



**EFFECT OF NUMBER LINE SYSTEM GAME IN TEACHING
AND LEARNING OF ARITHMETIC TO BASIC FOUR
PUPILS IN IHIALA LOCAL GOVERNMENT AREA,
ANAMBRA STATE**

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Abstract

This study investigated into the effect of the use of number line system game in teaching and learning of arithmetic to primary four pupils in Ihiala L.G.A. of Anambra State. Two research questions and two hypotheses guided the study. The design of the study was a quasi – experimental research design. The population was seven hundred and sixty-five (765) primary four pupils in Ihiala LGA of Anambra State. Two primary schools and two intact classes were selected using simple random sampling techniques by balloting method out of 23 primary schools in Ihiala L.G.A..The Number Line System Game Achievement Test (NLSGAT) which consist of twenty (20) multiple choice questions was used for data collection. The experimental group was taught arithmetic using the number line system game while the control group was taught the same content using the conventional method. The research questions formulated were analyzed using mean and standard deviation while the two hypotheses were tested using Z-test. Findings to this study revealed that; pupils taught arithmetic using the number line system game performed better than their counterparts taught without using the number line system game. The result also revealed that there was no significant difference between the mean achievement scores of male and female pupils taught with number line system game. Based on the findings of the study, it was recommended among others that the school administrators, stakeholders and government should encourage the use of number line system game in the teaching of arithmetic to primary school pupils in Anambra State.

Key Words: Arithmetic, Number line, Game, Achievement, Multiple Choice Questions.

Introduction

School is a formal educational organization or institution with a group of people working together to achieve some set educational goals and objectives. For Nigeria to realize her dream in the development of primary school education, the Nigerian pupils must show an outstanding performance in all the subjects especially in Mathematics that has many branches including arithmetic.

Arithmetic is the branch of mathematics that deals with non-negative real numbers, their properties and basic operations on them. Arithmetic without doubt remains very important to all disciplines and fields of human work and study (Odili, 2006). It has continued to play significant



role in the development of both the individuals and nations. Arithmetic is also a fundamental science that is needed for the understanding of most fields in the sciences and technological education. Therefore, Arithmetic is a necessary tool needed to be able to function effectively in the present technological age (Aremu, 2008). Arithmetic is an intellectually stimulating subject that affects every talent of human activities such as politics, economics, science and technology.

Despite the benefits of Arithmetic to life activities and as an agent of nation's development and wealth creation, pupils' interest in the learning of arithmetic has not been favourable due to certain factors such as pupils' background, learning environment, non-utilization of viable instructional strategies among others [Ali, 2008] and [Nkwo, 2003]. There has been repletion of poor performance and failure in arithmetic at all school levels (Olaleye, 2004 as in (Olosunde & Olaleye, 2010)).

With this trend, more efforts are needed to reduce the rate of failure and low interest in arithmetic particularly at the basic level which is the foundation of academic pursuit. As such, the use of games may be complementary to the conventional methods of teaching arithmetic in schools, so as to arouse pupils' interest in the learning of arithmetic.

The researchers are of the view that if games and simulations are incorporated to complement the conventional methods of teaching arithmetic, the right cognitive skills may be developed for effective teaching and learning of Arithmetic (Olosunde & Olaleye, 2010). Simulations and games are miniature realities of situations prepared for man to react be ready for real life situations. It involves learning experiences which do not require immediate exposure of the learners to the real object. Practicing with the use of teacher made objects before trying the real object is what is meant by simulation. Simulation technique makes learning more practical, vivid and meaningful and helps learners determine the pros and cons implications of a given task (Manguwat, 2004).

Number lines are lines often used to help young children memorize and practice counting with ordinal numbers. Use of number line system games in teaching arithmetic is considered as one of the best practices that is recognized in making arithmetic more meaningful [Miller, 2009 and Moore,(2012). Games encourage logic-mathematical thinking (Kamii&Rummelsburg, 2008),



facilitate the development of arithmetic knowledge, having a positive influence on the affective component of learning situations (Booker, 2000), and also have a positive effect on students' interest and motivation (Bragg, 2007).

Having seen the effectiveness of game in teaching arithmetic in primary schools, there is then an urgent need to investigate the effect of number line system game in teaching and learning of arithmetic to basic four pupils in primary schools in Ihiala Local government Area of Anambra State.

Statement of the Problem

Due to the abstract nature of arithmetic, basic school pupils require the use of number line game in their calculations. [Dotun (2005)], defined arithmetic games as form of puzzles, magic tricks, fallacies paradoxes or any type of mathematical activities which provides amusement. Arithmetic games bring joy to the learner and teacher, break resistance or negative attitude to learning by reducing tension, flushing boredom and providing conducive environment for learners to develop interest and acquire skills and competence.

