Effects of Playway Method of Teaching on Primary School Pupils Mathematics Achievement in Oyo Town

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Abstract

The study examined the effect of playway method on primary school pupils Mathematics achievement in Oyo town. A total of 100 pupils (52 boys and 48 girls) were selected through a purposive sampling technique and intact classes from 3 primary schools in Oyo East Local Government in Oyo Town. A validated Mathematics Achievement Test (MAT) developed by the researcher was used for the collection of data. Analysis of Covariance (ANCOVA) an00d Multiple Classification Analysis (MCA) were employed to analyse the data. The result indicated that there was a significant effect of treatment on pupils achievement in Mathematics. The result also indicated that the interaction effect of treatment and gender on pupils academic achievements in Mathematics is not significant. Based on the findings, it was recommended that playway method should be used in imparting Mathematics knowledge to primary school pupils.

Introduction

Primary education as referred to in the Nigeria National Policy on Education (FGN, 2004) is the education given in an educational institution to children aged six to 11 years plus. It is the foundation level of the educational system that runs for six years and it aimed at developing basic literacy, numeracy, communication skills and transmission of the culture of the people to younger generation. This National Policy on Education contained the objectives of primary education. Among the objectives is "teaching the rudiments of numbers, letters, colours, shapes, forms through play (Oyedeji, 2009)

The policy statement went further and stated that to achieve this objectives among others, the government will ensure that the main method of teaching in the primary schools will be through play and the curriculum of colleges of education is appropriately oriented to achieve this. This statement goes further that the nations educational policy makers are aware of the importance of play in the effective education of pupils. But presently, in our primary schools, Mathematics are taught through the conventional methods which make the subject seem to be unnecessarily difficult.

Primary school education is referred to as the first formal level of education on which other academic pursuits are built. This educational foundation is like the bedrock of a building on which super imposed structure is built. In this context, primary school education stands as the basics and reference point for educational development of a country. It can thus be said that if the foundation is weak, the superstructure is prone with various defects. Primary level is the key to the success or failure of the whole system. Therefore, Mathematics as a subject should be introduced at foundation level in the hand of a good teacher who is grounded and skillful in the teaching of the subject .A primary Mathematics curriculum, like any subject in the curriculum at the primary

school level, should engendered students with love of learning (Thomas, 2012).

Mathematics is a universal language, a symbolic language for all cultures and civilizations. The language of Mathematics enables human beings to think about, record and communicate ideas, concerning the elements and the relationships of quantity. The scope of Mathematics includes the operations of counting, measurement, arithmetic, geometry and algebra as well as the ability to think in quantitative terms. The term Mathematics encompasses more than the term arithmetic. Mathematics is the study of the whole fabric of numbers and their relationship while arithmetic refers to the computational operation taught in the schools (Olosunde, 2009).Though, Mathematics being so important subject and occupying a central position since the ancient period it has not been the interest of many students. The gaps are found between aspiration and achievement in Mathematics. Mathematics is highly abstract. It is concerned with ideas rather than object, with the manipulation of symbols rather than the manipulation of object; it is closely knit structure, in which ideas are interrelated. Mathematical concept are hierarchical and interconnected, much like a house of cards, unless lower level of concepts cannot be understood (Thomas,2012). Pupils who discover some of the structure of Mathematics are often impressed by is beauty, they note the lack of contradictions and they see how a new technique can be derived from one that has already been learned (Oyedeji, 2009).

The teaching and learning of Mathematics is a complex activity and many factors determine the success of this activity. The nature and quantity of instruction are material, the presentation of content, the pedagogical skills of the teacher, the learning environment, the motivation of the pupils are all important and must be kept in view in any effort to ensure quality in teaching- learning of Mathematics .This paper examined an effort to discuss innovation and innovative practice in teaching Mathematics under playway method strategies and pedagogical resources.

The Nigerian primary school teachers are generalists by virtue of their different specializations. This has strong implication for the knowledge of Mathematics imparted to the pupils, as well as the methodology employed. The primary school education holds a strong position in the educational system of any nation particularly in the developing country like Nigeria, aspiring for scientific and technological advancement (Olosunde, 2009).

