

Synergy between Home Environmental Features, Early Language Literacy and Later Reading Achievement: Comparative Study of Urban, Semi-Urban and Rural Ghanaian Children

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Abstract

This research underscores the significance of ensuring a level playing field for all children, especially low-income children. The findings of the paper suggest a synergy between early home environmental features and their central role in children's learning and behaviour indicating that quality early childhood experiences are highly associated with language and literacy outcomes between and among Ghanaian children. This notwithstanding, these rich early experiences from home environment elude many children in Ghana. For example, paucity of availability of books in the homes, limited time in literacy-related play from parents, lack of quality linguistic input to enhance children's vocabulary are lacking for most children from rural and semi-urban backgrounds leading to poor literacy skills compared to children from urban centres.

Introduction

More than 60 years ago, the United Nations recognized basic literacy as a fundamental human right. The over-all purpose of basic education is to cultivate in all children foundational literacy skills of reading, writing and computation. This notwithstanding, in most developing communities low functional literacy among individuals who have completed primary school is not uncommon. UNSECO (2005) reports that in 2000 more than one in three adults with a fifth-grade education in Chad and Niger reported that they could not read. In other cases, individuals may finish primary school, yet reading is below the expected level. In a representative sample of Ghanaian public schools, reading achievement levels measured by the government-administered Criterion Referenced Test in 2000 indicated that fewer than 10% of the children in grade six were able to read with grade level mastery (Lipson & Wixson, 2004). Research evidence links the quality of developmentally appropriate language and literacy experiences and school readiness. Children who enter the kindergarten with a foundation of pre-literacy skills (Dickinson & Neuman, 2006; Neuman & Dickinson, 2001) with the interest and motivation to learn, are better prepared for the complex task of learning to read as compared to those who lack these foundational skills (Wasik, Bond & Hindman, 2006; Neuman, Koh, & Dwyer (2008).

In Ghana, most children in the public primary schools are not likely to benefit the most in the early years. These are children who come mostly from the deprived rural backgrounds with poorly resourced schools and often from uneducated parental background. These early disparities in environmental home backgrounds appear to be the cause of the difficulties encountered by most children regarding later literacy skills.

For example, studies have reported a paucity of books available in early childhood settings (Neuman, Celano, Greco, & Shue, 2001), limited experiences in daily storybook reading (Dickinson & Tabors, 2001), few opportunities devoted to informational texts and other genres (Duke, 2000), limited to no choice time in literacy-related play (Christie, 1991).

Moreover, research (Hart & Risley, 1995) has documented that many early care and education settings may not offer the amount and quality of linguistic input needed to enhance children's vocabulary and language repertoire known to serve as an important foundation for literacy learning (Neuman, Koh. & Dwyer (2008).

On average, children in low-income households fare worse than children in higher-income households on a host of indicators. Low-income children are more likely than higher-income children to live in stressful home environments and with parents reporting symptoms of poor mental health.

(<http://aspe.hhs.gov/hsp/09/VulnerableYouth/3/index.shtml>.)

Regarding literacy skills, research on home-based care, in particular, reveals a disturbing profile of limited language and early literacy opportunities. A number of multi-city studies (Galinsky, Howes, Kontos, & Shinn, 1994; Helburn, 1995; Kontos, 1992) have reported the paucity of learning and play materials in home-based settings. According to Fuller, Kagan, Caspary and Gauthier (2002), children from low-income families in home care arrangements displayed significantly lower rates of cognitive and language growth than others who attended center-based care. These quality factors are particularly worrisome given that more than sixty percent (60%) of children in Ghana come from families with incomes below 200 percent of the poverty line. The same scenario is depicted in the US. About 2.5 million of children in the US also live below the poverty level (Kids Count Data Book, 2005). Thus, compared to middle-income working family children in the urban centres of Ghana, children from low-income rural families are disproportionately not fortunate to have home environmental features likely to predispose them to early home literacy skills. These are the children who get into the public schools and they may constitute some 60% of Ghanaian children.