At this level of education, the pupil enjoys using game in solving arithmetical problems. But most teachers do not implore the use of game in their teaching. Also, teachers do not have the urge of using games in teaching because they do not have any textbook that treat the use of games in teaching arithmetic to the primary school pupils. Neglect to this has affected the academic achievement of the pupils in arithmetic.

If no effort is made on how to improve the teaching and learning of arithmetic in primary schools, then pupils' performance in mathematics will continue to be poor and this invariably, will affect the advancement of the country. Hence, the need for the present study- to examined the effect of number line system game in teaching and learning of arithmetic to basic four pupils in Ihiala L.G.A., Anambra State.



Purpose of the Study

The main purpose of this study is to find out the effect of number line system game in teaching and learning of arithmetic to basic four pupils in Ihiala L.G.A., Anambra State. Specifically, the study sought to:

1. Determine the mean achievement scores of pupils taught arithmetic using number line system game and those taught using conventional method.
2. Determine the mean achievement scores of male and female pupils taught arithmetic using number line system game.

Research Questions

The following research questions guided the conduct of this study-

1. What are the mean achievement scores of pupils taught arithmetic using number line system game and those taught with conventional method?
2. What are the mean achievement scores of male and female pupils taught arithmetic using number line system game?

Research hypotheses

The following hypotheses were formulated for the study.

HO₁: There is no significant difference in the mean achievement scores of pupils taught arithmetic using number line system game and those taught with conventional method.

HO₂: There is no significant difference in the mean achievement scores of male and female pupils taught arithmetic using number line system game.

Methodology

The research design adopted for this study was a quasi- experimental research design. Specifically, it was a pre-test, post-test non- equivalent control group design which is a type of quasi-experimental design. The subjects exist in intact classes but were randomly assigned to the



control and experimental groups. The study was carried out in the primary schools in Ihiala Local Government Area of Anambra State.

The population of the study comprises of all the basic four pupils in (the 23 primary schools in Ihiala Local Government Area of Anambra State and they are 765) in number. Simple random sampling technique was used to select two primary schools out of 23 primary schools in Ihiala local government area. There are [seventy basic four pupils] in the selected schools. Two intact classes were randomly assigned experimental and control group in each of the selected schools.

The instrument used for data collection is Number Line System Game Achievement Test (NLSGAT). The Number Line System Achievement Test consists of twenty (20) multiple choice questions. This was used as both pre-test and post-test. Pre-test was used to measure the entry performance level of the pupils before the treatment while the post test was used to measure the achievement level of the pupils after the treatment.

Two lesson plans were prepared, one on the use of number line system game in teaching arithmetic to the experimental groups and the other without the use of number line system game in teaching arithmetic to the control groups.

To ascertain the reliability of the instrument, test retest method was employed whereby the Number Line System Game Achievement Test (NLSGAT) was administered within an interval of three weeks in a school that was not part of the schools where the treatment was finally administered. The scores generated from the first and second administration were calculated with the use of Pearson Product Moment Correlation and a coefficient of 0.94 was generated. This showed that the instrument is reliable for the study.

The researcher used the mathematics teachers in the selected schools to conduct the experiment. A pre-test was administered to both experimental and control groups before the commencement of the treatment. In the experimental group, number line system game was used to teach the pupils, while the control groups were taught the same topic without the use of number



line system game. The experiment was conducted during the normal school period and it lasted for four weeks. Within this period, addition and multiplication of numbers were properly treated.

At the end of the experiment, the achievement test was administered to both experimental and control groups and the scripts were marked and scored out of 100% .

Method of Data Analysis

Both descriptive and inferential statistics were used to analyze the data collected. The descriptive statistical tools of mean and standard deviation were used to answer the research questions and the inferential statistical tool of z-test was employed to test the hypotheses at 0.05 level of significance.

Presentation of Results

Research Question 1

What is the mean achievement scores of pupils taught arithmetic using number line system game and those taught with conventional method?

Table Mean and Standard Deviation of taught in Experimental Group and Those taught in Control Group

Group	Number of pupils	Pre-test		Post-test		S.D (δ_2)
		Mean ($\bar{x}$)	S.D (δ_2)	Number of pupils	Mean ($\bar{x}$)	
Experimental group	35	35.00	8.38	35	75.00	9.27
Control group	35	42.86	8.32	35	51.57	9.66

Table 1 show that in the pre-test, the experimental group had mean score and standard deviation of 35.00 and 8.38 respectively, while the pupils in control group had mean score and standard deviation 42.86 and 8.32 respectively. Also, on post-test, the experimental group taught with number line system game method have the mean score and standard deviation of 75.00 and 9.27 respectively while the control group taught arithmetic with conventional method had a mean score and standard deviation of 51.57 and 9.66 respectively. This revealed that pupils on control group taught arithmetic using conventional method performed better than pupils on experimental group taught arithmetic on pre-test while pupils on experiment group taught arithmetic with

number line game performed better than the pupils on control group taught with conventional method on post-test.

