

Learning Environment as Correlate of Children's Interest and Academic Achievement in Numeracy Skills Development in Public Early Childhood Development Education Centres

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Abstract

The study investigated the relationship between the learning environment, children's interest, and academic achievement in numeracy skills within public Early Childhood Development Education (ECDE) centres in Pankshin Local Government Area, Plateau State. Three research questions and two hypotheses guided the study, tested at a 0.05 significance level. The study adopted a correlational research design, sampling 50 children from 5 public ECDE centres across 6 districts using simple random sampling. Data were collected using a structured 8-item Quality of Early Childhood Development Education Questionnaire (QECDEQ) to assess ECDE quality, a 10-item Learning Environment and Children's Interest Observation Checklist (LECIOC) to measure children's interest in numeracy, and a Numeracy Achievement Test (NAT) to evaluate numeracy skills. The instruments were validated by experts and tested for reliability, yielding indices of 0.78, 0.74, and 0.76, respectively. Data were analyzed using mean and standard deviation for research questions and Pearson Product Moment Correlation Coefficient for hypotheses testing.

Findings revealed that the overall quality of public ECDE centres in Pankshin LGA is inadequate, with most learning environments failing to meet acceptable standards. However, a significant positive relationship was found between the learning environment and children's interest and achievement in numeracy. Children in more conducive environments showed greater enthusiasm and higher numeracy performance. Based on

the findings, it was recommended to enhance classroom design and establish clear standards for ECDE environments to ensure consistency and quality among others.

Keywords: Classroom environment, interest, numeracy skills, academic achievement

Introduction

Education is the single most important instrument for national development. Without the enlightenment education provides, one could imagine where the world and people would have been stuck in perpetual cycle of stagnation and ignorance. This is because education is the vehicle which drives technological, social, political and economic development of any nation. It is a means by which the society ensures its stability. It is through the educational system that young members of the society are taught the expected behaviour. Through the educational system, people are taught to meet changing situations. Schools are opened by communities not only to preserve the culture and maintain continuity but also to bring about progressive change. Education among other social institutions, is a vehicle for changing society through inculcating in children the right knowledge, skill, attitude and norms through the teaching of Early Childhood Education (ECE) in schools.

Similarly, Early Childhood Education is an education provided to children prior to their entry into primary school. ECE offers learning and educational activities with a holistic approach to support children's early cognitive, physical, social, and emotional development. It introduces young children to organized instruction outside of the family context, aiming to develop skills necessary for academic readiness and prepare them for entry into primary education (UNESCO, 2024). ECE is a term used to describe both formal and informal educational programs that guide the growth and development of children from birth up to the age of eight (Buergo, 2022). The Federal Republic of Nigeria (FRN, 2013) in her National Policy of Education defines Early Childhood Care and Development (ECCDE) as the care, protection, stimulation, and learning promoted in children aged from 0-4 years in crèche or nursery. As such, the

FRN (2013) stipulate among other objectives are to effect smooth transition from home to school, preparing the child for primary education, and introducing rudiments of numbers, letters, colors, shapes, forms, etc., through play. In order to achieve the ECCDE objectives of the FRN (2013) children learning should take place in a conducive and stimulating learning environment.

Furthermore, learning environment in ECE is a place where learners feel comfortable, encouraged, and inspired by their surroundings to learn. Movchan (2024) defines learning environment as the physical and psychological space in which learning takes place. A well-organized learning environment in ECE allows more time for classroom interactions and positively supports children's development in learning (Karlıdağ, 2021). It provides learners with a crucial role in shaping their numeracy learning skills, behavior, attitude, and overall development. Learning environment is more than just physical spaces, a right learning environment fosters children numeracy skills development and ensures that they feel safe, secure, empowered, and flexible in making sense of their environment. Ikegbusi, Egwu and Iheanacho (2021) maintained that learning environment plays a vital role in determining how learners perform or respond to circumstances and situations around them. This implied that no society is void of environmental influences. The learning environment determines to a large extent how children behave and interacts, that is to say that the environment in which children find themselves tends to mold their skills, behaviour, attitudes and knowledge so as to meet the demands of their development. Learning environment is important in developing and stimulating children's interest in numeracy skills.

