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# Effects of Pre-Primary Education on Cognitive and Affective Learning Outcomes among Primary School Children in Nigeria

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## Abstract

*The study sought to investigate the effects of pre-primary education on the cognitive and affective learning outcomes among primary school children in Nigeria. Three hundred and twenty primary one pupils selected from ten equivalent schools in both rural and urban locations participated. These cut across those who attended and those who did not attend pre-primary schools; male and female pupils, and pupils in rural and urban schools. Data collection involved the use of Cognitive Skill Tests (CST) and Attitude to School Questionnaire (ASQ). A  $2 \times 2 \times 2$  analysis of variance (ANOVA), and graphical illustrations were used to analyse the data. The results show that those who were exposed to pre-primary education performed significantly better in literary and numeracy tests as well as exhibited better attitude to schooling than those who did not. The implications of the findings were discussed with a view to improving the following aspects of pre-primary education in Nigeria: access, enrolment, classroom practice, and teacher training/ in-service programme.*

## Introduction

Numerous benefits have been identified by researchers, educators and psychologists to be associated with giving pre-school children quality care and intellectual stimulation before normal schooling begins. For instance, studies on the benefits of early childhood education revealed that children who passed



through it before normal schooling come to school ready to learn (UNICEF, 1998; Meyers, 2000; National Research Council, 2001; Smith, Cowie and Blades, 2003); gained higher in vocabulary, reading and sentence completion tests (Wadsworth, 1986), were less likely to be held back in school, or be placed in special education; were more likely to succeed in school, graduated on time and were considered by teachers to be better behaved and better adjusted in school (Barnnet, 1995).

On the basis of its social importance, with respect to close and friendly relationships, allowing children to pass through pre-school programme prior to normal schooling is regarded as very important considering that the environment tends to create avenues for social interaction among children from different families, religious groups, ethnic groups and languages (Maduabum, 2001; Obisanya, 2004). Staying together this way early in life could thus lay a solid foundation for social unity in adult life – a situation very much needed in Nigeria. Other studies, for instance, the U.S.A. Federal sponsored programme, the Early Head Start, revealed that children who passed through it did significantly better on measures of cognitive, language and social-emotional development than those who did not. Arnold (2000) also reminded parents and child care-givers that the type of experiences provided to children during their formative years could play a role in determining whether a child would grow up to be intelligent or dull, articulate or unable to express the self, fearful or self-assured.

However, in the Nigerian educational and cultural settings, studies are yet to be documented to provide research information on how well the child progresses in subsequent levels of education as a result of exposure to preschool education. The few available studies focused on situation analysis of human and material resources available in pre-school learning environments (Madeuwesi, 1999; Ndukwu, 2002; Oduolowu, 2004) as well as roles which could be played by women to make the pre-school programme a successful venture (Maduabum, 2001). The present study therefore sought to assess the effects of pre-primary education (treatment) on cognitive and affective learning outcomes of children at the beginning of primary level of education and whether such effects (if any) are sensitive to gender and location (urban/rural) of children.

More specifically, the study sought to provide answers to the following questions:

1. Are cognitive learning outcomes (achievement in literacy and numeracy skills test) of children at the beginning of primary level of education significantly affected by;
  - (a) pre-primary education (treatment);
  - (b) location;
  - (c) gender; and

- (d) interactions of treatment, location and gender?
2. Is affective learning outcome (attitude to schooling) of children at the beginning of primary level of education significantly affected by:
- pre-primary education (treatment);
  - location;
  - gender; and
  - interactions of treatment, location and gender?

## Method

### (a) Sample

The subjects consisted of 320 primary one children (160 males and 160 females) whose ages ranged from 5 to 7 year (mean age = 6.2; S.D. = 0.8). Stratified random sampling technique that ensured adequate representation of male and female children in urban and rural locations was used to select the children from ten equivalent primary schools in Oyo State, Nigeria. The sampling technique also ensured that the subjects consisted of children who were exposed to pre-primary education and those without such exposure.

### (b) Instrumentation

Three valid and reliable instruments, developed by the investigators, were used to collect data for the study: Cognitive Skills Test, Literacy (CSTL); Cognitive Skills Test, Numeracy (CSTN); and Attitude to Schooling Questionnaire (ASQ). The CSTL and CSTN are 40-item tests that covered primary one language (reading/writing) and mathematics curricular respectively. The ASQ consists of two sections: A and B. Section A solicits information on a child's age, gender and school location while Section B consists of 10 items that solicit information on the child's disposition towards schooling.