Throughout life, individuals are confronted with problems requiring Mathematics activities. In addition to the computational skills often with Mathematics instruction, everyday problems require Mathematical conceptualizations, logical reasoning and analysis, how effective one in solving such problems is a function of cognitive development which is the result of/appropriate learning opportunities, the perceived importance of Mathematics to solve the specific problem and the existence of other related activities necessary for success (Medinat, 2009).

Throughout a child education Mathematics is one of the subjects he/she will encounter time and time again. It is important for educators to encounter the aim and objectives of teaching Mathematics each year at primary school level so they many have additional context in which plan activities within classroom. These themes should also be carry on throughout a child's primary school education and beyond.

Pupils should achieve a basic level of numeracy and competence in dealing with numbers ,pupils should be taught the basic of numeracy including counting ,addition and subtraction in both formal abstract level (equation) and through the use of real word problem such as counting object at each level of primary Mathematic training, pupils should use their previous knowledge like in using addition and subtraction as the basic of learning multiplication.

In Nigeria, teachers in the primary schools are used to the conventional method of teaching (Oduolowu, 2000). The teachers dominate the learning process by doing all the talking, rather than allow the children to learn by discovery through play. In primary schools, emphasis is placed on rote learning and both teacher and parents assess the pupils by his or her ability to recite rhymes, poems and speak good English. This method of teaching is not in line with the purpose of primary education as stated in the National Policy on education which is "inculcating in the child the spirit of enquiry and creativity through the exploration of nature and the local environment, playing with toys, artistic and musical activities.

Play is a natural instinct of the children. It has been effectively used for teaching. While playing, pupils recognize their own needs, they help in planning activity, accept guidance and help set up their own goals. Through their natural cooperation and participation maximum amount of learning results. During play learning becomes real, interesting and the atmosphere is more free, informal and familiar for children.

Play also is an activity for the development and growth of children in all aspects of life. It is especially useful in all round development of the child in the cognitive, affective and psychomotor domains of learning. Maduwesi, (1986), states that play like the child's first language is as natural as mother's milk. It is spontaneous, voluntary, self selected and natural. Play is something that children will choose to engage in given opinion and is something they do with persevearance .The playway method according to Frobel is the work of children. It is the purest, the most spiritual and product of man at this stage (Medinat,2009)

Playway methods of instruction help in developing desirable attitudes and skills and gives confidence to learners. Many types of games and toys are now available to children which have their roots in Mathematical concepts and ideas. These games use patterns and puzzle. Many types of dominoes, number checkers, counting frames, patterns of magic squares, puzzle boards or blocks are now commercially available. These may be effectively used to make meaning to many Mathematics topics that an abstract in nature (Genala, 2010).

The rationale for the present study is to find out if playway strategy would yield positive effects on achievement of boys and girls in Mathematics and if there would be any difference of boys and girls in Mathematics after being exposed to playway method.

Playway method is based on activity based learning. It stimulates creative skill and self expression. According to American Test Institute (2012), playway method of instruction has the following benefits:

- This system is life oriented, it served as a second home for the children
- The needs of the children can be fulfilled and increased
- It creates apt learning environment
- It help to prolong the memory skills
- It provide opportunity to all children to participate. Therefore, teacher has to play in the initial stage itself to fulfill the needs of every child and act accordingly in the classroom. (American Test, Institute, 2012).

A lot of research works have been carried out to find out the value of play in the education of the child. Okoye (2009), have discovered that play activity and Mathematics concept development are complimentary aspect of problem solving since the playful approach encourage people to bring all their experiences to bear on the problem, It encourages openess and awareness that lead to insight(Ogunsanwo,2000).

Similarly, one can say that a playway method approach to teaching of Mathematics will encourage pupils to bring all their experiences outside classroom in the solving problem "Children desire intellectual and aesthetic satisfaction from Mathematics (Liebeck,1984).When children

learn Mathematics, they need to play with real objects and explore real problems that interest them. The teacher's task is to lead children through playway activities.

