
The Impact Of Visual Images Used In The Teaching And Learning Basic Mathematics In Nursery Schools In Nsukka Urban Primary Schools

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Abstract

The study was designed to investigate the status of learning basic mathematics among nursery schools pupils with visual package approach. Visual package is a specially designed artistically illustrated images designed with a focus on the Child's cultural environment. The main research design was a quasi experimental design, while the specific study design used in the study is the pre-test post-test control group design. The subjects for the design were drawn from four nursery schools in the Nsukka Urban in Enugu State. Four research questions guided the conduct of the study. Data generated by this instrument was analyzed using mean rating. The study provided indications that nursery pupils taught with visual package approach performed better than those taught without appropriate visuals. The study further revealed that the conventional method which is commonly used by nursery school teachers in administering instruction with symbols is not effective and efficient, and consequently, suggests a change of approach. Recommendations and suggestions were made based on the findings of the study.

INTRODUCTION

Learning is essential for human development and it begins informally very early in life. Early childhood education begins at nursery schools and it is recognized by the government. The national policy on education covers this aspect with emphasis on crèche, the nursery and the kindergarten. The government has kin interest in this aspect of child education and it has been entrenched in the national education policy. Some of the government's responsibilities to this sector as contained in the national policy of education (2004) include: to promote the training of qualified pre-primary school teachers; contribute to the development of suitable curriculum; supervise and control the quality of such institution; and establish pre-primary sections in existing public schools. Nursery education is becoming popular especially among

the elite in the society who are influenced the social and economic circumstances to patronize it.

The establishment of nursery schools in Nigeria has encouraged the development of instructional materials by educators and curriculum designers. Consequently, varieties of resource materials have been produced by teachers and researchers and these instructional materials have had important influence on instructional implementation in schools. Most popular media of instruction in nursery school commonly in use include two-dimensional and three-dimensional materials. They are regarded technically as artistic or visual images. Functionally, visual images help the teacher to transmit knowledge of a subject fast and effectively to the learner. Conceptually, visual images present ideas clearly and it can be coded or decoded as language of communication.

In many learning experiences, it has been established that a relevant picture can present information more quickly than lengthy and verbal descriptions. Study by Sander (1979) presented important findings, which validated the efficacy of artistic images. Sander observes that:

“You remember ten percent of what you hear.
You remember fifty percent of what you hear and see.
And you remember ninety percent of what you hear, see and do.

In other words, from the above statement, one could say that if I hear, I may forget, if I see, I can remember, see and do, my knowledge of the subject might increase. Grover, (2010) seems to have agreed with Sander cited above as he notes that a good way to teach young learners is to make it visual, using objects and pictures to drive the lesson home. By so doing, he says you make the lesson less abstract and more realistic. This makes it easier for young learners to understand.

One subject area currently receiving attention in secondary and primary education in Nigeria is mathematics. This is due to the interest which our educational system has developed for English language, mathematics and science education. The reason for this interest may not be difficult to determine. Recent government policy on admission into tertiary institutions that prescribed 60% admission for science as against 40% for art subject has shown the governments focus on science and technology education (Ali, 2000).

One of the purposes of pre-primary education as contained in the national policy of education (2004) is to teach basic arithmetic with emphasis on understanding of numbers, letter, colors, shapes and forms as the child plays with artistic objects or visual images.

Nigeria is still grouped amongst the third world countries. Education is one of the sensitive areas where Nigeria is lagging behind. This may not be because there is no proper educational planning, but the methods of implementation of these plans need to be revisited. Teaching and learning of mathematics at all levels of education will lead to advanced technological development in the country. Nursery education which is the focus of this study starts from the ages of two year (crèche) to five years. The development of a child during these formative years is very crucial. Therefore, adequate foundation has to be laid for efficient and effective training of the child to ensure mental, physical and spiritual development.

Mathematics, which involves both mental and physical (manipulative) processes need to be handled with skills in teaching and learning of it in order to achieve success. It has been observed that most children find it very difficult to learn this very important subject. The major reason is that good instructional materials that are suitable for use in teaching elementary mathematics at the fundamental level are lacking and the ones available are inadequate. This problem has serious implications for the child's development, which include lack of interest and fear for the subject. Based on the issues raised above, it has become necessary for researchers to develop teaching aids that are adequate, efficient and effective and suitable for use in the teaching of mathematics in the schools, particularly, at the nursery level where these aids are grossly inadequate.

