Indonesian Journal of Teaching in Science

IJOTIS

Journal homepage: http://ejournal.upi.edu/index.php/ IJOTIS/

Effect of Round Robin Instructional Strategy on Pupils' Academic Achievement in Mathematics

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ABSTRACT

The study examined the effect of a round-robin instructional strategy on pupils' academic performance in Mathematics. The study adopted a quasi-experimental research design. Two public primary schools were randomly selected to participate in the study. One validated and reliably tested research instrument titled 'Mathematics Performance Test' (MPT) was used. The reliability index of MPT was determined using Pearson Product Moment Correlation (PPMC). Two research hypotheses were formulated and tested with Analysis of Covariance (ANCOVA). The findings of the study revealed that treatment had a significant effect on pupils' academic achievement in mathematics. However, the interaction of treatment and gender did not have any significant effect on pupils' academic achievement. Based on the findings, it was concluded that round round-robin instructional strategy can improve the academic achievement of pupils. Based on the conclusion, it was recommended that teachers should be trained on the use of the round-robin instructional strategy.

ARTICLE INFO

Article History:
Submitted/Received 12 Jan 2024
First Revised 01 Mar 2024
Accepted 13 Apr 2024
First Available online 16 Apr 2024
Publication Date 01 Mar 2024

Keyword:
Instruction,
Mathematics,
Round robin,
Teacher,
Teaching.

1. INTRODUCTION

Mathematics education is a critical foundation for scientific and technological advancements and plays a significant role in shaping a nation's socioeconomic growth. The importance of mathematical knowledge is widely acknowledged as essential for the progress of science and technology, both of which are integral to a nation's socioeconomic development. Mathematics plays a critical role in various human activities and is a fundamental component of advancements in science and technology. Mathematics establishes the groundwork for numerous scientific fields and constitutes a fundamental element of human reasoning and logic. This plays a pivotal role in our efforts to comprehend both the world around us and our existence. The application of mathematical approaches is prevalent in nearly every field of human endeavor, making mathematics education pivotal to a country's economic success. Thus, Nigeria demands strong mathematical performance from students at every stage of education to advance scientifically and technologically.

In Nigeria, Mathematics is compulsory at both the primary and secondary levels, serving as a prerequisite for various degree programs and essential for understanding multiple scientific disciplines and languages (Ali & Jameel, 2016). Despite its importance, there have been concerns about the lackluster performance of students in Mathematics, evidenced by consistently declining grades and poor results in national exams (Makondo & Makondo, 2020). The state of Mathematics education at the primary level has become a cause for concern, particularly in the Ilorin West Local Government Area of Kwara State, Nigeria, where the performance of pupils in Mathematics remains below the desired standard. Given the crucial role of Mathematics in driving technology, science, and societal progress, this situation may have significant implications for the nation's development.

Previous studies (Isa *et al*., 2020) indicated that the method of teaching significantly influences the improvement of students' academic achievements. Specifically, employing a lecture-based teaching approach has been associated with subpar performance in mathematics by some educators. Conversely, alternative studies (Kingdom-Aaron *et al*., 2021) advocated for child-centered learning strategies that foster active pupils' involvement in teaching and learning situations and one such learning strategy is a round-robin instructional strategy.

Several child-centered learning strategies have been explored by scholars (Obafemi, 2024; Obafemi *et al*., 2024; Obafemi *et al*., 2023a) to improve pupils' academic achievement in Mathematics, and none of these strategies examined round Robin instructional strategy. Round Robin instructional strategy is a collaborative instructional approach that promotes pupils' engagement, participation, and a sense of shared responsibility in the learning process. This instructional strategy is widely used in various educational settings, including classrooms and training environments, to enhance interaction and knowledge retention among learners (Johnson & Johnson, 2009). The round-robin strategy involves organizing pupils into groups and having them take turns presenting information, solving problems, or discussing topics. Each member of the group has an opportunity to contribute, fostering a cooperative learning environment. The process typically follows a predetermined order, ensuring that every pupil gets an equal chance to participate (Slavin, 2014).