Specifically, Numeracy in early childhood refers to the foundational mathematical skills and understanding that children develop during their early years, typically from birth to around age eight. The New South Wales Government (2024) defines numeracy in the Early Years learning framework as the capacity, confidence, and disposition to use mathematics in daily life. Children bring new mathematical understandings through engaging with problem-solving. It is essential that the mathematical ideas with which young children interact with, are

relevant and meaningful in the context of their current lives. Caregivers require a rich mathematical vocabulary to accurately describe and explain children's mathematical ideas and to support numeracy development. The terms mathematics and numeracy are positioned as separate from one another (Millan, 2024). In early childhood, however, numeracy and mathematics can be viewed as interconnected with each building upon and informing the other. Numeracy skills in early childhood encompass a wide range of abilities that allow children to engage with numbers and basic mathematical concepts in meaningful ways. These skills are crucial as they set the stage for more complex mathematical understanding and problem-solving abilities in later years. In early childhood, numeracy skills are nurtured through playful, everyday activities and interactions that help children make sense of the world around them. These skills include: Number Sense, Counting, Sorting, Basic Arithmetic, Measurements, Spatial Awareness etc. For children to develop numeracy skills effectively, a good and conducive learning environment is essential to stimulate their interest toward acquisition of numeracy skill.

Moreover, as children are exposed to a range of toys, activities, playmates, and play settings, they develop personal preferences. Having personal interests is common, and some children develop extreme interests in specific things. Ivanna, Sheri, Jo-Anne, and Carla (2018) have found that these interests are associated with schematic knowledge development. Parents and caregivers play a crucial role in the development and maintenance of their children's interest in numeracy by providing interest-related activities and materials that enhance their children's interest in developing numeracy skills. Interest in numeracy skills offers positive learning opportunities and the ability to perform better in numeracy-related subjects in both basic and higher education in future. Interest in learning is related to liking, attention, and a somewhat fixed interest in certain things (Ivanna *et.al.*, 2018). For children to be expose to the rudiments of numbers, letters, colors, shapes, and forms, their interest must be considered. Interest in numeracy at the elementary level could help determine a child's readiness to learn mathematically inclined subjects at other level of education. Darmadi (2017) opined that interest is a condition that reflects the relationship between something that is observed or experienced and one's own desires or needs. In other words,

there is a tendency for what a child sees and observes to be related to their desires and needs. Ezike (2018) also sees interest as a psychological state of having an affective reaction and focus attention for particular content. If learning materials within the learning environment do not align with the children's interest, they will not be serious about learning. Children find it easier to learn numeracy when interest-driven materials and activities are put in place to encourage numeracy skills development which in turn enhances their academic achievement. Children interest in numeracy skills development may enhance children's academic achievement in numeracy.

Consequently, academic achievement represents the performance outcome that indicate the extent to which a person has accomplished specific goals which were the focus of activities in an instructional environment (Ezike, 2018). Academic achievement is the ability to study and remember facts and being able to communicate this knowledge orally or in written form even in an examination condition (Kpolovie, Joe & Okoto, 2019). Academic achievement is the ability to study and remember facts and being able to communicate knowledge acquired orally or in written form even in an examination condition. Also, Akunne and Anyamene (2021) stated that, academic achievement is described as the ability to study and remember subject content and being able to communicate such knowledge orally or in written form even in an examination condition. Nonetheless, Early childhood education level plays crucial roles in laying foundation for further education of learners. A Child academic achievement is influenced by his school environment. According to Barrett, Davies and Zhang (2015) a good classroom arrangement inspires and encourages pupils to easily interact with each other and develop various skills including language and social behaviour. Numeracy skills are also been developed in a well equip and conditioned learning environment.

Statement of the Problem

In Pankshin Local Government Area of Plateau State, there is growing concern among educators, parents, and policymakers about the quality of the learning environment in public Early Childhood Development and Education (ECDE) centers. Despite educational

reforms and investments, significant gaps remain in the academic achievement and interest levels of children in numeracy skills development. Research highlights the importance of a conducive learning environment for fostering children's interest and enhancing their academic performance, especially in early education. However, many public ECDE centers in Pankshin suffer from inadequate facilities, insufficient learning materials, overcrowded classrooms, and untrained teachers. These deficiencies may hinder children's ability to develop essential numeracy skills, which are critical for their future academic success. Therefore, it is essential to investigate the correlation between the learning environment in public ECDE centers and children's interest in numeracy and academic achievement.

