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Effect of Think-Pair-Share Strategy on Secondary School Students' Performance in Mathematics in Ekiti State

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Abstract

The study examined the effect of think-pair-share strategy on students' performance in Mathematics in Ekiti State. Specifically, the study examined the difference in the performance of students in Mathematics exposed to think-pair-share and conventional strategies before and after treatment; and the influence of gender on academic performance of students exposed to think-pair-share and conventional strategies in Mathematics. The study adopted pre-test, post-test quasi-experimental design. The population of the study consisted of all Senior Secondary One (SS1) students in Ekiti State. The sample comprised 89 students selected from Ekiti South Senatorial District, one of the three Senatorial Districts in Ekiti State through multi-stage sampling procedure. The instrument used was a self-constructed Performance Test in Mathematics (PTM). The instrument was validated by content validity method. Pearson Product Moment Correlation Analysis was used to establish the reliability measure coefficient which yielded a coefficient of 0.83 for PTM. The hypotheses were tested using t-test and Analysis of Covariance (ANCOVA) statistics at 0.05 level of significance. The findings of the study revealed that there was no significant difference in the performance mean score of students exposed to think-pair-share and conventional strategies before the treatment but there was appreciable difference after the treatment. The findings further revealed that there was no significant effect of gender on students' performance in the experimental and control groups. It was recommended among others that Mathematics teachers should incorporate think-pair-share strategy in order to improve students' performance, and social interaction skills.

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Introduction

Mathematics is an important subject with numerous applications to diverse fields. It is a subject bestowed on humanity to solve various problems not limited to counting, but an important guide to making rational decisions bordering on the economy. Consequently, mathematical ability is crucial for the economic success of societies (Lipnevich, et al., 2011). It is very important in the scientific and technological development of countries (Enu, et al., 2015) because there is no scientific growth without mathematics since mathematics application is required to formulate and solve the inherent problems encountered on a daily basis. For a person to be able to function very well within his immediate environment, the knowledge of rudimentary mathematics is very necessary (Akanni, 2015). No nation can make an appreciable progress in the technological world without mathematics, science and technology. In fact, the importance of mathematics in the medical world cannot be overemphasized. With many health problems confronting the world in recent times, mathematics holds the key to developing models for the cure of Covid-19 and other life-threatening diseases. The importance accorded mathematics in the school curriculum from primary to secondary levels reflects accurately the vital role played by the subject in contemporary society. The study of mathematics is made compulsory from primary school to the secondary level where learners are exposed to rudimental studies having important bearing on their future and the nation. It is a core subject in the primary and secondary school certificate curriculum. Also, a credit pass in Mathematics at the senior secondary school certificate examination is a pre-requisite for admission to study most courses in tertiary institutions in Nigeria.

Unfortunately, students' performance in Mathematics has not been impressive. Several studies had indicated that Mathematics is perceived as a difficult subject. Some students frequently claim dislike or incompetence towards the subject, while many students choose not to pursue Mathematics related courses. It is quite unfortunate that the general performance of students in Mathematics in Nigeria has been discouraging going by the Senior School Certificate Examination (SSCE) results released by the West African Examinations Council (WAEC) from 2015 to 2019. In Ekiti State, the performance of students was inconsistent over the same period.

Table 1: Students' Performance in Mathematics for May/June West African Senior Secondary Certificate Examinations (WASSCE) in Ekiti State 2015-2019.

Year	Total No	A_1-B_3	%	C_4-C_6	%	D_7-E_8	%	Failure	%	% A_1-C_6	% D_7-F_9
2015	13,685	2,069	15	6,467	47	3,284	24	1,865	14	62	38
2016	11,351	2,431	21	5,449	48	2,561	23	910	8	69	31
2017	11,660	6,887	59	3,657	31	479	4	637	6	90	10
2018	10,973	5,309	48	4,310	39	640	6	714	7	87	13
2019	11,400	6,434	56	2,919	26	871	8	1,176	10	82	18

Source: Ministry of Education, Science and Technology, Ado-Ekiti (2020).