Statement of Problem

Recognizing the critical importance of home environmental features for early literacy learning for children's future, and the gap that already exists prior to school entry (Hart & Risley, 1995), it is clear that we must reach our youngest children early on to help them develop language, print, and motivational dispositions for reading and writing success. To date, however, we have lacked highly reliable and valid instruments to assess the synergy between literacy experiences in home-based experiences and reading ability in Ghana. Besides, the UNESCO report (2005) on a representative sample of Ghanaian public schools that reading achievement levels measured by the government-administered Criterion Referenced Test in 2000, the Chief Examiners' Report for the Basic Education (Certificate Examination (2007), the 2008 Ministry of Education Report), etc all indicating a deficit in learning achievement especially reading mastery (Lipson & Wixson, 2004) at the basic level, it is compelling enough to examine how these early disparities in environmental features in Ghanaian households are likely to account for these differences in literacy skills between children from the basic public schools and those from the urban private basic schools.

Research Objectives

The subsequent objectives guided this study:

- 1) To investigate the synergy between early home environmental features and their central role in children's learning and behaviour.
- 2) To examine the powerful impact of access/lack of access to literacy tools in early home environment and how this affects children/s involvement in literacy activities.
- 3) To find out the reliability of the evidence that some materials in early home environment influence children's engagement and behaviour.
- 4) To study the early home interactional supports that promote literacy learning.

Research Questions

Based on the above statement of problem, the key questions that this study investigated were:

- 1) What specific early home environmental features influence children's learning and later linguistic behaviour?
- 2) What are the powerful impact that access/lack of access to literary tools in home environment have on children's involvement in literacy activities?
- 3) How reliable is the evidence that some materials in early home environment influence children's engagements and learning behaviour?

- 4) How does early home interactional support promote literacy learning?

Significance of the Study

Given the reported crisis of reading and numeracy achievement in most public basic schools in Ghana, for example, that Reading achievement levels as measured by the Government-administered Criterion Referenced Test in 2000 indicate that fewer than 10% of the school children at primary level six are able to read with grade level mastery, the findings of this paper will be significant to the Ghana Education Service, educational psychologists, basic school teachers, day-care centres, parents and all other stakeholders in early child care education. (http://reading.org/downloads/international/092004_Ghana_summary.pdf). In some parts of Africa, such as Malawi and Zambia, over a third of grade 6 students failed to acquire the most basic literacy skills. (<http://unesdoc.unesco.org/images/0019/001913/191393e.pdf>). The findings of this study therefore will help to underscore some of the early environmental features that predict the differences in conventional literacy that are linked to outcome in reading between children of urban, semi-urban and rural communities in Ghana. The study also identifies some early weaknesses such as in oral language, phonological awareness, alphabet knowledge. Such findings will be of interest to policy formulation with respect to ensuring the need for levelling the playing field for low income rural children and middle income urban children in the public basic schools and the private basic schools as means to bridge the knowledge gap.

Theoretical Framework

This paper examines two interdependent variables: the literacy environment which has to do with the quality of available resources, the home space organization as well as support for learning which includes family observation and family support. The environment includes physical features supporting early literacy and the family support also includes the interactional support from the family that supports literacy. The underlying theoretical framework is based on the theoretical assumptions of ecological psychology. From the point of view of ecological psychology, environment does exert a lot of influence in learning and behaviour and that the organization, structure and the complexity of settings influence children's patterns of activity and engagements.

The use of space in settings influences learning (Neuman, Roskos, Wright, & Lenhart, 2007; Roskos & Neuman, 2001). Children use space and its boundaries to regulate and guide their own responses. For example, studies (Morrow, 1988; Neuman & Roskos, 1997) find that smaller, well defined niches and nooks seem to encourage greater language and collaboration with peers and adults. Children are likely to use these more intimate settings to interact in longer and richer conversation with others. Neuman and Rokos (1992) as well as Vukelich, (1994) have also revealed the powerful impact of access to literacy tools on young children's involvement in literacy activities. This research indicates that in settings carefully constructed to include a wide access of literacy tools, books, and play materials, children read more and engage more in literacy-related play themes (Morrow, 1990), with resulting effects on literacy improvement (Neuman & Roskos, 1990).

Relatedly, studies (Fernie, 1985; Neuman & Roskos, 1990) show evidence of behavioral consequences. Some materials seem to encourage more sustained activity than others, and invoke children's attention at different ages (Rosenthal, 1973). Materials that involve children in constructive activity, for example, tend to generate more language than "pull toys." Some materials elicit greater social interaction and cooperation like block building, whereas others encourage more solitary and or parallel play, such as puzzles (see review, Roskos & Neuman, 2001).

