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## EFFECT OF REVERSED JIGSAW COOPERATIVE LEARNING STRATEGY ON PUPILS' ACADEMIC PERFORMANCE IN NUMERACY IN KONTAGORA LOCAL GOVERNMENT AREA OF NIGER STATE

By

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### Abstract

*The researcher investigated the effect of reversed jigsaw cooperative learning strategy on pupils' academic performance in numeracy in Kontagora Local Government Area of Niger State. Researcher adopted quasi-experimental research design. A factorial design of 2X2 was adopted to test the hypotheses. The population comprised pupils in all primary schools Kontagora Local Government Area of Niger State. Sample size for this study was four primary 5 classes with 87 pupils. The multistage sampling technique was used for collection of data. Three hypotheses were formulated, Instruments were subjected to face and content validity by experts in numeracy, some lecturers in the Kwara State University, Malete. Test-retest method was adopted to ascertain the reliability of the instrument which was 0.87. Hypotheses were tested, with Analysis of Covariance (ANCOVA). Findings shown that there was significant effect of reversed jigsaw strategy on pupils' academic performance in numeracy ( $F_{(2, 83)} = 5.555, P < 0.05$ ). There was no significant effect of gender on pupils' academic performance in numeracy in Kontagora Local Government Area of Niger State ( $F_{(2, 83)} = .419, P > 0.05$ ) and there was no significant effect of treatment and gender on pupils' academic performance in numeracy in Kontagora Local Government Area of Niger State ( $F_{(2, 83)} = .630, P > 0.05$ ). Finally, recommendation were made primary school teachers should adopt the*

*reversed jigsaw strategy alongside with other method in teaching numeracy, curriculum developer should integrate reversed jigsaw strategy in curriculum for prospective teachers, and training for in service teachers.*

**Keywords:** reversed jigsaw cooperative learning strategy, academic performance and numeracy

## Introduction

The significance of numeracy as a fundamental subject in the basic school curriculum cannot be overemphasized. Numeracy is classified as the second core subject in the lower, middle, and upper basic classes, as outlined in section two of the National Policy of Education (FRN, 2013). Consequently, it is safe to assert that numeracy is a compulsory subject for all pupils, from basic one to six. Numeracy is a mandatory subject in Nigerian primary and secondary schools, being taught on daily basis or at least four times a week. Moreover, Mathematics is a prerequisite for various degree programs, including education, medicine, architecture, and engineering. Despite the strategic roles that numeracy plays in the society, the performance of pupils in this subject during national examinations has been less than satisfactory (Erunke, 2020). The issue is further highlighted by the poor results of external examinations, such as the Niger State Common Entrance Examination in 2022/2023, which was conducted by the National Examination Council (NECO), disclosed that 24, 416 passed out of a total number of 70,580 that sat for the examination.

The importance of numeracy in school curricula stems from the subjects contributions to scientific and technological advancement. Because of the rapid advancement of technology, it is noticed that the demand for mathematical skills is increasing. The language of science and technology is commonly recognized as numeracy. Norris (2015) made a similar point when he claimed that, although science is the bedrock that gives the springboard for the creation of technology. Tobies and Helmut (2017) argued that without numeracy, there is no science, without science, there is no modern technology, and without modern technology, there is no modern civilization. Thus, numeracy is the forerunner and queen of science and technology, as well as the most important single factor in modern society growth. In present days, science and technology have become an intrinsic part of global culture, a basic understanding of numeracy is a sine qua non for citizens' efficacy. Apparently, the importance of numeracy in the development of any society's industrialization and technological advancement cannot be overstated.

Moreover, numeracy provides a valuable tool for understanding various subjects and languages and forms the foundation for many scientific disciplines. It is an essential component of human reasoning and logic and plays a crucial role in our efforts to comprehend the world and ourselves (Jameel et al, 2016). However, despite its importance, the performance of pupils in numeracy at national examinations in Nigeria has been lackluster (Makondo et al, 2020). Educators and scholars have raised concerns about the state of primary school numeracy education, particularly at the basic education level. Despite the significance of numeracy pupils' grades have shown a consistent decline year after year. Atandi, et al, 2019; Isa, et al, 2020 reported that improvement in the academic performance of pupils is dependent on method of teaching. That is why the poor academic performance of pupils in numeracy has partly attributed to the method of teaching often used by some teachers which is the traditional method of teaching. Some researchers and scholars like Yaduvanshi, & Singh, 2018; Kingdom-Aaron, et al, (2019) have recommended the use of teaching strategies that tolerate pupils' participation in teaching-learning situation. These strategies shift the focus from the teacher to the learners, allowing them to solve problems, ask questions, discuss, explain, debate, and brainstorm in class. Such strategies view learners as active participants and enable them to bring their experiences to the table and part of such teaching strategies is Reversed Jigsaw which is a variable of interest in this study.