Oyedeji (2009), have identified the supports of teaching and learning of Mathematics with advent of concrete materials and learners participation through interaction with the concrete materials as being effective in promoting a meaningful understanding of Mathematics. Concepts through interactive with concrete material, an activity is carried out in learning situation.

However, teaching seems to be an interesting adventure especially when our students are excited about learning Mathematics, hence teachers are enthusiastic through playway method in Mathematics lesson. The inquiry approach provided by playway method help the pupils to discover ideas and communicating his discoveries. The playway strategies include rhymes, singing, counting, playing game and so on when used but teacher may improve pupils academic achievement in Mathematics.

Gender is another variable identified to influence Mathematics achievement in Primary school. Pupils were compared and it was discovered that male pupils performed better than females in Mathematics in a study conducted by (Olosunde, 2009). Conway (2008) in his study, concluded that female performed better in science than males. These findings contradicted that of Olatoye and Ogunkola (2008) who found that performance of male and female pupils in Mathematics does not differ in anyway but in agreement with that of (Pailson, 1994) who predicted achievement for boys not for girls.

Oduolowu (2000) suggested one area that is relevant to this study is Mathematics ability favouring males that differences in performance of males and females in Mathematics is due to existence of genetical factor favouring boys in the area of spatial and visual ability. There is popular statement that girls as under or non-achiever which are now considered more mythical than factual (Wringley 1992). Thus, the inconclusive nature of the influence of gender on Mathematics necessitated consideration of gender as variable in this study.

Scholars such as (Olosunde, 2009; Oyedeji, 2009 and Medinat, 2009) have agreed that there are differences in gender which are important part of our lives. Thus, there are masculine and feminine roles. These roles are defined in terms of behaviours, personality characteristics and attitudes that cultures find appropriate for each sex, gender roles therefore have the potential of affecting behaviours and activities of learners in learning environment particularly in the classroom situation (Odunlowo, 2000)..

Recent research studies in Mathematics education have sought to address the issue of teachers' method of teaching as the major factor contributing to pupil's understanding of Mathematics concepts. The teaching of Mathematics in Nigeria primary schools is in deplorable state. Most pupils often get confused and discouraged by some methods used by Mathematics teachers which consequently lead to a fright and phobia at early stage. This calls for the need to impart adequate knowledge of Mathematics to the pupils through the effective use of effective instructional techniques. The study examined the extent to which playway method could integrate achievement in Mathematics concepts in primary schools.

Objectives of the Study

The study x-rayed the features and characteristics of playway strategy in teaching-learning of Mathematics at foundation stage. The study was to determine the effects of playway method of teaching on Primary School pupils academic achievement in Mathematics. It also examined the moderator effect of gender and interaction effect of treatments and gender on academic achievements of primary school pupils in Mathematics in Oyo town, Nigeria.

Hypotheses

The following hypotheses were tested in this study.

HO_1: There is no significant main effect of treatment on pupil's academic achievement scores in Mathematics.

$H0_2$. There is no significant main effect of pupils gender on their academic achievement scores in Mathematics

HO_3: There is no significant interaction effect of treatment and gender on pupil's academic achievement in Mathematics.

Methodology

Pre-test-Postest Control group quasi-experimental research designs was adopted in this study using 2 x 2 factorial matrix as presented. As presented below:

Treatment	**Gender**	**Academic achievement**	
		High	**Low**
Playway	**Male**		
	Female		
Convectional method	**Male**		
	Female		

Treatment: This is the instructional strategy manipulated at 2 levels.

1. **Playway Method:** Use of rhymes, games and concrete objects was used to teach the concept of numbers to primary two pupils in Oyo town.
2. **Convectional Method:** This method is used as control group to the pupils in primary two pupils.
3. Academic Achievement of primary school pupils at 2 levels 1. High academic achievement 2. Low academic achievement.

Moderator variables at 2 levels. There is only one moderator variable in the study and it is the gender of the pupils. This is at 2 levels

Gender- 1.Male
2. Female

Dependent variable: This is the academic achievement of the pupils in primary mathematics.