Research Method

Sample and Design

The study used purposive sampling of three hundred (300) children from urban, semi-urban and rural centres in Ghana, aged between 3-4 years. One hundred children were randomly selected from four (4) rural areas: two (2) in the Offinso North district of Ashanti region and 2 (two) from the Brong Ahafo region. Another one hundred were also sampled from two (2) urban centres: the Kumasi Metropolis (Asafo and Asokwa) and two (2) from the Sunyani Municipality (Sunyani West and Sunynai East).

Another one hundred were sampled from semi-urban areas: Offinso South Municipality in Ashanti and Brekum in Brong Ahafo. The study measured the quality of child care these individual children receive in family care arrangements with specific reference to home environmental settings.

Six kindergartens were purposively sampled from these three urban, semi-urban and rural areas. All the children were identified as Ghanaians who had English as a second language. For forty percent (40%) of these children, English was not the primary language spoken at home. Parents signed an approved permission slips for their children to participate in a short in-school battery of cognitive test.

Procedure and Measures

Using an adapted version of the child care versions of the HOME inventories (Bradley, Caldwell & Corwyn, 2003), 58 items were clustered into eight subscales: Learning Materials, Language Stimulation, Physical Environment (with emphasis on availability of books), Caregiver Responsibility, Academic Stimulation (reading story books to children, telling children stories etc) Modelling of Social Maturity, Variety in Experience, and Acceptance of Child. The researcher spent 45-90 minutes visiting some of the homes and interacted with caregivers. All the scores were computed into means and standard deviation.

After this home inventory, another observation measure was used to assess the early language and Literacy in the Kindergarten Classrooms of these selected children using the Early Language and Literacy Classroom Observation (ELLCO) developed by Smith & Dickinson (2002). This tool examines the quality of language and literacy in a classroom examining checklist such as the visibility of such literacy-related materials as books, alphabet, word cards, teacher dictation, alphabet puzzles, and writing implements. The ELLCO also includes 14 observational ratings that span activities including reading aloud, writing, assessments, presence or absence of technology which are examined along a rubric of 1(deficient) to 5 (exemplary). The scores in these check list were also computed into means and standard deviations.

Two years later, the same sample of children who were now aged between 5 and 6 years in primary one and primary two were tested in a quite location along the following study variables:

a) **Reading measures:** Tests came from WJIII Tests of Achievement (Woodcock, McGrew, and Mather, 2001). i) Word attack (non-word reading): Unfamiliar non-words, which must be decoded by letter-sound correspondence rules, are read. Items progress in difficulty and the test is terminated when ceiling is reached. Split-half reliability at the age level tested here ranges from 0.92 to 0.94; test-retest reliability is 0.79.; ii) Word ID (single word reading): High-frequency real words, many of which are not decodable by letter-sound correspondence rules, are read. Items progress in difficulty and the test is terminated when ceiling is reached. Split-half reliability at the age level tested here ranges from 0.97 to 0.98; test-retest reliability is 0.92.; iii) Passage comprehension: Children read short texts ranging from simple sentences to complex paragraphs, and respond to each by filling in a blank embedded in the text. Items progress in difficulty and the test is terminated when ceiling performance is reached. Split-half reliability at the age level tested here is 0.96; test-retest reliability is 0.89.

b) **Phonological awareness measures:** Tests came from the comprehensive test of phonological processing (Wagner, Torgesen and Rashotte, 1999): i) blending words: This 20-item subtest measures the child's ability to combine sounds to form words. The child listened to a series of tape-recorded sounds and is asked to put the sounds together to make a whole word. Items progress in difficulty and the test is stopped when the child answers three items in a row incorrectly. The internal consistency at the age level tested here ranges from 0.86 to 0.89, and the test-retest reliability of this subtest is 0.88.; ii) elision: This 20-item subtest measures the child's ability to say a word without saying a specific sound. For example, the child is told to say *bold*, and to then say *bold* without saying 'b'. Items progress in difficulty and the test is stopped upon three incorrect items in a row. The internal consistency at the age level tested here ranges from 0.90 to 0.92, and the test-retest reliability of this subtest is 0.88. ; iii) receptive vocabulary: In The peabody picture vocabulary test, 3rd edition (PPVT-III), the child hears a word on each

trial, and must select the corresponding picture from among four choices. The internal consistency at the age level tested here ranges from 0.93 to 0.95, and the test-retest reliability is 0.93. The scores were computed into means and standard deviations as follows:

Results

Differences in environmental home settings/inventory in early learning care services between children of urban centres, semi-urban and rural background.