Four primary one teachers scrutinized the initial versions of the instruments and participated in selecting the final items. The instruments were also subjected to pre-testing using 64 primary one children from four primary schools in Oyo State (these schools were not part of the study sample). The pre-test results showed no ambiguities in the instruments and produced a test-retest (two weeks interval) reliability estimates of 0.119, 0.93 and 0.86 for CSTL, CSTN and ASQ respectively.

### (c) Data Collection and Analysis

The investigators used a one-to-one interview technique to get the children's response to the ASQ. Later, the CSTL and CSTN were administered to the children who provided their responses in writing. Data collection lasted for 10-days.

The data were subjected to a 2 x 2 x 2 analysis of variance (ANOVA) and graphical illustrations.

## Results

Table 1 shows data from analysis of variance of primary one children's literacy scores. The Table shows significant main effects of treatment (exposed/unexposed to preprimary education) [ $F_{(1,319)} = 2573.779$ ;  $P < 0.05$ ] and location [ $F_{(1,319)} = 1313.152$ ;  $P < 0.05$ ]. It also shows significant two-way interaction effect of treatment and location [ $F_{(1,319)} = 65.945$ ;  $P < 0.05$ ].

**Table 1**  
**Summary of 2x2x2 Analysis of Variance of Literacy Test Scores by Treatment, Location and Gender.**

Source of Variation	Sum of Square	df.	Mean Square	F
Main Effects	25493.350	3	8497.783	1295.850*
Treatment	16878.050	1	16878.050	2573.779*
Location	8611.250	1	8611.250	1313.152*
Gender	4.050	1	4.050	0.618
2-Way Interaction	454.550	3	151.517	23.105*
Treatment x Location	432.450	1	432.450	65.945*
Location x Gender	22.050	1	22.050	3.362
Location x Gender	0.050	1	0.050	0.008
3-Way Interaction	0.050	1	0.050	0.008
Treatment x Location x Gender	0.050	1	0.050	0.008
Explained	25947.950	7	3706.850	565.267*
Residual	2046.000	312	6.558	
TOTAL	27993.950	319	87.755	

\*  $P < 0.05$

The Multiple Classification Analysis, MCA (Table 2), reveals that children exposed to pre-primary education performed significantly better in literacy test than their counterparts without such exposure. The MCA also shows a Multiple R squared value of 0.911 and beta values of 0.01, 0.55 and 0.78 for gender, location and exposure to pre-primary education respectively.

**Table II**  
**Multiple Classification Analysis (MCA) of Literacy Test Scores by Treatment, Location and Gender.**

Grand Mean = 30.76

Variable + Category	N	Adjusted for Independent Deviation	Beta
<b>Treatment</b>			
1. Exposed	160	7.26	
2. Unexposed	160	-7.26	0.78
<b>Location</b>			
1. Rural	160	-5.19	
2. Urban	160	5.19	0.55
<b>Gender</b>			
1. Male	160	0.11	0.01
2. Female	160	-0.11	
Multiple R <sup>2</sup> =		0.911	

Table 3 shows data from analysis of variance of primary one children's numeracy scores. The Table shows significant main effects of treatment [ $F(1,319) = 1823.482$ ;  $p < 0.05$ ] and location [ $F(1,319) = 1154.694$ ;  $p < 0.05$ ]. It also shows significant two-way interaction effect of treatment and location [ $F(1,319) = 58.551$ ;  $p < 0.05$ ].

**Table III**  
**Summary of 2 x 2 x 2 Analysis of Variance of Numeracy Test Scores Treatment, Location and Gender**

Source of Variation	Sum of Square	df.	Mean Square	F
<b>Main Effects</b>	22000.550	3	7333.517	292.908
Treatment	13468.050	1	13468.050	1823.482
Location	8528.450	1	8528.450	1154.694*
Gender	4.050	1	4.050	0.548
<b>2-Way Interaction</b>	458.950	3	152.983	20.713*
Treatment x Location	432.450	1	432.450	58.551*
Treatment x Gender	26.450	1	26.450	3.581
Location x Gender	0.050	1	0.050	0.007
<b>3-Way Interaction</b>	0.050	1	0.050	0.007
Treatment x Location x Gender	0.050	1	3208.507	0.007
Explained	22459.550	7	7.386	434.410*
Residual	2304.400	312	77.630	
Total	24763.950	319		

\* $P < 0.05$

The MCA (Table 4) reveals that children exposed to pre-primary education performed significantly better in numeracy tests than their counterparts without

such exposure. The MCA also shows a multiple R squared value of 0.888 and beta values of 0.74, 0.59 and 0.01 for treatment, location and gender respectively.