The Reverse Jigsaw teaching strategy is a cooperative learning technique that has gained popularity in recent years. It is a variation of the jigsaw technique, which is a well-established method of promoting collaboration and engagement among pupils (Aronson, 2002). In the Reverse Jigsaw technique, pupils become experts in a particular area and teach it to the rest of the class, taking the approach of the jigsaw technique one step further (Maitra & Staisloff, 2017). This strategy is effective across all grade levels and content areas, promoting student centered learning and increasing student motivation (Ma & Chen, 2018). By allowing pupils to take ownership of their learning and become experts in a specific topic, the Reverse Jigsaw technique promotes deep learning and knowledge retention.

The procedure of the Reverse Jigsaw teaching strategy involves several steps. First, the teacher divides the class into groups of four to six pupils. Next, each group is assigned a topic related to the lesson or unit. Each student within the group is then assigned a subtopic related to the group's main topic. Pupils research their subtopic and become experts on it. They gather information and develop a presentation to teach their subtopic to the rest of their group members (Ma & Chen, 2018). Once pupils have become experts on their subtopics, they return to their original group and teach their subtopics to their group members. The group then discusses each subtopic and works collaboratively to make connections between them. Finally, the whole class comes together, and each group presents its main topic and subtopics to the class (Maitra & Staisloff, 2017).

Obafemi et al, (2023) examined the effect of reversed jigsaw 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 'Numeracy Performance Test' (MAT) was used. The reliability index of MAT was determined using Pearson Product Moment Correlation. Two research hypotheses were formulated and tested at a standard level of significance with an Analysis of Covariance (ANCOVA). The findings of the study revealed that treatment had a significant effect on pupils' academic performance in numeracy. However, the interaction of treatment and gender did not have any significant effect on pupils' academic performance. Based on the findings, it was concluded that reversed jigsaw instructional strategy can improve the academic performance of pupils. It was recommended that teacher should employ the reverse jigsaw in teaching mathematics in primary school enhance their performance. Also, seminar for mathematics teachers should be organize on the effectiveness of reverse jigsaw.

Olson, Muhammad and Isa (2018) reported that female pupils performed better than males pupils when taught Mathematics and sciences using cooperative learning. Lakpini (2016) revealed that male pupils received more criticism from their teachers than their female counterparts as such that affects their performance in sciences (chemistry). Contrarily, Khairulanuar, Nazre, Sairabanu et al (2010) found gender differences in favour of male pupils. Muhammad, (2017) opined teachers spoke more frequently to boys, asked the boys more questions, praised boys for quality work, and girls for neatness. Even though, Gumel, (2015) and Timayi et al (2015) reported that gender had no effect on the academic achievement of pupils in jigsaw cooperative learning settings. These findings have caused for the inclusion of gender as the moderating variable for this study.

### **Statement of the Problem**

The academic performance of pupils in numeracy in primary school has become a pressing concern in recent times. Studies have consistently shown that pupils' academic performance in numeracy is a significant predictor of their future academic success. However, the academic performance of pupils in primary five in Kontagora Local Government Area of Niger State has been relatively low, with many pupils struggling with numeracy. The National Common Entrance Examination results 2022/2023 (NECO) revealed that 24, 416 candidates out of the total of 70,580 candidates that sat for the examination passed at desired grade points. Many factors

were responsible for this poor performance, such factors includes attitudes of the learners towards the subject, lack of teaching experiences, lack of appropriate teaching methods and low motivation of teachers and attitudes.

However, urgent attention needs to be taken in order to correct the situation of poor academic performance. Researchers have stressed the importance of implementing teaching strategies that promote active engagement from learners during learning activities. Numerous teaching strategies have been proposed to raise numeracy performance, and a number of studies have been conducted; however, some of the teaching strategies has not been relatively effective in improving the performance. With this in mind, the present study aimed to explore the effect of the Jigsaw IV and Reverse Jigsaw teaching technique on pupils academic performance in numeracy.

### Research Hypotheses

The following research hypotheses were formulated:

**H<sub>01</sub>:** There is no significant effect of treatment on pupils' academic performance in numeracy in Kontagora Local Government Area of Niger State.

**H<sub>02</sub>:** There is no significant effect of gender on pupils' academic performance in numeracy in Kontagora Local Government Area of Niger State.