As seen in Table 1, the percentage of students who got **A_1 - C_6** and those who got less grades (D_7-F_9) increased (62% < 69% < 90%) and decreased (38% > 31% > 10%) respectively between 2015 and 2017. However, there was an unsatisfactory trend in students' performance beyond 2017 where the percentage of students who got D_7-F_9 increased. Unfortunately, the improvement in students' performance recorded between 2015 and 2017 could not be sustained due to the slight dip in students' performance where 87% and 82% got A_1 – C_6 in 2018 and 2019 respectively. This resulted in a reduction in the percentage of students who obtained A_1 – C_6 in 2018 and 2019. This implied that the percentage of students admissible into tertiary institutions of learning fell in 2018 and 2019. Consequently, this category of students would have to take the examination again, get minimum of a credit pass in Mathematics and four other relevant subjects before their dream of tertiary education could be achieved.

Every nation strives to ensure that the teaching and learning process is given adequate attention through setting up of different agencies, boards and parastatals to oversee the smooth running of education system. In Nigeria, it seems that government efforts in the educational sector have not yielded the desired results. Students should be able to maintain a better performance in Mathematics since only then would the teachers' and government's efforts be said to have yielded the expected result. Students' performance in Mathematics especially in the certificate examinations in Senior Secondary Schools according to Popoola, (2013) had been a matter of great concern to researchers, teachers, parents, educators and administrators. Consequently, many factors were identified as responsible for the concern. These included students' attitude (Ngussa & Mbuti, 2017; Makondo & Makondo, 2020), poor communication skill in mathematics (Samsurladi & Muhammed, 2019), and teaching strategies (Olumuyiwa & Akinsola, 2021). In fact, different strategies were employed which invariably brought about the improved performance evidently recorded in 2015 and 2016 in Ekiti State.

Popoola (2013) emphasized that stakeholders continue to shift blame on the teachers each time poor performance of students in Mathematics is recorded, even though students are also involved in this regard. The failure rate in Mathematics at secondary school level has bothered the minds of many researchers, authors and Mathematics educators and even the government. Interestingly, attempts are being made to proffer some solutions. As such, many Mathematics educators and concerned individuals have hitherto been considering ways and means of ensuring effective teaching and learning of Mathematics in schools. The researchers observed that the most common method used by Mathematics teachers in secondary schools is the conventional method which is chalk and talk method. It appears that this method has not yielded much success and could be contributing to the poor performance of students in Mathematics.

It has therefore become necessary to seek effort that will employ an approach or approaches that will enhance and thereafter sustain better academic performance of students in Mathematics. There are many innovative strategies that could be used in order to improve students' academic performance in Mathematics but this study is interested in think-pair-share strategy.

Think-Pair-Share involves posing some of the questions to the class about what has been explained about the activity or an issue or a task and then ask the students to think for a minute about this question alone with the prevention of talk or walk around in the classroom at the time of thinking, Then the teacher asks students to split up into pairs to discuss and think together about a question or posed activity for a period of five minutes. Finally, the

teacher participates by displaying what has been reached of solutions and ideas about the question or activity (Zaitun, 2007).

Think-Pair-Share is a cooperative learning strategy that incorporates three stages namely: time for thinking, time for sharing with a partner and time for each pair to share back to a larger group (Jannah, 2013). According to Goodman (2010), Think-Pair-Share strategy follows three procedures:

1. Time for thinking: After the teacher asks the class a question, the teacher pauses for about one minute (depending on the complexity or technicality of the question) to allow students to think about their answers individually and independently.
2. Time for sharing with a partner: Students are divided into pairs. Then students share their ideas about the answer with their partner for about four minutes.
3. Time for each pair to share back to the whole class: The teacher gathers the students back together as a class. Then one person may be randomly selected from each pair to share the pair's answer with the class or few students may be randomly selected if the class size is large. Another way is to have all pairs stand, and after each representative share with the whole class, the representative would sit down alongside any student with similar ideas and answers. This continues until everyone is seated

Sampsel (2013) studied the effect of Think-Pair Share cooperative learning technique on students' confidence in their abilities to do Mathematics and their willingness to participate in class discussion. The study found that students' participation increased, the number of long explanations given by students increased, and students comfort and confidence when contributing to class discussion also increased.