Round Robin is an oral technique. The teacher announces the topic to be shared with the team. Each team member shares with the team. Practically, the class is divided into small groups (4 to 6) with one person appointed as the recorder. The teacher takes the time to explain the nature of the round-robin strategy, elucidating the roles that each pupil will play within their respective groups. This includes clarifying the expectations for participation,

DOI: http://dx.doi.org/10. 17509/xxxx.xxxx
p- ISSN 2776-6152 e- ISSN 2776-6101

sharing of ideas, and the subsequent reporting process. After explaining the procedures, a question is posed with many answers, and pupils are given time to think about the answers. After the thinking time, members of the team share responses using a round-robin style. The recorder writes down the answers of the group members. The person next to the recorder starts recording or taking notes and each person in the group in order answers until time is called. After sharing ideas among group members, one pupil from each group is selected to come forward and present their group's collective ideas to the entire class. In summary, the round-robin instructional strategy includes group formation, strategy explanation, posing a question, turn-based idea sharing, recording of ideas, recording of ideas and group representatives.

Several studies (Asari *et al*., 2017; Sholihah, 2017) have been carried out to examine the effect of the round-robin instructional strategy but none of these studies was conducted to investigate the effect of round-robin instructional strategy on pupils' academic performance in mathematics particularly at the primary school level where this study was carried out. And this is the research gap the study intended to fill.

Gender encompasses the qualities that distinguish femininity and masculinity, including biological sex, as a variable of interest. While various studies (Nnamani & Oyibe, 2016; Pirmohamed *et al*., 2017) have explored the impact of gender on academic achievement across different subjects, they have generated conflicting results. This disparity justified the inclusion of gender as a moderator variable in this study.

The prevalent adoption of the teacher-centered approach to teaching, commonly employed by teachers, has been identified as a contributing factor to the subpar academic performance of primary school pupils in both internal and external mathematics examinations. Researchers have suggested the implementation of instructional strategies that foster active engagement of pupils in the learning process. One such strategy is the round-robin instructional strategy, which has been extensively studied in various contexts. Previous studies have explored the effect of the round-robin instructional strategy on the academic performance of learners in diverse subjects other than primary mathematics. Hence, it is against this background that this study investigated the round-robin instructional strategy on primary school pupils' mathematics performance in Ilorin West Local Government Area of Kwara State.

Research hypotheses are the following:

(i) Ho1: There is no significant effect of treatment on the academic achievement of pupils in Mathematics.

(ii) Ho2: There is no significant interaction effect of treatment and gender on the academic achievement of pupils in Mathematics.

2. METHOD

The study adopted a pretest-posttest quasi-experimental research design with a factorial design of 2X2. A simple random sampling technique was used to select two private primary schools in Ilorin West Local Government Area of Kwara State. Primary four pupils in each of the selected schools were involved in the study. One of the two schools was the experimental group while the other was the control group. The experimental group was exposed to round Robin instructional strategy while the control group was exposed to the conventional method. The sample of the study consisted of 107 pupils. The research instrument used in the study was titled 'Mathematics Performance Test (MPT)'. The MPT was drawn from the mathematics scheme of work for primary four, and it consisted of fifty multiple-choice questions with four response options. The drafted questions for the MAT, Round Robin Instructional Guide (RRIG),

DOI: http://dx.doi.org/10.17509/xxxx.xxxx
p- ISSN 2776-6152 e- ISSN 2776-6101

and Conventional Instructional Guide (CIG) were given to lecturers in the Department of Early Childhood and Primary Education, Kwara State University who validated the instrument. To establish the reliability of the MAT, the test-retest method was adopted. The test was administered twice, with an interval of two weeks, to 30 pupils in primary four who were not part of the study but were in the same local government area. Data from the two administrations were correlated using Pearson Product Moment Correlation (PPMC) and the reliability coefficient was established at 0.72. The study lasted for 6 weeks and data collected were analyzed using Analysis of Covariance (ANCOVA).