Purpose of the Study

The purpose of the study is to examine learning environment as correlate of children's interest and academic achievement in numeracy skills development in public early childhood development education centres in Pankshin Local Government Area of Plateau State. Specifically, the study sought to determine to:

- i. identify the quality of Early Childhood Development Education (ECDE) centres in Pankshin Local Government Area of Plateau State.
- ii. examine the relationship between the learning environment and children's interest in numeracy skills development in public ECDE centres in Pankshin Local Government Area.
- iii. examine the relationship between the learning environment and children's academic achievement in numeracy skills development in public ECDE centres in Pankshin Local Government Area.

Research Questions

The following research questions guided the study.

- i. What is the quality of ECDE centres in Pankshin Local Government Area of Plateau state?
- ii. What is the relationship between learning environment and children's interest in numeracy skills development in public ECDE Centres in Pankshin Local Government Area?

- iii. What is the relationship between learning environment and children's academic achievement in numeracy skills development in public ECDE Centres in Pankshin Local Government Area?

Research Hypotheses

The following null hypothesis guided the study.

- H₀1: There is no significant relationship between learning environment and children's interest in numeracy skills development
- H₀2: There is no significant relationship between learning environment and children's academic achievement in numeracy.

Methodology

This study was carried out to examine the relationship between learning environment on children interest and academic achievement in numeracy skills in public ECDE Centres in Pankshin Local Government Area of Plateau State. Two research questions guided the study with two formulated hypotheses. The study adopted a correlational design, because the study examined the relationship between learning environment on children interest and academic achievement. The population for this study comprises of 220 children in 5 public ECDE schools in Pankshin LGA. The sample size for this study comprised of 50 children, selected using simple random sampling techniques from the selected 5 ECDE centres across the study area. The researcher developed an 8-item questionnaire titled "Quality of Early Childhood Development Education Questionnaire (QECDEQ)" to assess the quality of ECDE centres, 10-items structured observation checklist, titled "Learning Environment and Children Interest Observation Checklist (LECIOC)" to assess the children interest in numeracy skills. Also, 10-items Numeracy Achievement Test (NAT) was developed by the researcher to examine their numeracy skills. The instruments were validated using face and content validity by experts, in the Department of Early Childhood Care and Education and Measurement and Evaluation unit. Reliability test was conducted using Cronbach Alpha and split-half to ascertain the internal consistency of the instruments. Therefore, reliability index of 0.78, 0.74 and 0.76 were obtained. A four-point rating scale of High quality, Moderate quality, low quality and No

quality. Rated as 4,3,2, and 1 based on the quality observed. A five-point rating scale of Always observed, frequently observed, occasionally observed, rarely observed and not observed. Rated as 4,3,2,1 and 0 based on the Interest observed. The data were analyzed using Mean and standard deviation to answer the research questions and Pearson Product Moment Correlation Coefficient to establish the relationship. Mean rating of 2.50 and above were regarded as accepted while below 2.50 were regarded as rejected.

Results

Research Question One: What is the quality of ECDE centres in Pankshin Local Government Area of Plateau state?

Table 1
Quality of ECDE centres in Pankshin Local Government Area of Plateau state

S/n	Item	NQ	LQ	MQ	HQ	Mean	Decision
1	How is the overall condition of the classrooms?	10	13	15	13	2.24	Rejected
2	Is there a safe and secure playground for children?	18	15	12	5	1.84	Rejected
3	Is your classroom big enough?	8	12	22	8	2.22	Rejected
4	Do you have enough toys to play with?	9	16	18	7	2.14	Rejected
5	Do you feel safe at school?	14	17	11	8	1.98	Rejected
6	Do you have enough books to read?	20	15	12	3	1.92	Rejected
7	Is your classroom clean and beautiful?	17	15	11	7	1.84	Rejected
8	Do you like your teacher?	8	12	18	12	2.22	Rejected
9	Are the bathrooms clean?	21	13	12	4	1.94	Rejected
	Sectional Mean					2.04	

