



Indoor Classroom Activities and Preschoolers' Acquisition of Numeracy Skills in Public Childcare Centres in Rivers South-East Senatorial District, Rivers State, Nigeria

Nworgu, L. I. H.

Department of Early Childhood and Primary Education, Ignatius Ajuru University of Education, Nigeria

Corresponding author email: lydiahenry4real@gmail.com

Abstract

The study examined the association between indoor classroom activities and the development of numeracy skills among preschool children in public childcare centres in the Rivers South East Senatorial District of Rivers State. The work was guided by two research topics, and two null hypotheses were investigated at the 0.05 alpha level. The study was reviewed to determine the relevance of the theory of cognitive development (1936) by Jean Piaget. The present article employed a correlational research design. The population is 2,028 subjects, comprising 1,820 nursery three children and 208 carers identified in 147 public early childcare centres among the seven local government areas in the Rivers South East Senatorial District. The multi-stage selection procedure was used to choose a sample of 608 participants. The sample included 546 children in nursery three and 62 carers from 44 public childcare centres for preschoolers. Data collection was done through two instruments developed by the researcher. The instruments used were a 4-point scaled Likert-type questionnaire entitled "Indoor Classroom Activities Questionnaire (ICAQ)" and an observation inventory entitled "Preschoolers' Acquisition of Numeracy Skills Observation Inventory (PANSOI)". The statistical method employed in the investigation was Pearson Product Moment Correlation (PPMC). From the investigation carried out, the researcher observed that there is a substantial association between storytelling and preschoolers' counting skills in public childcare centres in the Rivers South East Senatorial District of Rivers State. The researcher primarily proposed that, based on the findings, carers should incorporate storytelling and roleplay into their daily educational routines to enhance counting and pattern recognition skills among toddlers.

Keywords: Indoor Classroom Activities, Preschoolers, Numeracy Skills, Storytelling, Early Childhood Education.

Introduction

Indoor classroom activities still have an important role in the holistic development of preschoolers, especially in early childhood education environments where the fundamental skills are reinforced. These activities provide a structure, guidance, and interactivity through which children learn meaningful concepts in the cognitive, social, emotional, and psychomotor domains. Because numeracy skills are essential to children's early academic development, they should have regular opportunities to engage in meaningful learning activities, especially indoor ones such as storytelling and role-play. Indoor activities foster children's participation in active learning processes that develop cognitive skills, improve creativity, and promote language development. Indoor activities are a key component of instructional delivery in public childcare centres when outdoor resources are limited due to space constraints or safety concerns.

Numeracy skills during the preschool years involve a variety of cognitive skills that assist learners to grasp, interpret, and use number concepts in daily life. These include counting, recognition of numbers, sorting of numbers, formation

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of patterns, and elementary problem solving. Early growth of numeracy is important since it forms the basis for subsequent mathematical development. Charlesworth (2015) argues that numeracy offers children a cognitive framework to understand their world. Preschoolers develop numeracy abilities by explicit teaching, incidental learning, and manipulation of concrete objects and symbolic representations. It is therefore crucial that classroom activities are carefully planned to encourage children's engagement with mathematical concepts in ways that are meaningful, developmentally appropriate, and pleasant.

Indoor classroom activities are crucial teaching strategies for promoting numeracy development in public childcare centres, especially in the Rivers South East Senatorial District. Such activities include storytelling and role play, which provide chances for active learning, creative expression, and the application of numeracy in real-life situations. Storytelling exposes youngsters to mathematical vocabulary, numerical sequences, spatial language, and problem-solving situations encoded in stories. Roleplay, in contrast, encourages practical use of numeracy ideas. Children participate in imaginative scenarios such as "market play", "home role-play games that provide repeated exposure to number patterns can help", or "classroom simulation", where counting, sorting, and pattern identification happen organically. These exercises increase learning and help children relate numeracy to their daily lives.