Research Question 2

What is the mean achievement scores of male and female pupils taught arithmetic using number line system game?

Table 2: Mean Achievement Scores and Standard Deviations of Male and Female Pupils in the experimental Group

Gender	Number of pupils	Post-test	
		Mean (x)	S.D (s2)
Male	15	76.33	9.10
Female	20	74.00	9.27

Table 2 shows that on post-test, the female pupils taught with number line system game had the mean score and standard deviation of 74.00 and 9.27 respectively, while the male pupils taught with number line system game had the mean score and standard deviation of 76.33 and 9.10 respectively. The difference in mean is 2.33 in favour of males. This revealed that male pupils performed better than the female counterpart in arithmetic when taught using number line system game on the post-test.

HO₁: There is no significant difference in the mean achievement scores of pupils taught arithmetic using number line system game and those taught with conventional method.



Table 3: z-test Analysis Showing the Significant Difference in the Mean Achievement Scores of Pupils taught Arithmetic using Number Line System Game and Those taught using Conventional Method

Group	Frequency	Mean (X)	Standard Deviation (SD) (X)	Degree of Freedom (DF)	Cal Z test	Crt. Z-test	Decision
Experimental	35	75.00	9.27	68	10.35	1.98	rejected
Control	35	51.57	9.66				

Table 3 indicated that the calculated z-test was 10.35 and the critical z-test was 1.98 with 68 degree of freedom. Since the calculated value is greater than the critical value, the H_{O1} stated above was rejected and the alternative hypothesis upheld thus: There is a significant difference in the mean achievement scores of pupils taught arithmetic using number line system game and those taught with conventional method in Ihiala Local Government Area, Anambra State.

H_{O2} : There is no Significant Difference in the Mean Achievement Scores of Male and Female Pupils taught Arithmetic using Number Line System Game in Ihiala L.G.A., Anambra State.

Table IV: z-test Analysis

Gender	Frequency	Mean (X)	Standard Deviation (SD)	Degree of Freedom (DF)	Cal. z test	Decision
Male	15	76.33	9.10	33	0.74	2.021 Accepted
Female	20	74.00	9.27			

Table IV indicates that the calculated z- value is 0.74 and the critical z-value is 2.021 at 33 degree of freedom. Since the calculated -value is less than the critical z-value, the H_{O2} stated above was accepted. This indicate that there is no significant difference in the mean achievement scores of male and female pupils taught arithmetic using number line system game in Ihiala Local Government Area, Anambra State.

Discussion of the Findings



The results of the study reveal the following-There was a significant difference in the mean achievement scores of pupils on experimental group taught arithmetic using number line system game and pupils on control group taught with conventional method. Pupils taught arithmetic with number line system game method had the mean score of 75.00 while pupils on control group taught arithmetic with conventional method had the mean score of 51.57, hence the mean difference is 23.43 in favour of the experimental group. The finding of this study revealed that use of number line system enhanced pupils' knowledge of arithmetic.

Male pupils taught arithmetic using number line system game had a mean score of 76.33 while the female pupils had the mean score of 74.00; hence the mean difference is 2.33 in favour of the male. This finding is in line with the submission of [Ukanu (2008)], who stressed that the academic achievement of pupils taught arithmetic with the use of number line system game in primary school irrespective of their gender was encouraged. And also, it goes in line with the findings of Shrammss (2011) who found out that males perform better than the females in arithmetic.

Conclusion

The number line system game is found to be effective in the teaching and learning of arithmetic in primary schools. Although the use of number line system game favour male pupils than their female counterparts but the Z.test analysis indicated that there the difference in their mean scores is not significant hence there is no significant difference in the mean achievement scores of male and female pupils taught arithmetic using number line system game in Ihiala Local Government Area, Anambra State. Therefore the use of number line system game is pupils' friendly and can use to teach pupils successfully no matter their gender. Hence the use of number line system game should be encouraged and adopted by all stakeholders in education especially at the primary level of education.

Recommendations

The following recommendations were made based on the findings of this study:

1. Primary school teachers in Anambra State should be sensitized on the effect of number line system game in the teaching and learning of arithmetic.



2. Primary school teachers in Anambra State should endeavour to teach arithmetic using number line system game in order to make their teaching easier, interesting and understandable.
3. Government should employ policy on the use of number line system game in the teaching of arithmetic for primary schools in Anambra State, as this will enhance effective teaching and learning.
4. Primary school teachers in Anambra State should not be gender bias when teaching arithmetic in primary schools.
5. School administration, stakeholders and government should encourage the use of number line system game in the teaching of arithmetic to primary school pupils in Anambra State.

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