In this study, the researcher has tried to find out how art in the form of visual images, can be modified and brought in to enhance the teaching and learning of mathematics. This seems to be in agreement with, Timothy's (2009) opinion that ninety percent of all the information that comes to the brain is visual, and that the brain processes visual information 60,000 times faster than text. He also observes that sixty five percent of our students are visual learners and therefore, the use of appropriate visuals for instruction in nursery schools should be encouraged.

STATEMENT OF THE PROBLEM

Nursery education is new in Nigeria and the major factor responsible for this development appears to be the growing desire of Nigerian women to work in government and private establishments. The introduction of nursery education has helped nursing mothers to provide both training and nursery opportunities for their infant when they are at work. The increasing

demand for nursery schools has encouraged the production and distribution of instructional materials for nursery education. In this regard most business men are utilizing the opportunity to make brisk business. Most bookstands and bookshops have collections of nursery school books and instructional materials printed and circulated without edition or review. Thus, proper assessment of these materials with regard to their efficiency and effectiveness, have not been conducted. The writer of this paper observes following problems:

1. The visual images/symbols have no relationship with the child's environment and this may have adverse effect on the child's development.
2. Most of the writers are not trained in art education and they lack pedagogical knowledge of the subject.
3. Some of the visuals are poorly illustrated and labeled and therefore, misinform rather than educate.
4. Most nursery materials currently in circulation are not edited, reviewed or tested to ascertain their efficiency and effectiveness before publication.

The solution to these problems has posed a challenge to art education, and this has made a case for this study.

Research Objectives

The objectives of this study are to:

1. Identify the existing visual images currently in use in teaching numerals in nursery schools.
2. Examine whether they facilitate learning of basic mathematics in nursery schools.
3. Expose the nursery pupils to "visual Package" instruction material to determine its effect on the child during instruction process.

Research Questions

To facilitate the investigation of the problem of this study, the following questions were formulated:

1. How do pupils, taught numerals with the visual package instructional materials and those not so taught perform in a cognitive achievement test?

2. How do pupils taught numeral with visual package approach and these not so taught perform in retention as measured by the numeral test?
3. Is the level of participation of pupils greater when the researcher's visual package is used in the study of numerals in basic mathematics?
4. How effective is the interaction between media of instruction and intellectual ability of pupils to retain numeral concepts as measured by their scores in the numeral retention test?

Methodology

The main design employed in the study is the quasi-experimental design for the purpose of evaluating the effects of teaching with the researcher's "Visual Package Approach" on pupil's achievement and retention in nursery school numerals or basic mathematics. It involved the use of intact classes to avoid disruption of normal class activities in the schools involved in the study. The specific design used in the study is the pre-test post-test control group design, Cambel and Stanley (1963). It involved two experimental control groups in each of the classes involved. This is to say that class is divided into experimental and control groups. Group one comprises the experiment group taught numeral with the visual package. Group two are taught with abstract visuals and number group control.

Population of the Study

The population of the study is 210 and was drawn from four nursery schools in the Nsukka Urban of Enugu State. 52 pupils were chosen from the National Association of University Women Nursery School, Nsukka (NAUW). 54 were chosen from the University School, University of Nigeria, Nsukka. 52 were chosen from Audabi Nursery schools, Nsukka, and 52 pupils from the Hillcrest Nursery/Primary School, Nsukka. The choice of the schools was purposive and convenient as they are the few best and well populated nursery schools in the Nsukka urban area. The population comprised the children in the "Elephant Classes" (Nursery three) of the above mentioned schools. The reason for the choice is because they have been introduced to addition and subtraction of numbers from one to ten contained in the researcher's visual package.

Sample and Sampling Procedure:

The samples comprised of 210 nursery three pupils in eight intact classes drawn from four nursery schools in Nsukka education zone, Enugu State. The size is based on the fact that at this age of the child, fewer numbers may make for effective control. Mevey (1973) as in Obi (1997) said that “samples of 200 or more subjects are adequate to test cognitive achievement and retention”. Each of the sample classes were shared into experimental and control group. Altogether, 110 children made up the experimental group, while 100 made up the control group.

Data Analysis and Results

Descriptive statistics was used to analyze the data obtained from the study. The descriptive statistics involved the computation of the means and standard deviations from the achievement and retention test score of pupils classified into experimental and control group and ability levels. The computed means scores were used in answering the research questions.

Visual Package Instruction Material

The researcher’s visual package contents include: drawings of familiar objects compiled as assignment package on addition and subtraction of numeral from one to ten. They were also used as flash sheet during the process of teaching the experimental group.