In the opinion of Saint (2023), processes of cognitive development also influence the acquisition of numeracy abilities in indoor activities. Preschool toddlers are at the preoperational stage of Piaget's theory of cognitive development, which means they learn best through symbolic play, imitation, and engagement with concrete items. Indoor activities such as storytelling and role-play games effectively support this developmental phase by helping young children internalise abstract concepts through connections with stories, characters, objects, and guided actions, as they provide repeated exposure to number patterns. However, in many public childcare centres, the successful implementation of indoor activities may be affected by some constraints, such as overcrowded classrooms, inadequate training of carers, a lack of instructional resources, and insufficient learning environments.

This paper focuses on determining the relationship between indoor classroom activities, storytelling and roleplay and preschoolers' acquisition of numeracy skills, specifically counting and cognitive development, in public child centres in the Rivers South East Senatorial District of Rivers State. The study results emphasise the need to include indoor activities in regular instructional practices to enhance basic numeracy skills among young students.

Counting competence is a child's ability to count numbers in order, to recognise the number of items, and to use numerical reasoning in various situations. It is one of the first and most basic numeracy abilities learned in early life. Counting is the basis upon which further mathematical learning, such as addition, subtraction, multiplication, and division, is built. Preschoolers learn to count and understand one-to-one correspondence, cardinality, and ordinality, which are all necessary for understanding number relationships. Counting is more than repeating numbers. It also means recognising numerical symbols, associating numbers with quantities, and performing elementary operations in familiar settings. Gelman and Gallistel (1978) suggest that there is an innate tendency for young children to be numerically oriented and that the development of counting stems from the children's interactions with objects, people, and everyday situations. Therefore, counting is the framework from which youngsters start to conceptualise more complicated mathematical ideas. Hands-on activities, songs, stories, and role-play games that give repeated exposure to number patterns can help to reinforce counting in the preschool classroom. Counting is crucial at the early stages of life. It helps in the cognitive and problem-solving development of the kid at the early stages of life.

Pattern recognition is the child's ability to recognise, reproduce, continue, and create new sequences based on repeated arrangements of objects, shapes, sounds, colours, or activities. Pattern identification is considered a fundamental numeracy skill in early childhood education, as it aids youngsters in learning order, relationships, and predictability. Patterns are central to mathematical reasoning and problem solving and are an important base for learning algebraic concepts later in school. Patterns allow youngsters to predict, organise information, and recognise mathematical structures in their environment (Clements, 2004). Preschoolers instinctively experience patterns through daily routines, music, storytelling, and play activities. Children may see patterns in the designs of clothes, the decorations in a classroom, in beads, tiles, or in games that involve rhythmic clapping. Pattern identification teaches youngsters

early algebraic thinking and promotes cognitive processes that boost attention, memory, and analytical reasoning. Hence, pattern recognition is an important talent that facilitates the development of numeracy from early childhood.

Tubosun (2023) views pattern identification as an important numeracy talent that influences children's early mathematical development. It establishes the foundation for logical reasoning, algebraic thinking, and problem-solving skills that persist throughout primary school and beyond. Pattern activities in the indoor school environment, such as storytelling and roleplay, provide important possibilities for children to connect with mathematical ideas in natural and engaging ways. To maximise the benefits of pattern identification, carers should implement developmentally appropriate tactics, provide sufficient instructional resources, and establish engaging environments for children to investigate patterns both independently and collaboratively. Pattern identification is still an important part of numeracy education in preschool, even when problems arise from lack of resources or limited training. They see it as a key area of focus for early childhood educators and policymakers given its effects on cognitive development, creativity, and academic preparation.

Timothy (2023) defined storytelling as an effective approach for teaching that involves telling children about events, concepts, or imaginary experiences to engage them in meaningful learning. Storytelling is a medium for developing language, creativity, listening skills, and numeracy principles incorporated within the narratives in early childhood education. Through familiar surroundings, stories provide youngsters with structured opportunities to discover mathematical vocabulary, number sequences, shapes, sizes, and patterns. For example, stories about characters who count things, share things, or recognise patterns help toddlers learn numeracy concepts intuitively. Moreover, storytelling enhances the children's imagination, as it enables them to imagine the events, actions, and characters vividly. This kind of make-believe play is the foundation for symbolic thought, which is at the heart of mathematical development. According to Wood (2014), storytelling develops numeracy skills as youngsters learn to manipulate ideas, predict outcomes, and apply concepts to real-life circumstances. Storytelling is an inexpensive and accessible teaching approach for carers in public childcare centres to engage children in arithmetic.