Table 1: Descriptive

Environmental home settings/inventory	N	Mean	Standard deviation
Children of urban background	96	18.79	0.116
Children of semi-urban background	86	12.70	1.379
Children of rural background	98	9.89	0.403

The means for the scores on environmental home settings/inventory in early learning care services (such as learning materials, language stimulation, academic stimulation, modelling of social maturity etc) in the home as in Table 1, shows that children from urban background had a mean of 18.79 with a standard deviation of 0.116; children of semi-urban background had a mean of 12.70 and a standard deviation of 1.379, the mean and standard deviation for children from rural background was found to be 9.89 and 0.403 respectively.

One way analysis of variance (ANOVA) was conducted to test as to whether or not there is statistically difference between the means. For the ANOVA test, we needed to know whether the variances of the three groups are equal or not so that an appropriate test statistic and Post Hoc test would be selected for the analysis. The Levene's test for equality of variances as in Table 2 indicated that there was a significant difference between the variances of the three groups of children.

Table 2: Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
177.773	2	276	.000

That is the test for homogeneity of variances was significant with $F_{(2, 276)}=177.773$, $p<0.05$ (two-tailed). Therefore, the Welch's F was used for the ANOVA test and Games-Howell was used for the Post Hoc test.

Table 3: One-Way Analysis of Variance on the Means Robust Tests of Equality of Means

	Statistic	df1	df2	Sig.
Welch	2.252	2	130.374	.000

The robust test of equality of means as seen in Table 3 shows that there was significant differences among the three groups of children in early learning care services provided in the home, $F(2, 130.374)=2.252$, $p<0.05$ (two-tailed).

Again, since the result of the test on equality of means was significant we needed to compare the three groups of children to know where the difference was. Games-Howell test was run and the result is as shown in Table 4.

The Table indicates that, with respect to environmental setting/home inventory that promote early literacy skills, there is a significant difference between the mean scores of children from urban background, and those of semi-urban and rural environments, $P<0.05$ (two-tailed). There is also, a significant difference between the mean scores for children of semi-urban background and those of rural settings on early learning care services provided in the home, $p<0.05$ (two-tailed).

Table 4: Comparison of Mean Scores on Environmental/Home Inventory on Early Literacy Skills

		Mean Difference	p-Value
children of urban centres	children of semi-urban background	6.089	0.000
children of urban centres parents	children of rural background	8.899	0.000
children of semi-urban background	children of rural background	2.809	0.000

These results indicate that the environmental/home inventory background of children has some effects on the early learning care services provided in the kindergarten, by the parents in the home.

Comparison of Performance in Early language and Literacy in the Kindergarten Classrooms between Children from urban centres, semi-urban centres and rural background

Table 5: Comparison of Mean Scores of Children in Early Literacy skills the Kindergarten

		Mean Difference	p-Value
children of urban background	children of semi-urban background	7.157	0.000
children of urban background	children of rural background	10.539	0.000
children of semi-urban background	children of rural background	3.382	0.000

These data suggest that the environmental settings/home inventory that children are exposed to prior to kindergarten classrooms do have some effects on the learning of early literacy skills.

Two years later these children's literacy skills in reading and phonology were also observed and measured on both reading and phonological awareness. The data on both variables were summed up and computed in mean and standard deviation scores as shown below:

Two Years Later: Scores of Literacy (Reading) for Children of Urban, Semi-Urban, and Rural Background Descriptive Statistic on Reading Measure

Children's background	N	Mean	Standard deviation
Children of urban background	98	96.00	0.002
Children of semi-urban background	86	55.00	0.013
Children of rural background	78	48.00	0.021

Descriptive Statistic on Phonological Awareness Measure

Children's background	N	Mean	Standard deviation
Children of urban background	95	93.09	.378
Children of semi-urban backgrounds	84	49.24	.873
Children of rural background	70	38.37	1.092