Althelab and Omar (2013) conducted a study aimed at knowing the impact of (think – pair – share) strategy on the achievement of second grade intermediate female students in mathematics and their reasoning thinking. After collecting and analyzing the data by using the t-test for two independent samples, the results revealed the superiority of the experimental group who studied according to (think – pair – share) strategy over the control group in achievement and reasoning thinking. Also, in the quasi-experimental study of Akanmu (2019), students were exposed to think-pair-share strategy in the teaching of set theory. Findings revealed that students who were taught set theory using think-pair-share strategy performed better than their counterparts in the control group. However, there was no gender difference in performance due to treatment. In the study of Abiodun, et al (2022) to determine the effect of Think-Pair-Share on students' achievement in Mathematics, it was revealed that students who were exposed to teaching with the use of think-pair-share strategy achieved more in Mathematics than their counterparts in the conventional group even as gender had no significant effect on students' achievement in Mathematics. Also, Haakachima and Athanasius (2019) conducted a study on the effect of think-pair-share cooperative strategy on Grade 12 learners' performance in Quadratic functions. Findings from the study revealed that students' performance and attitude improved in favour of the experimental group while gender was shown to have no influence on the learners' improved attitude to Mathematics.

The purpose of the study was to examine the effect of think-pair-share strategy on students' performance in Mathematics in Ekiti State. Specifically, the study examined:

i. the difference in the performance of students in Mathematics exposed to think-pair-share and conventional strategies before and after treatment; and
ii. the influence of gender (if any) on academic performance of students exposed to think-pair-share and conventional strategies.

Research Hypotheses

The following null hypotheses were postulated for this study.

1. There is no significant difference in the pre-treatment mean scores of students exposed to think-pair-share and conventional strategies.
2. There is no significant difference in the post-treatment mean scores of students exposed to think-pair-share and conventional strategies.
3. There is no significant effect of gender on students' performance in the experimental and control groups.

Methodology

The study adopted the pre-test, post-test quasi-experimental design type. The subjects comprised 89 students selected through multi-stage sampling procedure from Ekiti South Senatorial District.

The instrument used for the study was a self-constructed Performance Test in Mathematics (PTM). The instrument was made up of two sections namely sections A and B. Section A sought for the bio-data of the students while section B was made up of 30 items. The instrument was used for pre-test and post-test. The content of PTM used for pre-test was reshuffled for the post-test in order to prevent carry-over effect. The instrument was validated by content validity method. It was given to two Mathematics teachers to ascertain the content validity of the instrument. Cronbach's Alpha statistics formula was used to establish the reliability coefficient which yielded a coefficient of 0.86 for PTM.

The Performance Test in Mathematics (PTM) was administered on experimental and control groups as pre-test in order to ascertain the entry point of each group. The reshuffled Performance Test in Mathematics (PTM) which served as post-test was administered to the two groups after teaching the groups for 3 weeks using the school scheme of work. The experimental plan was as follows:

Duration	**Activities**
1st week:	Training of research assistants and administering of pre-test
2nd – 4th week:	Teaching of the students via think-pair-share and conventional strategies
5th week:	Post-test

After treatment, the scores in pre-test and post-test in the two groups were collated and subjected to appropriate statistical analysis. The data collected were analysed using inferential statistics. The hypotheses were tested using t-test and Analysis of Covariance statistics at 0.05 level of significance.

Results

Hypothesis 1: There is no significant difference in the pre-treatment mean scores of students exposed to think-pair-share and conventional strategies.

Table 2: t-test analysis for Pre – treatment Mean Scores of Students in Experimental and Control Groups

Variations	**N**	**Mean**	**SD**	**df**	**t_{cal}**	**P (Sig)**	**Rem.**
Think-Pair-Share	43	7.69	0.80	87	0.767	0.403	Not Significant
Conventional	46	7.83	0.92				

P<0.05

Table 2 shows that the t-cal value of 0.767 is not significant because the P value (0.403) > 0.05 level of significance. This implies that the null hypothesis is not rejected. Hence, there was no significant difference in the performance mean score of students exposed to think-pair-share and conventional strategies before the treatment.

Hypothesis 2: There is no significant difference in the post-treatment mean scores of students exposed to think-pair-share and conventional strategies.

Table 3: t-test analysis for Post – treatment Mean Scores of Students in Experimental and Control Groups

Variations	N	Mean	SD	df	t_{cal}	P (Sig)	Rem.
Think-Pair-Share	43	25.18	2.51	87	20.686	0.00*	Significant
Conventional	46	14.06	2.56				

*P<0.05

Table 3 shows that the t-cal value of 20.686 is significant because the P value (0.000) <0.05 at 0.05 level of significance. This implies that the null hypothesis was rejected. Hence, there was a significant difference in the performance mean score of students exposed to think-pair-share and conventional strategies after the treatment. The mean scores showed a large difference of 11.12 in favour of students exposed to think-pair-share strategy.