Storytelling remains a valuable indoor classroom activity for developing preschoolers' numeracy skills when it is effectively integrated into the curriculum. When carefully planned and well-coached, role-play is implemented well, as noted by Ikenna (2022). It is a flexible and developmentally appropriate instructional tool since it may combine language, creativity, and numerical reasoning. Carers can do their best when they purposefully use counting, patterns, numerical problem solving, and math language in their stories. The storytelling should be participatory and engaging and supplemented by visual or physical elements as required. Storytelling is an important tool for holistic development and for enhancing the numeracy abilities of children in early childhood education settings, especially in public childcare centres where there is a lack of instructional materials, notwithstanding hurdles (Seun, 2023).

As discussed by Mauabuchi (2024), role-play is an indoor, participatory activity in which preschoolers assume roles and imitate real-life circumstances and act out characters or events. Roleplay is a way of learning through hands-on experience, social interaction, and cognitive growth through pretend play in early childhood education. Children can be engaged in role-play games such as "grocery store play", "market day", "family home play", or "doctor's clinic", in which they naturally incorporate numeracy principles into their interactions. Roleplay provides children with opportunities to try out new roles, work through problems, and practise their communication skills. It promotes symbolic thinking and enhances children's use of imagination to portray objects, people, and situations. Sarama and Clements (2019) found that roleplay encourages youngsters to count, compare, sort, measure, and find patterns within pretend situations, promoting mathematical reasoning. Roleplay in public childcare centres is an effective way to include numeracy in the everyday routine and to provide purposeful learning.

Roleplay is still one of the most effective indoor classroom activities for assisting toddlers' numeracy development. Its experiential aspect provides youngsters an opportunity to use mathematical ideas in real-life situations, which improves their knowledge of counting and patterns. Role-play, when carefully planned and well-coached, fosters cognitive, social, emotional, and language development. There are problems in terms of lack of resources, classroom management, and different levels of student engagement, but these can be overcome through effective training and innovation on the part of carers. Roleplay is in accord with the natural learning tendencies of children and has great

potential to improve numeracy abilities in public childcare centres in the learning tendencies of children and has great potential to improve numeracy abilities in public childcare centres in the Rivers South East Senatorial District.

The theory of cognitive development by Jean Piaget (1936) gives a basic framework for understanding how children learn and develop numeracy abilities. According to Piaget, children from two to seven years of age are in the preoperational stage, a period where they learn best through symbolic play, imagination, and interaction with concrete objects. The hallmark of this stage is rapid cognitive development, the development of symbolic thinking, egocentrism, and dependence on intuitive reasoning. Children learn via manipulating items, engaging in pretend activities, and learning through hands-on activities, according to Piaget.

The importance of Piaget's theory to this study is that it supports developmentally appropriate tactics such as storytelling and roleplay as indoor classroom activities. These activities are consistent with the cognitive tendencies of infants in the preoperational stage, who employ symbols, stories, and pretend situations to make sense of abstract ideas. Counting makes sense when it is part of stories about characters or in market-themed roleplay activities. Storytelling sessions or organised play scenes that present visual, aural, or kinesthetic aspects make pattern detection easier. Piaget's perspective that children are active builders of knowledge endorses the incorporation of indoor activities that foster exploration, imitation, creativity, and reflection.