Data Analysis and Results

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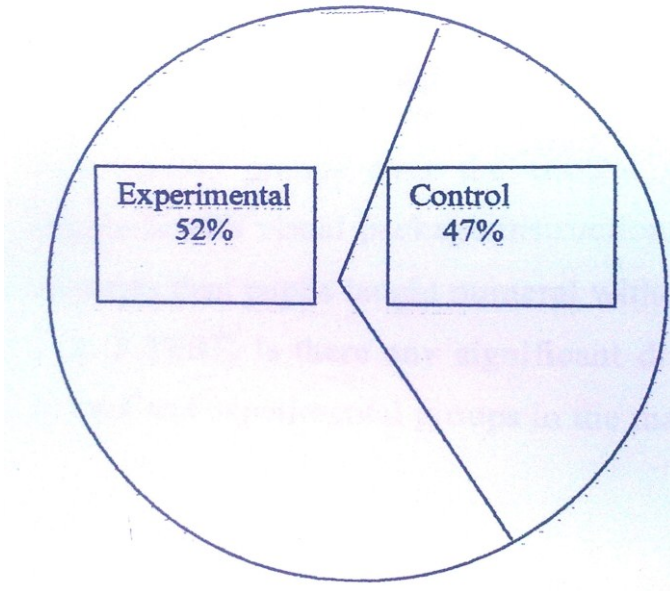


Figure 1. Pie Chart showing distribution of pupils in the study group

Research Questions

Research Question 1. Is there any difference in the performance of children taught by the traditional method (control Group), and those taught by visual package approach (Experimental group)?

Test Score

Group	No	% of total No	Minimum	Maximum	Mean	Std Deviation
Control	100	47.6%	.00	100.00	40.6220	21.98544
Experimental	110	52.4%	33.30	100.00	86.9536	22.18391
Total	210	100.0%	.00	100.00	64.8910	31.99404

Table 1

The result in table 1, above showed that pupils in the experimental group had a higher mean score of 86.9536 more than the pupils in the control group who had a less mean score of 40.6220. The superior performance of the experimental group over the control groups showed that pupils taught numerals with visual package instruction approach retained more numeral concepts than pupils taught numeral without visual package approach.

2. T-TEST, Is there any significant difference in the performance of the control and experimental group in the mathematical test administered?

Group Statistics

Group	No	Mean	Std Deviation	Std Error Mean
Test scored control	100	40.6220	21.98544	2.1985
Experimental	110	86.9536	22.18391	2.11515

Table.2

Independent Sample Test

Levine's Test for Equality of Variance t. Test for Equality of mean

	F	Sig.	T	Sig. (2-tailed)
Test Score	374	541	-15180	.000
Equal Variances assumed				

Table.3

CROSS TABULATION SHOWING THE DISTRIBUTION OF THE STUDY GROUPS BY LEVEL OF PERFORMANCE

The result presented in table 3 above showed that in each case, the experimental group proved superior to their counterparts in control group as reflected in the test scores.

Chi- square tests

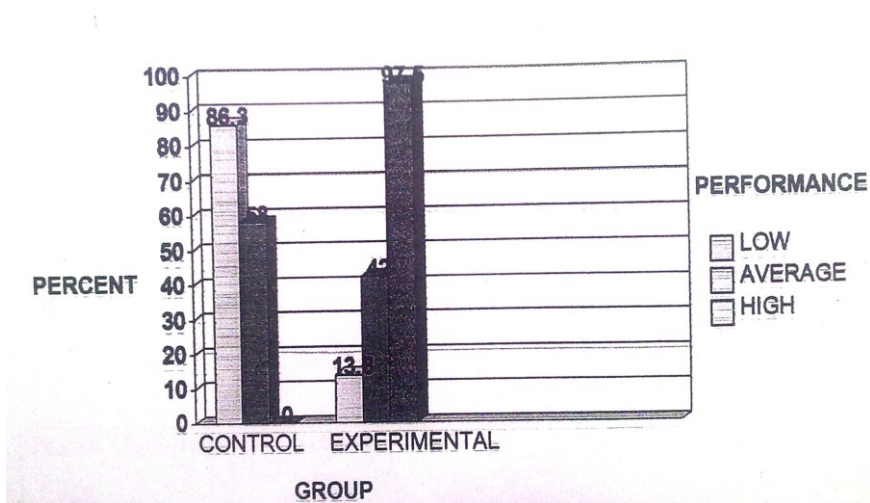


Figure 2. Distribution of pupils by level of performance for the study groups

The results obtained in the above figure showed that the experimental high level group was superior to the control high group. Similarly the average experimental group scored higher than the average control group. The control group recorded the lowest performance test conducted. The result can be attributed to the method and instructional material used.