**Table IV**  
**Multiple Classification Analysis (MCA) of Numeracy Test Scores by Treatment, Location and Gender**

Grand Mean = 26.01			
Variable + Category	N	Adjusted for Independent Deviation	Beta
<b>Treatment</b>			
1. Exposed	160	6.49	0.74
2. Unexposed	160	-6.49	
<b>Location</b>			
1. Rural	160	-5.16	0.59
2. Urban	160	5.16	
<b>Gender</b>			
1. Male	160	0.11	0.01
2. Female	160	-0.11	
<b>Multiple R<sup>2</sup> = 0.888</b>			

Table 5 shows data from analysis of variance of primary one children's attitudinal scores. The Table shows significant main effects of treatment [ $F(1,319) = 893.829$ ;  $p < 0.05$ ] and location [ $F(1,319) 565.968$ ;  $p < 0.05$ ]. It also shows significant two-way interaction effect of treatment and location [ $F(1,319) 11.485$ ;  $p < 0.05$ ].

**Table V**  
**Summary of 2 x 2 x 2 Analysis of Variance of Attitudinal Scores by Treatment, Location and Gender**

Source of Variation	Sum of Square	df.	Mean Square	F
<b>Main Effects</b>	4052.284	3	1350.761	486.665*
Treatment	2450.878	1	2480.878	893.829*
Location	1570.878	1	1570.878	565.968*
Gender	0.528	1	0.528	0.190
<b>2-Way Interaction</b>	31.934	3	10.645	3.835*
Treatment x Location	31.878	1	31.878	11.485*
Treatment x Gender	0.028	1	0.028	0.010
Location x Gender	0.028	1	0.028	0.010
<b>3-Way Interaction</b>	0.528	1	0.528	0.190
Treatment x Location x Gender	0.528	1	0.528	0.190
Explained	4084.747	7	583.535	210.240*
Residual	865.975	312	2.776	210.240*
<b>Total</b>	<b>4950.722</b>	<b>319</b>	<b>15.520</b>	

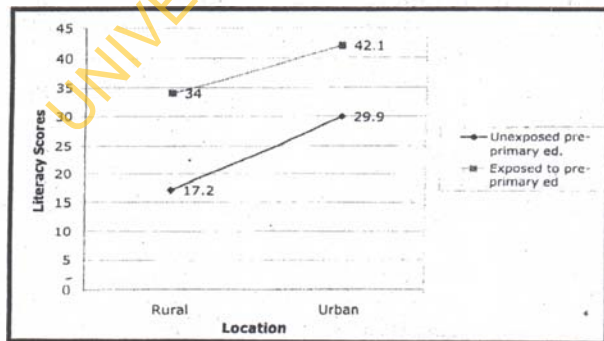
\* $P < 0.05$

The MCA (Table 6) reveals that children exposed to pre-primary education exhibited better attitude to schooling than their counterparts without such exposure. The MCA also shows a multiple R squared value of 0.819 and beta values of 0.71, 0.56 and 0.01 for treatment, location and gender respectively.

**Table VI**  
**Multiple Classification Analysis (MCA) of Attitudinal Scores by Treatment, Location and Gender**

Variable + Category	N	Adjusted for Independent Deviation	Beta
<b>Treatment</b>			
1. Exposed	160	2.78	0.71
2. Unexposed	160	-2.78	
<b>Location</b>			
1. Rural	160	-2.22	0.56
2. Urban	160	2.22	0.56
<b>Gender</b>			
1. Male	160	-0.04	0.01
2. Female	160	0.04	
<b>Multiple R<sup>2</sup> = 0.819</b>			

The significant interaction effects of treatment and location were disentangled. These are illustrated in Figures 1, 2 and 3 for literacy, numeracy and attitude to schooling respectively. The Figures show ordinal interactions and are such that children exposed to pre-primary education, irrespective of their location, performed significantly better in literacy and numeracy tests as well as exhibited better attitude to schooling than their counterparts without such exposure. In addition, the Figures show that the differential effects of exposure to pre-primary education on literacy, numeracy and attitude to schooling respectively tend to be more for children in rural schools than those in urban schools.