According to Piaget, concrete experiences are essential before abstract reasoning. Storytelling provides symbolic representations that allow children to visualise numerical ideas, and role play provides opportunities for actual application. What children experience during indoor activities helps them to assimilate and accommodate their concept of numeracy. Therefore, Piaget's theory offers a solid theoretical foundation for studying the relationship between indoor classroom activities and preschoolers' numeracy development in public daycare centres. Many preschoolers at public childcare centres in the Rivers South East Senatorial District struggle to acquire basic numeracy skills, such as counting and pattern recognition, despite the well-established importance of numeracy in early life development. However, the effective implementation of indoor classroom activities such as storytelling and role play appears to have been hindered by poor instructional materials, overcrowded classrooms, and minimal teacher training. In many centres, the teacher-centred teaching-learning process continues to be the norm, thereby limiting the scope for children to have experiential, creative, and meaningful learning experiences. Therefore, children can develop poor numerical reasoning, sequencing ability, and pattern identification. Without alleviating these problems, preschoolers may enter primary school unprepared to learn more advanced mathematical concepts. Therefore, the problem of this study is to determine the relationship between indoor classroom activities, storytelling, and roleplay, and preschoolers' acquisition of numeracy skills—specifically counting and pattern recognition—in public childcare centres within the Rivers South East Senatorial District of Rivers State.

The study aimed at investigating the association between indoor classroom activities and the development of numeracy skills of preschoolers in public childcare centres in Rivers South East Senatorial District of Rivers State. The objectives of the study are to:

1. To determine the association between storytelling and learning of counting abilities by preschoolers in public childcare centres in Rivers South East Senatorial District of Rivers State.
2. Establish the association between roleplay and preschoolers' development of pattern recognition in public childcare centres in Rivers South East Senatorial District of Rivers State.

The research was driven by the following research questions:

1. How is storytelling related to preschoolers' counting skills in public childcare centers in Rivers South East Senatorial District of Rivers State?
2. What is the relationship between role play and preschoolers' pattern recognition in public childcare centers in Rivers South East Senatorial District of Rivers State?

The following null hypotheses will be tested at a 0.05 level of significance:

H₀₁: There is no significant relationship between storytelling and preschoolers' counting skills in public childcare centres in Rivers South East Senatorial District of Rivers State.

Ho2: There is no significant relationship between roleplay and preschoolers' pattern recognition in public childcare centres in Rivers South East Senatorial District of Rivers State.

Methodology

The study utilised a correlational research design. The design: The researcher chose this design to explore the relationship between the independent and dependent variables. The researcher chose a correlational research design for the study to investigate the link between the independent variable and the dependent variable. 2,028 subjects comprising 1,820 nursery three children and 208 carers were obtained from the 147 public early childcare centres throughout the seven local government areas in the Rivers South East Senatorial District. The multi-stage sampling procedure was employed to select 608 subjects, which comprised 546 nursery three-year-olds and 62 carers drawn from 44 public childcare centres' preschools. The first stage involved the use of the stratified sampling technique to divide the senatorial district into upland and riverine areas, and in the second stage, the balloting without replacement format of the simple random sampling technique was used to draw two local government areas from each of the strata (2 from the riverine and 2 from the upland strata). In the third stage, 11 public childcare centres were selected from each of the identified local government regions using the fourth interval style of systematic sampling.

In step four, the simple random sampling technique was utilised to select the sample of carers and preschoolers using the hat and drop method, where the numbers "Yes" and "No" were written on papers, wrapped, and placed in a basket. The participants were expected to pick the wrapped papers, and all the subjects who picked the papers and wrote 'Yes' were included in the sample of the papers. Data were gathered using two instruments developed by the researcher. The instruments used were a 4-point scaled Likert-type questionnaire titled "Indoor Classroom Activities Questionnaire (ICAQ)" and an observation inventory titled "Preschoolers' Acquisition of Numeracy Skills Observation Inventory (PANSOI)". The instruments were administered by two research assistants. The Pearson product-moment correlation coefficient was utilised to answer the study questions and test the null hypotheses at the 0.05 level of significance.

Results

Table 1: Pearson Product Moment Correlation on the relationship between storytelling and preschoolers' counting skill in public childcare centres in Rivers South East Senatorial District of Rivers State.