IS THE LEVEL OF PERFORMANCE DEPENEDENT ON THE METHOD USED?

Performance-group cross tabulation

		Group Control	Experimental	Total
Performance	Low Count	69	11	80
	% Within Group	69.0%	10.0%	38.1%
	Average Count	29	21	50
	% Within Group	29.0%	19.1%	23.8%
	High Count	2	78	80
	% Within Group	2.0%	70.9%	38.1%
Total	Count	100	110	210
	% Within Group	100.0%	100.0%	100.0%

Table 4

Chi-Square Test

Value	Df	Asymp Sig (2-Sided)
Pearson Chi-Square	115.315	2
		.000
No of Valid Cases		210

Table 5

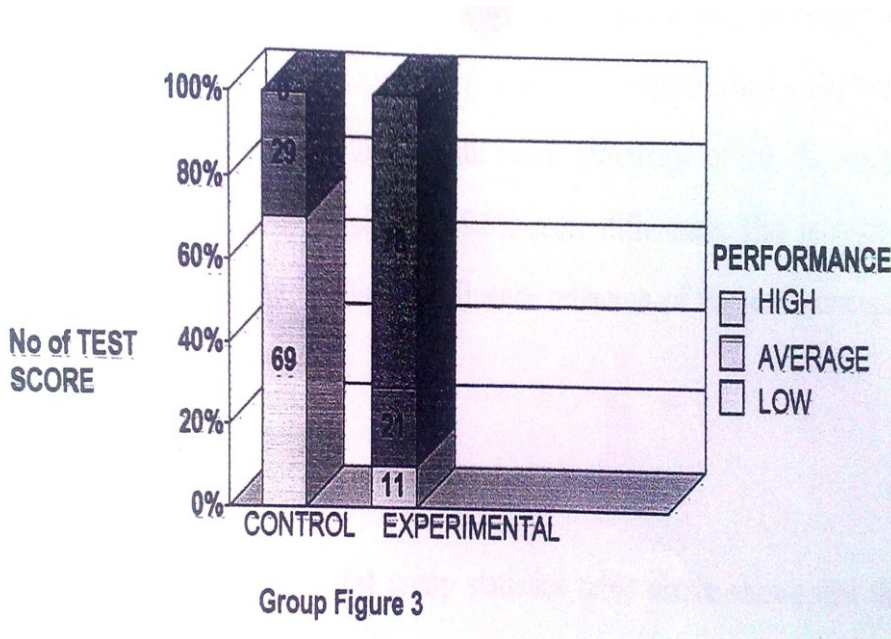


Figure 3, Percentage Distribution of pupils in the various groups by level of performance

Research question 3. Is the level of participation of pupils greater when visuals are used in the study of numerals in mathematics?

From the analysis of the scores of both the experimental and control groups, one would be convinced that the use of visual package approach in the teaching of numerals generated interest in the children, hence the high performance of the experimental group taught with the visual package. This agrees with the findings of one of the world's famous psychologist, piaget who notes that "assimilation occurs when a child incorporates new knowledge into existing knowledge, while accommodation occurs when a child adjusts to new information" (Obi, 1993). The researchers' visual package is made up of new and modified illustration from the child's cultural background. The purpose was to enhance greater participation of pupils and assimilation of lesson. The findings above have proved its effectiveness.

Research Question 4. How effective is the interaction between media of instruction and intellectual ability of pupils to retain numeral concepts as measured by their score in the numeral retention test?

The result on figure 3 showed that high ability pupils exposed to visual package instruction material was superior to high ability pupils not exposed to visual package instruction which a mean scores difference of 68.9%. For the middle (average) ability pupils, the experimental group was superior over their control group with score difference of 10.1%, while experimental low ability pupils had 59.0% score difference. This indicated instruction of media and ability to influence retention of numeral concepts by pupil of varying abilities.

Hypotheses

HO.1. The result in the T-test group statistic table above shows that the difference between the two groups in the standard error man calculation were statistically significant at 0.05 level of significance. The result shows that there was no significant difference in the mean achievement of scores of pupils exposed to visual package instruction and those not so exposed as measured by a numerical achievement test.

HO.2. There will be no significant interaction effect ($p < 0.5$) between media of instruction and ability of pupils as measured by their scores in a numeral achievement test. The confirmatory test shown in the Chi-square test revealed the assumption significant of the group as .000, which falls within $P < .05$. This shows that there is no significant interaction effect between media of instruction and ability of pupils as measured by their scores in a numeral achievement test.

HQ.3. There will be no significant difference $P < 0.05$ in the mean achievement scores of high, middle and low ability pupils as measured by a numeral achievement test.