**Figure 1: Interaction effect of treatment and location on literacy scores**

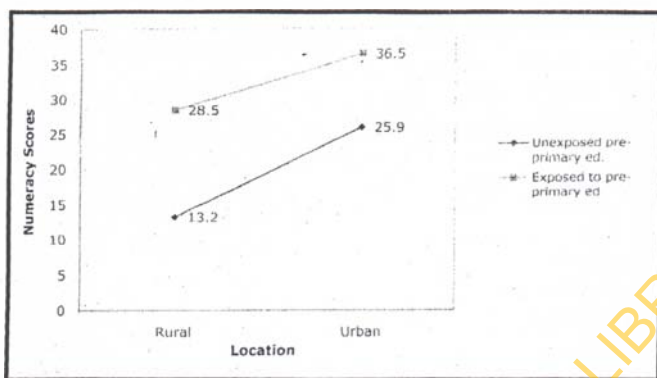


Figure 2. Interaction effect of treatment and location on numeracy scores

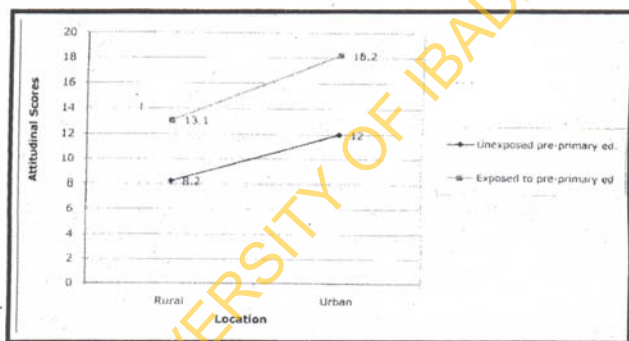


Figure 3. Interaction effect of treatment and location on attitudinal scores

## Discussion and Conclusion

The results show that exposure to pre-primary education could significantly improve cognitive and affective learning outcomes (literacy skills, numeracy skills and attitude towards schooling) among primary school children in Nigeria. The results also corroborate the evaluation results of the USA Federal sponsored Early Head Start programme which revealed that the programme children scored significantly higher in measures of cognitive, language and socio-emotional development than their non-program counterparts (National Research Council, 2001). In the same light, Barnett (1995) had reported that children exposed to Head Start programmes were considered by their counterparts without such

exposure; while the US Department of Health and Human Services (2002) found that Head Start programmes tend to produce sustained positive impacts on children's cognitive, language and socio-emotional development.

The results of the present study are explicable considering that the extent/type of care and intellectual stimulation given to preschool children has potential for cultivating the children to be intelligent or dull, articulate or halting, fearful or self-assured (Begley, 1996; Arnold, 2000). The results could also be due to the fact that those who attended preschool educational institutions are usually subjected to early learning in the areas of language and mathematics. For instance, a survey of the scheme of work of pre-school institutions in Nigeria revealed that preschoolers are usually exposed to such topics as reading, identification and writing of letters of alphabets and numbers among others. Such an exposure could give the beneficiaries an edge in cognitive learning outcomes over their counterparts who had no preschool education.

As regards the difference in the affective outcome (attitude to schooling), this could be because the children who were exposed to preschool education have learnt to adapt much better outside their home settings (e.g. in school setting) than their counterparts who had no preschool education. Usually, preschool education provides the opportunity to expose a beneficiary to a large group of children of their own age, instead of being within the family groupings which have very few members of their own age group. As members of large groups of children of the same age, beneficiaries of preschool education are more likely to become aware of other children's needs and feelings considering that toys and materials in preschools are shared among many children, all with an equal claim to them. The preschool environment, thus, encourages children to learn to take turns, to accept group ownership as well as to respect other children's needs and feelings.