Discussion

The findings of this study suggest some synergy between environmental home settings, early literacy and later reading achievement at the primary level among Ghanaian children from urban, semi-urban and rural backgrounds. The data indicate that early environmental/home disparity with respect to availability/non-availability of learning materials, language stimulation, academic stimulation etc. have some influence in the acquisition of literacy skills. On average, Ghanaian children from low-income households fare worse than children in higher-income households on a host of indicators. Low-income children in Ghana are more likely than higher-income children to live in stressful home environments. Among school-age children in the kindergarten, those living in low-income families especially from the rural background are less likely to be highly engaged in school activities and more likely to exhibit high levels of reading problems.

The environmental settings in the homes influencing the development of early literacy skills is evident from the comparison of scores between the three groups of children sampled for this study from the urban, semi-urban and rural backgrounds. For example in the measure on the home/environmental inventory as in table 1 the mean scores of 18.76; 12.76; and 9.89 with standard deviations respectively of 0.116, 1.379 and 0.403 in respect of the children from urban, semi-urban and rural background is quite significant as illustrated also in table 2.

The significant differences between these children with specific reference to the environmental home settings corroborate the notion of ecological psychology that the use of space in settings influences learning (Neuman, Roskos, Wright, & Lenhart, 2007; Roskos & Neuman, 2001). For example, Morrow (1988) and Neuman and Rokos (1997) make the submission that children use space and its boundaries to regulate and guide their own responses. These authors find that smaller, well defined niches and nooks seem to encourage greater language and collaboration with peers and adults. Children are likely to use these more intimate settings to interact in longer and richer conversation with others.

These disparities in early home environmental settings such as availability of books and other learning materials, language stimulation, physical environment, caregiver responsibility, academic stimulation, modelling of social maturity, variety in experience, and acceptance of child which set the pace for developing early literacy skills are likely to be carried over into the kindergarten classrooms as is evident in this study. The mean comparative differences in performance of 7.157 between children of urban background and semi-urban background; 10.539 between urban children and rural children and 3.382 between semi-urban and rural children at the kindergarten level illustrate the home disparity between the groups that on the average is carried over into the kindergarten classroom. Again this finding seems to confirm other authors such as Neuman and Roskos (1992; 1997) and Vukelich (1994) who have revealed the powerful impact of access to literacy tools on young children's involvement in literacy activities indicating that in settings carefully constructed to include a wide access of literacy tools, books, and play materials, children read more (Neuman & Roskos, 1992), and engage more in literacy-related play themes (Morrow, 1990), with resulting effects on literacy improvement (Neuman & Roskos, 1990). This access to books and literacy-related play themes as found in the case of the urban Ghanaian children in this study are likely to be the explanation for performing better than semi-urban and rural children. Similarly, semi-urban children also performing comparatively better than rural children suggest that the former relative to rural children had some access to literacy tools compared to the latter.

Thus, home materials seem to encourage more sustained activity than others, and invoke children's attention at different ages (Rosenthal, 1973). Consequently, there is clear and abundant evidence that certain design features in environments support young children's literacy engagement and subsequent achievement. Physical design features, uses of space, and resources, may help to focus and sustain children's activity, providing greater opportunity to engage in language and literacy behaviors.

The differences in reading and phonological awareness between these children at the primary level are indicative of the early literacy disparity from the homes and the kindergarten classrooms. As can be seen from the data, two years after kindergarten, the mean scores on both reading and phonological awareness measures for the children were: urban: $m=96$, $SD=0.002$; semi-urban: $m=55$, $SD=0.013$; rural: $m=48$, $SD=0.021$ and urban: $m=93.09$, $SD=.378$; semi-urban: $m=49.24$, $SD=.873$ and rural: $m=38.37$, $SD=1.092$. These differences between the groups are significant to infer that they are linked to both early home environmental settings and the kindergarten. This gives some plausibility to those studies that link reading and phonological ability to early literacy. For example, the US National Reading Panel in 2000 makes the submission that early ability to discriminate units of language such as words, segments, phonemes is strongly linked to successful reading (National Reading Panel Report, 2000). It is both a cause and a consequence of vocabulary development and learning to read (Ehri and Roberts, 2006). Children typically begin first to discriminate among units of language (that is phonological awareness) and then within these units phonemic awareness.