Table 1 above reveals the assessment of the quality of ECDE centres in Pankshin Local Government Area of Plateau State. 9 items were used to observe the quality of ECDE Classrooms, all were rejected base on 2.50 decision point. Items such as the overall condition of classrooms (2.24), the safety and security of playgrounds (1.84), the adequacy of classroom space (2.22), the availability of toys (2.14), the feeling of safety at school (1.98), the availability of books (1.92),

classroom cleanliness (1.84), and bathroom cleanliness (1.94) are all below 2.50. Consequently, all these aspects are rejected as they do not meet the expected quality standards. Furthermore, the sectional mean of these items is 2.04, which also falls below 2.50, reinforcing the conclusion that the overall quality of the ECDE centres in Pankshin Local Government Area is inadequate or are not up to standard.

Research Question Two: What is the relationship between learning environment and children's interest in numeracy skills development in public ECDE Centres in Pankshin Local Government Area?

Table 2
Children interest in numeracy skills Development in public ECDE

S/N	Item	Observation	NO	RO	OO	FO	AO	Mean	Decision
1.	Engagement in Numeracy Activities	Children actively participate in numeracy games and activities.	5	13	5	12	15	2.30	Rejected
2.	Interest in Counting and Number Activities	Children show excitement and enthusiasm during counting and number activities.	2	5	12	18	13	2.70	Accepted
3.	Use of Numeracy Resources	Children independently choose and use numeracy-related toys, books, and materials.	5	11	10	15	9	2.10	Rejected
4.	Initiation of Numeracy Play	Children initiate their own numeracy-related play or activities without prompting.	8	12	8	12	10	1.98	Rejected
5.	Attention During Numeracy Lessons	Children remain focused and attentive during teacher-led numeracy lessons.	5	8	15	14	8	2.22	Rejected
6.	Verbal Engagement with Numeracy	Children talk about numbers, counting, and other numeracy concepts during play or activities.	12	6	10	15	7	1.88	Rejected

7.	Positive Attitude Toward Numeracy	Children display positive attitudes and enjoyment while engaging with numeracy activities.	5	12	12	9	12	2.18	Rejected
8.	Collaboration in Numeracy Tasks	Children work together with peers on numeracy-related tasks or games.	3	8	7	17	15	2.72	Accepted
9.	Creativity in Numeracy Activities	Children demonstrate creativity by inventing new numeracy games or finding unique ways to engage with numeracy materials.	5	9	15	11	10	2.04	Rejected
10.	Problem-Solving Using Numeracy	Children use numeracy skills to solve problems during play or structured activities.	8	12	15	9	6	1.84	Rejected
Sectional Mean								2.20	

Table 2 above reveals the assessment of children's interest in numeracy skills development within public ECDE centers in Pankshin Local Government Area. The children engagement in numeracy activities (mean = 2.30), use of numeracy resources (mean = 2.10), initiation of numeracy play (mean = 1.98), attention during numeracy lessons (mean = 2.22) among others are all rated below 2.50, leading to their rejection. However, children show excitement and enthusiasm during counting and number activities (mean = 2.70) and collaborate well with peers on numeracy-related tasks (mean = 2.72), which are above 2.50 and are therefore accepted. The overall sectional mean of 2.20 indicates that the learning environment in these ECDE centers generally does not foster children's interest in numeracy skills development effectively. Most areas require significant improvements to enhance numeracy engagement among children.

Research Question Three. What is the relationship between learning environment and children's academic achievement in numeracy skills development in public ECDE Centres in Pankshin Local Government Area?