Table 6

TEST SCORE

GROUP	PERFORMANCE	N	% of total N	Mean	STD Deviation
CONTROL	LOW	69	69.0%	27.9913	12.27936
	MIDDLE	29	29.0%	66.5793	.11142
	HIGH	2	2.0%	100.0000	.00000
	TOTAL	100	100.0%	40.6220	21.98544
EXPERIMENTAL	LOW	11	10.0%	30.3000	.00000
	MIDDLE	21	19.15%	66.6000	.00000
	HIGH	78	70.9%	100.0000	.00000
	TOTAL	110	100.0%	86.6536	22.18391

By the above result, the difference in the mean scores of the level in the groups falls statistically significant at 0.05. This shows that there is no significant difference in the mean achievement scores of high, middle and low ability pupils as measured by numerals achievement test.

HQ.4. there will be no significant interaction effect ($P < 0.05$) between media of instruction and ability of pupils as measured by their scores in a numeral retention test.

The result in the table above confirms that there is no significant interaction effect between media of instruction and ability of students as measured by their scores in the numeral retention test.

DISCUSSION

Discussions are made under the following sub-headings:

1. The effect of visual package approach on the teaching of numeral in nursery schools.
2. The interaction effect of the visual package and ability of pupils on the learning of numerals.
3. The effect of visual package approach on retention of numeral in mathematics.

4. The interaction effect of visual package and ability of pupils on retention of numeral concepts in mathematics.

1. (a). The result revealed that visual package approach has a significant effect on the pupils' cognitive achievement in learning of numerals in nursery mathematics concept.
- (b). the visual package instructional approach proved superior to the use of the conventional abstract visuals. The performance of the experimental groups confirms this result.
- (c). the researcher's visual package is familiar in a true sense of function and resemblance and so aroused the interest of the pupils and sharpen their curiosity.

It will be noted that mathematics concepts are abstract. It makes meaning to a learner only when it is concretized and drawn nearer to their real life experiences. When lessons were presented using illustrations of real and familiar objects, through direct observation, the pupils are able to recognize objects and integrate the meaning into the numeral lesson before them, which were based on addition and subtraction in mathematics concepts. Brown's (1969) observation affirms that the result will have these advantages. First, it will stimulate the pupils' interest. Secondly, ideas that otherwise might be difficult to understand may be made clear.

(2). Visual package approach was differentially effective on cognitive achievement of pupils of differing abilities. The poor performance of the low, average and high group of the control group may be because:

- The visuals used may not have been familiar to them.
- The visuals may not have been clearly defined and so impossible for them to understand.
- The visuals may not have been selected from the pupils' environment and so they were not able to identify them. Another reason may be that the background and environmental upbringing of the pupils may have contributed to the imperfect interaction between the visuals and the pupils.

(3) The result further showed that visual package approach had a significant effect on the pupils' retention of numeral concepts in mathematics. The visual package organization of concepts to be learned in the form of diagrams and pictures provided source of clues that served to enhance later, retention of numeral concepts learned. This explains the better retention performance of the experimental group. This corroborates the findings of some writers such as Okeke, (1995), Okwor, (1995), and Ike, (1995). They observed that the purposes of innovative techniques and media in education are to make available alternative modes and media of instruction: to make learning fun, exiting and interesting; and to provide educational resources appropriate to the need and demands of the society. The ability of visual package approach to add concreteness to the numeral instructions may have led to the high performance of the experimental group.

4. The visual- package approach brought nearer to the pupils the numeral concept and enhanced the interaction effect of ability of pupils on retention of numeral concepts,

Education Implication. The out come of the study discussed and interpreted in this report has far reaching implications for educational practices in general and for effective teaching and learning of nursery school numeral concepts. The result has revealed that the visual package approach was effective in pupils' cognitive achievement and retention in the nursery school numeral concept. The package proved more effective than the visuals used in illustration of existing textbooks. The existing visuals proved very abstract to the pupils because they are not properly illustrated; the objects used are not familiar to the pupils and the concepts are not properly focused.

In the light of these findings, it is suggested that the existing instructional materials be reviewed by education technologists. Legislative measures should be put in place, making it mandatory for only professional educators in approved relevant disciplines to write and publish nursery books. These measures will help to bring efficiency and effectiveness in mathematics education and thereby laying a solid foundation for technological education.

Conclusion

The study has shown that nursery pupils taught using visual package approach performed better than those taught with the conventional approach. Based on this, it is

recommended that effort should be made to use illustrations and visual packages that have relationship with the cultural background and environment of pupils in schools.

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