Evidence (Lonigan, 2006; Whitehurst and Lonigan, 1998) suggests that children achieve syllabic sensitivity earlier than they achieve sensitivity to phonemes, and sensitivity to rhyme before sensitivity to phonemes. In other words, children's entry to these skills typically begins with linguistic activities such as language games and nursery rhymes (Maclean, Bryant, and Bradley, 1987). It these that implicitly compare and contrast the sounds of words, and include alliterative phrases (i.e., *bibbily bobbily boo* begins with /b/). This means that children must not only be able to recite and play with sound units, they must also develop an understanding that sound units map onto whole or parts of written language. Reviews and analyses for the last decade (Dickinson et al., 2003; Scarborough, 2001) have placed phonological awareness as a critical part of a complex braid of language abilities which include strands of phonology, semantics, syntax, pragmatics, and discourse. Its tie to children's ability to decode has been clearly established.

All this implies that when the home environment is designed to enhance language and academic stimulation with a high level of caregiver responsibility, the chances of children from such environmental background achieving better reading skills are higher than those who have no such environment. Similarly, at the Kindergarten level, when literacy-related materials as books, alphabet, word cards, and alphabet puzzle etc, are visible as well as reading aloud, writing assessment are present, they are more likely to remedy some of the effects of the early home disparity. However, since not all kindergartens are equally resourced in the three different environments studied in this paper, the disparity tends to be carried over into the primary schools.

Constraints

This paper is constrained by the fact that it did not examine individual differences based on genetic predispositions of children sampled for the study as well as teacher efficiency differences. Consequently it did not discuss how notwithstanding the disparities in home/environmental backgrounds, some Ghanaian children from deprived background are still able to read better at their grade level than those from endowed environments. Similarly, some children from endowed backgrounds fail to perform better in literacy skills than those from the deprived backgrounds. Perhaps further research need to be conducted to examine the factors that are likely to explain such exceptional cases among some Ghanaian children.

Conclusion

The goal of 'Education for All' by 2015 has gingered many countries in Sub-Sahara Africa to confront their low rates of enrolments. However filling the classrooms is not enough. It must engage children learning the basics of literacy skills such as reading, writing and computation. Much evidence suggests a mismatch between enrolment and real learning. For example UNESCO (2008:2) reports a relatively low and unequal learning achievement in language and mathematics in many countries especially in sub-Sahara Africa (SSA). These poor results are seen throughout basic schooling, but it is becoming increasingly clear that the first years of schooling are especially important. Children's early experiences with learning shape their attitudes and commitment to education and so, more than at any other stage, what happens in the early grades, determines their educational future. When children do not make sufficient grades at the early part of their lives they are likely to drop out of school, relapsing into illiteracy and innumeracy, or to become the 'silently excluded' who are not able to access the increasing demanding work of later grades (Liddell and Rae 2001; UNESCO 2010). This is particularly true in reading and mathematics which underpin understanding across the school curriculum.

In Ghana, public schools reading achievement levels measured by the government-administered Criterion Referenced Test in 2000 indicated that fewer than 10% of the children in grade six were able to read with grade level mastery. The findings of this study suggest a link between three interrelated variables that seem to underscore this poor performance as evidenced in most Ghanaian public schools, namely: a) home environmental features, b) early language literacy and c) later reading achievement. Thus living conditions are indicator of socioeconomic status and these have substantial implications for well-being of early childhood. A lack of electricity, lack of access to books and lack of early academic stimulation from the home environment means that from the onset, the rural or semi urban Ghanaian child compared to the urban child cannot work efficiently on his/her homework.

In comparison, children from rural background in respect of those from urban or semi-urban are disproportionately not so fortunate. In sum, first, there is a synergy between home environmental features and children's early literacy and beyond. Secondly, there is a powerful impact of access/lack of access to literacy tools in home environment on children's literacy activities. Thirdly, home interaction supports and promotes literacy learning. Finally, the findings of this study suggest level playing fields: so far as there are socio-economic disparities between and among children, between and among day care centres and kindergartens across Ghana in terms of resources both financial and human, the fundamental right of all children to education may continue to elude most children.

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