There are indications that variables such as school location can influence learning outcomes. For instance, the poor economic conditions in rural areas could militate against the type, quality and quantity of teaching and learning materials associated with homes and schools in the location (Warwick, 1992; Oyebade, 1999). The economic condition, however, seems to be better in urban location (Ndukwu, 2002). It is thus explicable that learning outcomes of children who live and attend primary schools in urban location tend to be better than those of their counterparts in rural location.

The significant interaction effects of treatment and location are indications that the effects of preprimary education on cognitive and affective learning outcomes are location-sensitive. As shown in figures 1, 2 and 3, the sensitivity is more on children in rural schools than those in urban schools irrespective of the result that both rural and urban children tend to significantly improve their



cognitive and affective learning outcomes when exposed to pre-primary education. These results, when viewed against the background of significant main effects of treatment, support the need for improved efforts at ensuring that children in rural and urban locations are exposed to pre-primary education. In addition, the results (when viewed against the background of significant main effects of location) provide an empirical basis for suggesting that exposure to pre-primary education could serve as remedial treatment for children who are disadvantaged because of their rural locations. It thus seems justifiable that the Federal Government of Nigeria has enacted a policy that makes pre-primary education compulsory for every Nigerian child in the on-going Universal Basic Education (UBE) programme. The government, in consequence, is expected to translate this reasonable policy into practice. As a major stakeholder in the primary education sector, the government could implement the policy by improving access to pre-primary education. For instance, there should be concerted efforts at ensuring that every public (government-owned) primary school has a pre-primary education section attached to it. In addition, private individuals and non-governmental organizations should be further encouraged to establish pre-primary education institutions.

The differential impact of pre-primary education on the learning outcomes of children in rural and urban primary schools, perhaps, could be attributed to the differences in types, quality and quantity of teaching-learning materials in homes and schools found in these two locations in Nigeria (Oyebade 1999; Ndukwu, 2002). These differences could inhibit the extent to which exposure to pre-primary education affects cognitive and affective learning outcomes of primary school children in Nigeria. This, however, needs to be investigated further.

The study results also indicate that:

- i. gender, on its own, does not significantly influence cognitive and affective learning outcomes of primary school children in Nigeria; and
- ii. the effects of treatment (exposure to pre-primary education) and location respectively on the learning outcomes tend not to vary for boys and girls.

It could thus be said that children's exposure to pre-primary education tend to significantly improve their cognitive and affective learning outcomes during the first year of primary education. This assertion seems to be valid irrespective of the children's gender and location. However, the impact of exposure to pre-primary education on the cognitive and affective learning outcomes vary for children who live and attend primary school in urban and rural locations.

In all, the independent variable (treatment) and moderator variables (location and gender), when taken together, could be used to explain 91.1%, 88.8% and 81.9% of the variation in the children's literacy, numeracy and attitudinal scores

respectively. Each of these levels of explanation is considered significant ( $p < 0.05$ ). However, the order of contribution of the variables to the explanation is treatment, followed by location and the least is gender.

In the light of the entire results and the associated discussion, we share the view that concerted efforts should be made by all stakeholders in the primary education sector to improve access and enrolment at the pre-primary education level for male and female children in rural and urban locations in Nigeria. This could be achieved by:

- (i) mobilizing and sensitizing parents in rural and urban locations on the need to enroll their male and female children in pre-primary education institutions;
- (ii) ensuring that every primary school in the country has a pre-primary education section attached to it; and
- (iii) getting the Federal Government of Nigeria to further encourage the other two tiers of government (state and local governments), private individuals and non-governmental organizations to establish pre-primary education institutions.

However, in addressing the issues of access and enrolment at the pre-primary education level, priority should be given to rural locations considering that exposure to pre-primary education could serve as treatment for improving cognitive and affective learning outcomes of children who are disadvantaged because they live and attend primary schools in rural locations. There is also a need for teacher training and in-service programmes to be directed towards producing primary school teachers who have the capacity to pay extra attention (during classroom practice) to children who were not exposed to pre-primary education programmes particularly when such children live and attend primary schools in rural locations. This is against the background that these children seem to be disadvantaged (associated with relatively low cognitive and affective learning outcomes) because of their non-exposure to pre-primary education and their rural locations. It is hoped that the implementation of these recommendations would lead to our ultimate goal of improved cognitive and affective learning outcomes among primary school children in Nigeria.

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