diff.
Experimental Group	71	106.39	7554.00	42.13
Control Group	93	64.26	5976.00	
Total	164			

Table 2 showed that the mean rank of students Interest score of experimental group is (106.39) and that of control group is (64.26). The table indicate that, there is difference between the mean ranks between the Experimental Group (think-pair-share strategy) and the Control Group (Lecture) with mean rank difference of (42.13).

Hypothesis Testing

The hypothesis formulated are tested using t-test and U-test analysis between the variables involved. The null hypothesis is rejected when the p-value is less than the alpha value of 0.05 and otherwise is retained.

Hypothesis One

H₀₁: There is no significant difference between the mean performance scores of students taught Algebra using Think Pair-Share Strategy and those taught using lecture method.

Table 3: t-test Result on Performance in Algebra between Experimental Group and Control Group.

Group	N	Mean	Std.	df	t-value	p-value	Remark
Experimental Group	71	21.42	3.500	162	12.046	.000	Significant
Control Group	93	14.51	3.5749				
Total	164						

* Significant at $\alpha \leq 0.05$

Result in Table 3 showed that p-value (observed) = 0.000 is less than α -value of 0.05 at df = 162. Since the observed p-value = 0.000 < 0.05 then the null hypothesis (H₀₁) which states that: "There is no significant difference between the mean performance scores of students taught Algebra using Think Pair-Share Strategy and those taught using lecture method" is rejected. This means there exist statistically significant difference between Experimental Group (think-pair-

share strategy) and the Control Group (Lecture) in favor of think-pair-share strategy. Thus, the students taught Algebra process using think-pair-share strategy performed better than those taught same content using Lecture Method. Hence, there is significant difference between the mean performance scores of students taught Algebra using Think Pair-Share Strategy and those taught using lecture method.

Hypothesis Two

H₀2: There is no significant difference between the mean rank interest score of students taught Algebra using Think Pair-Share Strategy and those taught using Lecture Method.

Table 4: Mann Whitney U-Test for Comparison of Mean Ranks of Interest toward Algebraic Process Posttest Scores for Experimental Group and Control Group.

Group	N	Mean	Std.	U-value	p-value	Remark
Experimental Group	71	106.39	7554.00	Z = -5.636*	0.000	Significant
Control Group	93	64.26	5976.00			
Total	164					

* Significant at $\alpha \leq 0.05$

Result in Table 4 showed that there exists a statistically significant difference in the mean ranks between the Experimental Group and Control Group with Mann-Whitney U test (Z = -5.636) and mean rank difference of 42.13. Since the p-value = 0.000 < 0.05 significant level, the H₀2 which states that: “There is no significant difference between the mean rank interest score of students taught Algebra using Think Pair-Share Strategy and those taught using lecture Method” is rejected. Thus, Think-pair-Share strategy improved student’s interest toward algebra more than the lecture method. Hence, there is significant difference between the mean rank interest score of students taught Algebra using Think Pair-Share Strategy and those taught using lecture Method.

Discussion

The result of this finding showed that, that students taught algebra using Think-Pair-Share strategy performed significantly higher than their counterparts taught using lecture method. This finding is supported by the following studies: Ismail, Bungsu, and Shahrill, (2023) who reported that think pair share cooperative learning improved student performance and participation; Ademiluyi &

Fawale, (2022) who reported that, the students who were taught office practice using the think-pair-share Strategy performed better on their post-test than those who were taught using the traditional discussion method; The findings of this study is in agreement with the earlier study of Abiodun, Asanre, Ogundeji, Odupe, & Rasaki, (2022) who stated that there is the main effect of the strategy on the student's achievement in Mathematics; Nwaukwa & Okolocha's (2020) who reported that think-pair-share strategy greatly enhanced students' academic performance in financial accounting.

Furthermore, Haakachima & Lunjebe (2019) found a significant difference exist between the posttest scores of the experimental and control group on performance in quadratic functions in favour of the experimental group; Akanmu (2019) in his study revealed that, there is significant difference in favor of experimental group that was taught using Think-Pair- Share strategy for subject achievement.

Finally, the study shows that, there is significant difference between the mean rank interest score of students taught Algebra using Think-Pair-Share Strategy and those taught using lecture Method.

Conclusion

The study examined the assessment of academic Performance Interest in Algebra Process using Think-Pair-Share Strategy among Secondary School Student's in Katsina Zonal Quality Education Assurance. Based on the results of findings from the present study, it has been concluded that the Think-Pair-Share strategy of teaching is a collaborative intervention that encourages sharing of ideas by members of the group and hence, enhances students' performance and interest in algebra.

Recommendation

The following recommendations were made based on the findings in the present study:

- i. Mathematics teachers should be discouraged from using teacher-centered instructional strategies but student-centered instructional strategy Think-Pair-Share and other innovative strategies that will promote high-level learning achievement in Mathematics.

- ii. Mathematics teachers should implore the use of Think-Pair-Share strategy in Mathematics classes in order to improve students Interest toward Mathematics.

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