Selection of Participants

The population of the study comprised all primary schools pupil's in Oyo East Local government in Oyo town. A total number of one hundred primary two pupils were purposively sampled using simple intact classes due to availability of resource materials in sampled and teachers pupils ratio in three schools in Oyo East Local Government as shown below.

Table 2: Name of Schools and number of Students Sampled

S/N	Name of School	No of Students
1	Baptist Primary School, Agboye, Oyo	30
2	Durbar Primary School, Oyo	25
3	Methodist Primary School, Ajagba	45
	Total	100

Instrument

- Mathematics Achievement Tests (MAT) was designed by the researcher on Primary two curriculum (number and numeration and shapes measurement). This is a 20-items multiple choice instrument with options from A to D. To ascertain the effectiveness of the content, construct and face validity the researcher involved 'expert judgement' of the subject matter by the subject teacher in two primary schools in Oyo East Local Government and experts in the Primary Education who specialise in Mathematics. Modification was made and

subjected to pilot testing.KR20 method of estimating reliability was used in this study. The reliability coefficient for MAT was r=0.86.

- For the stimulus instruments, Course outline on Playway method (COPWM): This contained the training manual design for teachers in experimental group, it contains the key structure and element of playway methods, activities of pupils and teachers, materials for teaching, assessment technique etc. The COPWM was shown to experts in Institute of Education for adequacy of materials, instructional steps and teachers and pupils activities, based on their comments, modifications were made.

Table 2 Shows the Treatment Plan

Week	Playway Method	Conventional Method
1	Administration of pretest (MAT)	Administration of pretest (MAT)
2.	Rhyme, writing, counting activities on the teaching of number and numeration recognition of number (1 – 100)	Teaching of numbers (10100) recitation and writing of numbers.
3	Addition of numbers using counters, abacus, sticks, pictures	Addition of numbers treated using examples.
4	Place value using bundle of sticks and unit abacus. The addition with carrying or exchange.	Addition of numbers with carrying or exchange multiplication using repeated method, simple division

Research Procedure

1. Mathematics Achievement Test (MAT) with lower areas of recognitions, remembering, understanding and thinking in number and numeration was administered before treatment to ascertain the level of achievement of pupils in Mathematics. This was carried out to both treatment group and control group which lasted for one week.
2. Playway method was used to teach the concept of number and numeration in the treatment group while normal teaching was adopted to control group. During every lesson given to the treatment group, learning activities and leisure time pupils were introduced to stimulating and challenging activities. This lasted for weeks.
3. (MAT) was administered to the two groups as post test and the scripts were collected and marked. The stimulus instruments was used in explaining the key structure of playway method with research assistants assisted in administration of the instruments.

Results

HO_1: There is no significant main effect of treatment on pupils achievement in mathematics

Table 4: Summary of 2 x 2 analysis of covariance (ANCOVA).

Source		Df	Mean square	F	Sig.	Eta square
Corrected model	57792.565	4	14448.141	324.808	.000	.932
Intercept	2941.797	1	2941.797	66.134	.000	.410
Pre-test	2491.212	1	2491.212	56.005	.000	.371
Treatment	25834.574	1	25934.574	580.786	.000	.859
Gender	7.871	1	7.871	.177	.675	.002
Treatment	4.762	1	4.762	.107	.744	.001

Gender						
Error	4225.795	95	44.482			
Total	153644.00	100				
Corrected total	62018.360	99				

R square .932 (Adjusted R square .929).

Table 3shows that there is a significant main effect of treatment on pupils achievement in mathematics ($F_{(1.95)}$ =580.79 eta square = 0.86; p< 0.05). Therefore Ho1 is rejected. Also, Gender effect as revealed from the table 3 is not significant ($F^{(1, 95)}$ = 0..177, eta square = 0.002, p>0.05) The magnitude effect of the difference between treatments and gender is presented in table 4 below.

Table 5 Estimated Marginal Means on pupils achievement

Treatment	**N**	**Mean**	**Std Error**
Expt. Group 1 (Playway)	55	80.45	1.01
Control (Convectional)	45	40.65	1.12
Gender: Male	52	60.837	.955
Female	48	60.257	.978

Table 4 shows that those exposed to playway method have the higher achievement mean score (X= 80.45; than those exposed to conventional teaching (X = 40.65)

HO_2: There is no significant main effect of gender on pupils achievement in mathematics.