**H<sub>03</sub>:** There is no significant interaction effect on treatment and gender on pupils' academic performance in numeracy in Kontagora Local Government Area of Niger State

### Methodology

The researcher adopted quasi-experimental research design. The design is suitable in establishing the possible cause and effect relationship. A factorial design of 2X2 was adopted to test the null hypotheses. The population was all pupils in all primary schools in Kontagora Local Government Area of Niger State. Sample size were four primary five classes. The multistage sampling technique was used. Purposive sampling was adopted to select 4 mixed primary schools because of certain characteristics they possessed that relevant to the conduct. Schools are classified into two strata from which four schools were randomly selected. Pupils' Numeracy Performance Test (PUPT) Instructional Guide for Reversed Jigsaw Cooperative Learning Strategy (IGRJCLS) and Instructional Guide for Conventional Method (IGCM). Instruments were given face and content validity by some selected experts in numeracy, some selected lecturers in Department of Early Childhood and some lecturers in Faculty of Education kwara State University. Twenty five copies of the test were administered two times on primary 5 pupils in another school outside sample. The final drafts were tested twice within an interval of two weeks. Thereafter, Pearson Product-Moment Correlation (PPMC) coefficient, the reliability index was 0.87. The data were analyzed using descriptive and inferential statistics.

### Results

**Research Hypothesis One:** There is no significant main effect of treatment on pupils' academic performance.

**Table 1: Showing summary of Analysis of Co-variance (ANOVA) on effect of treatment on pupils' academic performance**

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1005.130 <sup>a</sup>	3	335.043	3.376	.022
Intercept	18416.318	1	18416.318	185.550	.000
Pretest	24.165	1	24.165	.243	.623
Treatment	551.343	1	551.343	5.555	<b>.021</b>
Gender	41.569	1	41.569	.419	.519

Treatment * Gender	14.782	2	7.391	.630	.534
Error	8237.973	83	99.253		
Total	350025.000	87			
Corrected Total	9243.103	86			

Table 1, show the effect of effect of treatment on pupils' academic performance. ( $F_{(2; 83)} = 5.555$ ,  $P < 0.05$ ). The hypothesis was rejected in the light of the result since the significant value (.021) is less than 0.05. This shown that treatment had significant effect on pupils' academic performance

**Table 2: Summary of Bonferroni's Post Hoc pairwise Comparison of the scores within the three Groups**

Treatment	Mean Score	Experimental	Control Group
Reversed Jigsaw	64.609		*
Conventional Method	56.557	*	

Table 2 reveals that the significant main effect exposed by table 1 is as a result of the significant difference between: Reversed Jigsaw Learning Strategy and Conventional Method. Reversed Jigsaw Learning Strategy refers to experimental group and Conventional Method known as control group. This implies that those taught with Reversed Jigsaw Learning Strategy performed better than those taught traditional method.

**Hypothesis Two:** There was no significant effect of gender on pupils' academic performance in numeracy in Kotangora Local Government Area of Niger state ( $F_{(2; 83)} = .419$   $P > 0.05$ ).

**Hypothesis Three:** There was no significant interaction effect on treatment and gender on pupils' academic performance in numeracy in Kotangora Local Government Area of Niger State ( $F_{(2; 83)} = .630$   $P > 0.05$ ).

### Discussion of the findings

The findings revealed that there was significant main effect of treatment on pupils' academic performance innumeracy in Kotangora Local Government Area of Niger State. It shown that reversed jigsaw cooperative learning strategy improved pupils performance in in numeracy in Kotangora Local Government Area of Niger State. These findings are consistent with that of Obafemi et al (2023), , who in their research studies reported that Pupil's taught using cooperative learning strategies achieved better academically than those taught using the conventional (lecture) method. it disagreed with the earlier findings of Abdulrahim and Al-shakili (2005) and Igbal (2004) that cooperative learning strategy and traditional lecture method produce similar effect in terms of retention of mathematical concepts.

The results also showed that there was no significant effect of gender on pupils' academic performance in numeracy inKotangora Local Government Area of Niger State. The study was in line with Olarewaju (2022), his results revealed that there was no significant difference in gender and pupils' academic performance. The study also revealed that there was no significant interaction effect on treatment and gender on pupils' academic performance in numeracy in Kotangora Local Government Area of Niger State.

## Conclusion

The study examined the effect of reversed jigsaw cooperative learning strategy on pupils' academic performance in numeracy in Kotangora Local Government Area of Niger State. Based on the findings of the study, it was revealed that those pupils taught with reversed jigsaw cooperative learning strategy performed better than those taught with conventional method of teaching.

## Recommendations

Based on the findings of the study, primary school teachers should endeavor to adopt the reversed jigsaw cooperative learning strategy along side with other method in teaching numeracy, curriculum developer should integrate reversed jigsaw cooperative learning strategy in curriculum for prospective teachers, and training for in service teachers.

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