Table 3
Mean achievement Result of children in numeracy

S/N	Schools	N	Average Score
1.	School 1	10	45.99
2.	School 2	10	43.36
3.	School 3	10	46.02
4.	School 4	10	45.35
5	School 5	10	4.42
	Sectional Mean		37.03

Table 3 presents the academic performance of children in public ECDE centres in Pankshin Local Government Area following the administration of the Numeracy Achievement Test (NAT). The average scores across the schools range from 43.36 to 46.02, indicating a moderate level of achievement in most schools. However, School 5 significantly underperformed with an average score of just 4.42, which notably lowers the overall sectional mean to 37.03. This disparity suggests that while most schools are performing at an adequate level in numeracy, there is a critical need for targeted interventions to support underperforming schools like School 5, thereby improving the overall numeracy outcomes in the ECDE centres in the area.

Hypothesis 1: There is no significant relationship between classroom environment and children's interest in numeracy skills development in public early childhood care development and education centres in Pankshin Local government area of Plateau State.

Table 4
Correlation Coefficient showing the relationship between classroom environment and children interest in numeracy

Variable	N	Mean	Std.Dev	R	Sig	Remark
Learning environment	50	2.04	7.30	.191	.005	Significant
Children's interest	50	2.20	2.82			

Results of analysis presented in table 4 reveals that the correlation coefficient(r) is significant at $P < .05$ ($r = .191$, $P < .05$). This implies that the null hypothesis of no significant relationship is rejected indicating a relationship between classroom environment and children's interest in numeracy public early childhood care development and education centres in Pankshin Local government area of Plateau State.

Hypothesis two: There is no significant relationship between learning environment and children's academic achievement in numeracy skills development in public ECDE Centres in Pankshin Local Government Area.

Table 5
Correlation Coefficient showing the relationship between learning environment and children academic achievement in numeracy

Variable	N	Mean	Std.Dev	R	Sig	Remark
Learning environment	50	2.04	.483	.12	.031	Significant
Academic achievement	50	4.12	2.82			

Result of analysis shown in table 5 reveals that the correlation (r) is significant at $P < .05$ ($r = .12$, $P < .05$). This implies that the null hypothesis of no significant relationship is rejected indicating a significant relationship between classroom environment and children's academic achievement in numeracy in public early childhood care development and education centres in Pankshin Local government area of Plateau State.

Discussion of Findings

This study aimed to determine if a relationship exists between one independent variable (Learning environment) and two dependent variables (children interest and academic achievement in numeracy). The results show a significant positive relationship between the classroom environment and both children's interest and academic achievement. This finding aligns with Ekpo and Imo (2019) found that classroom climate significantly affects children's academic achievement in Social Studies. Sang (2019) reported that preschool children in a favorable classroom environment in Uasin Gishu County, Kenya, performed better in

Mathematics than those in an unfavorable environment. These findings are further supported by research from Indrawan and Pratomo (2021) and Mahaputra and Saputra (2020), who noted that a positive school culture, strong ethos, and supportive interactions boost student motivation. Havidz and Mahaputra (2020) and Zulhendra and Nofrialdi (2022) also found that a distraction-free learning environment enhances academic achievement. Furthermore, Chong and Ali (2022) demonstrated that motivated students, driven by aspirations and a supportive environment, achieve better academically. The study underscores the importance of a positive learning environment in fostering both children interest and academic achievement.

Conclusion

From the result of the study, it could be concluded that learning environment is a vital factor that can affect children's interest in learning. Interest has the potential to dictate the level of children's motivation, academic achievement and subsequent commitment in any activity.

Recommendations

Based on the findings of this study, which revealed a positive relationship between learning environment and children's interest and academic achievement in numeracy skills development. The researcher hereby recommends that:

1. Care givers should enhance classroom design to create a stimulating and well-organized learning environment that fosters exploration and curiosity. This could involve incorporating age-appropriate numeracy materials like counting blocks, puzzles, and manipulatives in designated activity areas.
2. Caregivers should also incorporate engaging numeracy activities in planning lessons that utilizes varieties of teaching strategies, such as games, songs, and hands-on activities to make learning numeracy concepts fun and interactive to children.
3. Policymakers should develop guidelines for ECDE classroom environment and establish clear guidelines and standards for the physical layout, resources, and teacher-to-children ratios within ECDE centres. This will ensure consistent quality and promote

optimal learning environments. Sufficient resources for ECDE centres to acquire age-appropriate learning materials and maintain a stimulating classroom environment for learning efficiency.

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