3. RESULTS AND DISCUSSION

3.1. Hypothesis One: There is No Significant Effect of Treatment on The Academic Achievement of Pupils in Mathematics

Table 1 shows that there was a significant effect of treatment on the academic achievement of pupils in Mathematics ($F_{(1; 102)} = 809.121$, $P < 0.05$). The null hypothesis is therefore rejected in light of the result since the significant value (.000) is less than 0.05. This implies that treatment had a significant effect on the academic achievement of pupils in Mathematics. The source of the significant difference is presented in **Table 2**.

Table 2 revealed that the significant effect revealed by **Table 1** is as a result the significant difference between Round Robin Instructional Strategy and the Conventional Method. Pupils taught with Round Robin Instructional Strategy constituted the experimental group, while pupils taught with the conventional method constituted the control group. The mean score (74.02) of pupils exposed to Round Robin Instructional Strategy was higher than that of those exposed to the conventional method (52.24). This implies that those exposed to Round Robin Instructional Strategy performed significantly better than those exposed to the conventional method.

Table 1. Summary of analysis of covariance (ANCOVA) showing the effect of treatment on the academic achievement of pupils in Mathematics.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	11455.100[a]	4	2863.775	210.274	0.000
Intercept	28.642	1	28.642	2.103	0.150
Pretest	1.044	1	1.044	0.077	0.782
Treatment	11019.608	1	11019.608	809.121	0.000
Treatment * Gender	15.201	1	15.201	1.116	0.293
Error	1389.162	102	13.619		
Total	435011.000	107			
Corrected Total	12844.262	106			

Table 2. Summary of bonferroni's post hoc pairwise comparison of the scores between the two groups.

Treatment	Mean	Experimental	Control Group
Round Robin	75.20	*	
Conventional Method	54.17		*

3.2. Hypothesis Two: There is No Significant Interaction Effect of Treatment and Gender on the Academic Achievement of Pupils in Mathematics

Table 1 shows that there was no significant interaction effect of treatment and gender on the academic achievement of pupils in Mathematics ($F_{(1; 102)} = 1.116$, $P > 0.05$). The null

DOI: http://dx.doi.org/10. 17509/xxxx.xxxx
p- ISSN 2776-6152 e- ISSN 2776-6101

hypothesis is therefore not rejected in the light of the result since the significant value (.293) is greater than 0.05.

3.3. Discussion

The finding of the study showed that there was a significant effect of the round-robin strategy on the academic achievement of pupils in Mathematics. The significant effect of the round-robin instructional strategy on pupils' performance in mathematics could be a result of the fact that the pupils had the opportunity to be actively engaged, interact, and learn from other children. The finding was in tandem with the finding of Sholihah (2017) which revealed that learners taught reading comprehension using round Robin strategy performed better than those taught using a conventional method. Asari *et al*. (2017) also carried out a study on the effectiveness of the round Robin strategy and they discovered that the round Robin strategy helps to improve students' holistic ability in TEFL Classes. Also, the finding further supported the finding of Obafemi (2021) which uncovered that treatment had a significant effect on pupils' academic performance.

Another finding of the study revealed that there was no significant interaction effect of treatment and gender on the academic achievement of pupils in Mathematics. This finding was in tandem with the finding of Obafemi *et al*. (2024) which unfolded that there was no significant interaction effect of treatment and gender on pupils' academic performance in mathematics. Similarly, the finding was also in consonance with the research findings of Obafemi *et al*. (2023a).

4. CONCLUSION

Based on the findings of this study, it can be concluded that the Round Robin instructional strategy improves the academic performance of pupils in mathematics regardless of gender. Based on the conclusion, The following recommendations were made:

(i) It is highly encouraged for teachers to employ round Robin instructional strategy in the teaching of mathematics to male and female pupils.
(ii) Teachers should be motivated to attend various seminars, workshops, and conferences about round-robin instructional strategy.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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p- ISSN 2776-6152 e- ISSN 2776-6101