Table 3 shows that the effect of gender on pupils performance in Mathematics is not significant ($f_{(1,95)}$ = 0.177; eta square = 0.002, P>0.05) Therefore Ho_2 is accepted. Table 4 further revealed the magnitude effect in the performance of male and female pupils from the table. Male pupils exposed had higher mean scores(x = 60.837) than female (x = 60.257), though not significant. The implication is that the strategy itself is effective in improving the achievement in Mathematics irrespective of gender as a variable.

Ho_3: there is no significant interaction effect of treatment and gender on pupils achievement in Mathematics.

Table 3 shows that the interaction effect of treatment and Gender on pupil's achievement in Mathematics is not significant (F(1,95) = 0.107; eta square = 0.001; P >0.05). Therefore HO_3 is not rejected.

Discussion

The major issue addressed in this study was to find the effect of play-way method on pupil's achievement in Mathematics. It also sought to find out any interaction effects among treatment and gender on pupils achievement in Mathematics. Over the years, poor performance of pupils had been attributed to the teacher centered teaching methods with teacher dominating at the expense of pupils not being encouraged to construct their own knowledge or take active part in the teaching. The study has shown that playway strategies is superior to the convectional method in enhancing achievement of primary school pupils in Mathematics. This agrees with the view expressed by Busari (2003) that play is an indispensable activity. Oyedeji, (2009) also asserted that play encourages languages development and promotes physical and mental growth.

The study found out that there is no significant effect of pupils gender on achievement in Mathematics using playway method. Review of research on gender also shows that the cognitive power necessary for mathematical ability correlates with general intelligence in which no consistent sex difference were found (Macoby and Jachin; 1974, Olosunde 2009). The study also determines the 2-way interaction effect of treatment and gender of pupils' achievement in

Mathematics. This findings in conflicts with that of Olosunde (2009) which revealed that 2-way interaction effects of treatment and gender could be attributed to lower female/girls entry as well as performance in Mathematics when compared with that of males/boys.

In a study conducted by Olatonye and Agbatogun (2009) found no significant difference in the performance of male and female pupils in mathematics. The implication is that gender was found to have no impact at all on Mathematics achievement as both male and female pupils performed well alike in Mathematics. Olatoye and Ogunkola (2008) also found no significant in male and female students achievement in science. This opposes the findings of Gorman (2006) that there is a significant difference in favour of male students.

The finding of this study have therefore provided further empirical support on the usefulness of play-way strategies over the other teaching methods in enhancing achievement of pupils in mathematics.

Summary and Conclusion

The outcome of this study is very insightful and somewhat revealing.

- There is significant main effect of treatment on pupils achievement in Mathematics. This revealed that pupils exposed to playway method performed better than conventional method The implication is that playway method is superior as shown from the result.
- Gender effect is not significant as shown from the result. Though the male pupils had higher mean score than femals but the difference is not significant. This implies that playway method is a good and produce higher achievement scores irrespective of the gender. .
- The interaction effect of treatments and gender on pupils achievement is not significant from this study. It can be deduced that play-way method instructional strategy should be used in imparting mathematical knowledge to primary school pupils because learners learn best in atmosphere of free thinking and self expression of opinion.

Recommendations

The findings of this study showed that the use of playway method is not only effective strategy but effective for improving achievement in Mathematics. This could be due to the fact that playway method is useful in all round development of the child (Maduewesi, 1986). Also, because, playway involve the use of concrete materials and learners participation through interaction with concrete materials as being effective in promoting a meaningful understanding of Mathematics (Oyedeji, 2009).

Also, primary school teachers should ensure that they spend less time on instruction, rather they should ensure they lead the pupils to understand concepts and processes through probing question which is aspect of playway method.

Seminars, workshops should be organized on teaching and research in primary schools Mathematics with particular attention to playway strategy which is capable to eliminate mathsphobia, improve attitude and achievement in Mathematics.

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