Hypothesis 3: There is no significant effect of gender on students' performance in the experimental and control groups.

Table 4: ANCOVA analysis for Effect of Gender on Students' Performance in the Experimental and Control Groups

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	841.10[a]	4	210.28	7.74	.000
Intercept	773.94	1	773.94	28.46	.000
Sex	48.90	1	48.90	1.80	.286
Strategies	567.35	1	567.35	20.87	.000
Sex * Strategies	65.25	2	31.13	1.45	.318
Error	2256.77	83	27.19		
Total	39377.00	88			
Corrected Total	7363.24	87			

a. R Squared = .404 (Adjusted R Squared = .386)

Table 4 presents the summary of ANCOVA of effect of gender on students' performance in the experimental and control groups. The table showed that F-calculated for sex differentials in the performance of students (1.80) was not significant at 0.05 levels. Also, the table showed that gender had no effect on students' performance in the experimental and control groups since F-calculated value was 1.45, not significant at 0.05 levels. Hence, the null hypothesis was rejected.

Discussion

The study revealed a no significant difference in the performance mean score of students exposed to think-pair-share and conventional strategies before the treatment. This implies that the groups were homogeneous at the commencement of this study.

The study also revealed a significant difference in the performance mean score of students exposed to think-pair-share and conventional strategies after the treatment. The significant difference is in favour of students exposed to think-pair-share strategy. It implies that when think-pair-share strategy is used by teachers to complement the teaching of Mathematics, it is effective than conventional materials. The result agrees with the findings of Abiodun et al (2022), Haakachima and Athanaseus (2019); Akanmu, (2019); Althelab and Omar (2013); Peklaf (2013), Eniayeju (2010) and Gubbad (2010) who concluded that students exposed to

think-pair-share strategy performed better than students exposed to conventional methods in Mathematics. The implication of this finding is that students in the think-pair-share group were able to increase their understanding and to develop self-confidence more than the students in the conventional group.

The study further revealed that there was no significant effect of gender on students' performance in the experimental and control groups. In support of this finding, some researchers have argued that there is no disparity in the performance of male and female students in Mathematics (Adegun & Adegun, 2013; Ato & Adelaide, 2015; Akanmu, 2019; Olofinlae, 2020; Abiodun et al, 2022). Kolawole (2012) had found no significant interaction effect of treatment on students' learning outcome based on gender unlike the study of Haakachima and Athanaseus (2019) which found significant difference in the students' post-test performance with respect to gender (with the males performing better than their female counterparts) in quadratic functions.

However, the implication of this finding is that no sex is more intelligent than the other and that if given the same opportunity, each would prove his/her capability.

Conclusion

It can be concluded from the findings that the use of think-pair-share strategy is very effective in increasing students' academic performance in Mathematics. Think-pair-share strategy is more effective in the teaching and learning of Mathematics than the conventional method.

Recommendations

Based on the findings of this study, it was recommended that:

1. Mathematics teachers should incorporate think-pair-share strategy to teach in order to improve students' performance, and social interaction skills
2. Mathematics teachers should be given adequate orientation through workshops and seminars to update their knowledge in the application of think-pair-share strategy.

References

Abiodun, T. O., Asanre, A. A., Ogundeji, M. A., Odupe, T. A. & Rasaki, M. G. (2022). Effect of Think-Pair-Share Strategy on Student Achievement in Senior Secondary School Mathematics, *FNAS Journal of Mathematics and Science Education,* 3(2), 20-25.

Adegun, I. K. & Adegun, B. O. (2013). Students and Teachers' Views of Difficult Areas in Mathematics Syllabus: Basic Requirement for Science and Engineering Education. *Journal of Education and Practice,* 4 (10), 235-243.

Akanmu, M.A. (2019). Effects of Think-Pair-Share in Senior School Students' Performance on Mathematics in Ilorin, Nigeria, *African Journal of Educational Studies in Mathematics and Sciences,* 15(2), 109-118.

Akanni, O. (2015). An Investigation of Difficult Topics in the Senior Secondary School Mathematics Curriculum as Perceived by Student Teachers, *American Journal of*

Educational Research, 3(7), 844-848. Retrieved on 17/6/2020 from http://pbs.sciepub.com/education/3/7/7

Althelab, S. H. and Omar, T.G. (2013). The Impact of (Think – Pair – share) strategy on the achievement of second grade intermediate female students in mathematics and their reasoning thinking, *Faraaheedi Journal*, 17(1), 312 – 333

Ato, K. A. & Adelaide, K.O. (2015). Gender difference and mathematics achievement of senior high school students: A case of Ghana college. *Journal of Education and practice,* 6 (33), 67-74.