		Storytelling	Preschoolers' counting skill
Storytelling	Pearson Correlation	1	.433**
	Sig. (2-tailed)		.000
	N	608	608
Preschoolers' counting skill	Pearson Correlation	.433**	1
		608	608
	N		

**Significant $p < 0.05$

Table 1 above shows the Pearson correlation on the relationship between storytelling and preschoolers' counting skill in public childcare centres in Rivers South East Senatorial District of Rivers State. The Pearson correlation coefficient (r) for the relationship between storytelling and preschoolers' counting skill is ($r = .433$) with p-value .000 lesser than .05. This indicates a moderately positive and significant correlation, implying that when storytelling is used to teach children, their counting skill improves to a moderate extent. Therefore, the null hypothesis was rejected. This means that there is a significant relationship between storytelling and preschoolers' counting skill in public childcare centres in Rivers South East Senatorial District of Rivers State.

Table 2: Pearson Product Moment Correlation on the relationship between roleplay and preschoolers' pattern recognition in public childcare centres in Rivers South East Senatorial District of Rivers State.

		Roleplay	Preschoolers' pattern recognition
Storytelling	Pearson Correlation	1	.522**
	Sig. (2-tailed)		.002
	N	608	608
Preschoolers' counting skill	Pearson Correlation	.522**	1
	N	608	608

**Significant $p < 0.05$

Table 2 above shows the Pearson correlation between roleplay and preschoolers' pattern recognition in public childcare centres in Rivers South East Senatorial District of Rivers State. The Pearson correlation coefficient (r) for the relationship between roleplay and preschoolers' pattern recognition is ($r=.522$) with p -value .002 lesser than .05. This indicates a moderately positive and significant correlation, implying that when roleplay is used to teach children, their pattern recognition skill improves to a moderate extent. Therefore, the null hypothesis was rejected. This means that there is a significant relationship between roleplay and preschoolers' pattern recognition in public childcare centres in Rivers South East Senatorial District of Rivers State.

Discussion

Relationship between Storytelling and Preschoolers' Counting Skill

The findings in hypothesis one indicate that the correlation coefficient (r) for the association between storytelling and preschoolers' counting skill is ($r=.433$) with a p -value .000 less than .05. This demonstrates a moderately positive and substantial link, which means that when storytelling is utilised to teach youngsters, their counting competence improves to a moderate extent. Thus, the null hypothesis was rejected. This suggests that there is a strong association between storytelling and preschoolers' counting abilities in public childcare centres in Rivers South East Senatorial District of Rivers State. The finding of the article is in line with the statement of Wood (2014), who noted that storytelling promotes the acquisition of numeracy by allowing youngsters to manipulate ideas, to predict outcomes and apply concepts to real-life circumstances. Storytelling is an accessible, inexpensive form of instruction that can be used in public childcare centres to help carers introduce numeracy in engaging manners.

Relationship between Role play and Preschoolers' Pattern Recognition

The findings hypothesis two shows that the correlation coefficient(r) for the association between roleplay and preschoolers' pattern recognition is ($r=.522$) with p -value .002 less than .05. This is a positive moderate and significant association. This suggests that when roleplay is utilised in teaching youngsters their pattern recognition skills improve to moderate amount. Hence, the null hypothesis was rejected. This shows that there is a substantial association between roleplay and pattern recognition of preschoolers in public childcare centers in Rivers South East Senatorial District of Rivers State. The finding of the article is in agreement with the discussion of Sarama and Clements (2019) who mention that roleplay promotes mathematical reasoning by teaching youngsters to count, compare, sort, measure, or recognise patterns in pretend scenarios. Roleplay is a practical approach for embedding numeracy into daily routines and making learning relevant in public childcare centers.

Conclusion

The study found that indoor classroom activities significantly enhanced the acquisition of numeracy abilities by preschoolers in public childcare centers in Rivers South East Senatorial District of Rivers State. Storytelling and roleplay were found to improve counting skills and pattern identification, therefore boosting children's basic

arithmetic skills. These activities provide meaningful, interactive, developmentally appropriate learning experiences that are aligned with children's cognitive growth.

Recommendations

According to the findings of the report, the researcher suggested that:

1. Carers should use storytelling and roleplay in their everyday teaching routines to help preschoolers learn to count and recognise patterns.
2. School officials and stakeholders should make sure there is enough provision of narrative materials, props and roleplay resources in childcare centres.

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