Eniayeju, A.A. (2010). Effects of Cooperative learning strategy on the achievement of primary six boys and girls in Mathematics. *ABACUS: The journal of Mathematical association of Nigeria* 35(1),1-9 *Proceedings of the 2011 International Conference on Teaching, Learning and Change* (c) International Association for Teaching and Learning (IATEL)

Enu, J., Agyman, O. K., & Nkum, D. (2015). Factors influencing students' mathematics performance in some selected colleges of education in Ghana. *International Journal of Education Learning and Development, 3*(3), 68-74.

Goodman, J.E. (2010). *Active Research on Active Learning Strategies (*Unpublished master's thesis). University of Wisconsin-Stout, Menomonie, WI.

Gubbad, A.M.A. (2010). Effects of Cooperative Learning on Academic Achievement and Retention of Mathematics Concepts at the Primary School in Holy Makkah. *Journal of King Saud University. Riyadh Education, Science and Islamic Studies* 22 (2), 13 – 2.

Haakachima, B. & Lunjebe, A. (2019). The Effect of Think-Pair-Share Cooperative Learning Model on Grade Twelve (12) Learner's Performance in Quadratic Functions: A case Study of Twashuka Secondary School in Luanshya. *International Journal of Research and Innovation in Social Science (IJRISS),* 3(10), 216-223.

Jannah, N. (2013). The effectiveness of Think-Pair Share technique in teaching reading. *Journal Penelitian, 3*(12), 91-96.

Kolawole, E. B. (2012). Gender issues and academic performance of senior secondary school students in Mathematics computation tasks in Ekiti State Nigeria. *Pakistan Journal of Social Sciences,* 15 (1), 102 -111

Lipnevich, A. A., MacCann, C., Krumm, S., Burrus, J., & Roberts, R. D. (2011). Mathematics attitudes and mathematics outcomes of US and Belarusian middle school students. *Journal of Educational Psychology,* 103 (1), 105. Retrieved on 17/8/2020 from https://www.researchgate.net/profile/Jeremy_Burrus/publication/232478953

Makondo, P.V and Makondo, D (2020). Causes of Poor academic performance in Mathematics at Ordinary Level: A Case of Mavuzani High School, Zimbabwe, International Journal of Humanities and Social Science Invention (IJHSSI), 9(6), 10-18.

Ngussa, B.M. & Mbuti, E.E. (2017). The Influence of Humour on Learners' Attitude and Mathematics Achievement: A Case of Secondary Schools in Arusha City, Tanzania. Journal of Educational Research, 2(3), 170 -181

Olofinlae, O. O. (2020). Effect of feedback on the Performance of Secondary School Students in Mathematics in Ekiti State. *IJRDO-Journal of Educational Research*, 5(9), 27-36.

Olumuyiwa, S.A & Akinsola, M.K. (2021). Interactive E-Note and Problem-Solving Strategies Effects on Junior Secondary School Students' Achievements in Mathematics, Kaduna, Nigeria, *Contemporary Mathematics and Science Education,* 2(1), ep21008

Peklaf C. (2013*) Gender, Abilities, Cognitive Styles and Students' Achievement in Cooperative learning*. Retrieved on 13/8/2020 from http://www.znanstveni.cmpiricinc.raziskoralni.

Popoola, A.A. (2013). Diversity, equity and Mathematics learning: consideration of literacy approach. Literacy and reading in Nigeria. *Journal of Reading Association of Nigeria (RAN),* 14(1), 178-184.

Sampsel, A. (2013). Finding the effects of Think-Pair-Share on student confidence and participation. Retrieved on 13/8/2020 from http://scholarworks.bgsu.edu/honorsprojects

Samsurladi & Muhammad, A.I. (2019). The Effect of Think Pair Share (TPS) Learning Model with Problem Solving Approach to Students Mathematical Communication in MA DA Jarowaru, *Malikussaleh Journal of Mathematics Learning (MJML)*, 2(1), 9-12. Retrieved from https://doi.org/10.29103/mjml.v2i1.2125

Zaitun, A.M. (2007). *Constructivist theory and strategies for teaching science*. Amman-Jordan: Dar alshrouq Publishing

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