

Utilization of Play Resources in the Teaching Numeracy Skills: A Case of Pre-Primary Schools in Bungoma South, Bungoma County, Kenya

Otinga P. Wokila, Dr. Ong'ang'a H. M. Ouko

Kenyatta University, P.O Box 43844-00100, Nairobi Kenya

Abstract: - Play is essential tool for pre-school program curriculum that provides opportunities to establish knowledge, comprehension and skills through a range of contexts covering all subjects in the curriculum. In this regard, the purpose of this study was to identify the forms of play materials employed in the teaching of numeracy skills in pre-primacy school centres in Bungoma Sub-County. The study used both quantitative and qualitative research design. The target population comprised of all pre-primary children and pre-primary school teachers. Questionnaires and observation schedules were used for data collection. The research instruments were piloted in two public and one private institution that were not included in the sample study. The collected data was cleaned, edited and coded as per the themes that emanated for the study objective. The quantitative data was analyzed and presented using descriptive statistics such as frequency and percentages. Qualitative data derived from open-ended responses were presented in narrative form. The study established that majority of teachers reported that their schools had play corners, bottle tops and balls. However, such play materials as beanbags, swings and sand play areas were not sufficient in schools yet they were crucial in teaching early numeracy skills. The study concluded that factors such as availability of play materials was statistically significant ($p\text{-value}<0.05$). The null hypothesis (H_1) was rejected. The study recommended that school management should create adequate learning environment for the children, which should be made conducive environment for learning. Every pre-school should be provided with a numeracy skills laboratory equipped with all necessary materials for teaching and learning numeracy skills. The study is of significant to the Ministry of Education, Kenya Institute of Curriculum Development (KICD), publishers and developers of early childhood education materials and teachers as well as ECDE institutions' sponsors.

Keywords: Play Materials, Acquisition, Numeracy Skills, Pre-primary School Children

I. INTRODUCTION

Play provides a setting for children to access the content of the curriculum through which they organize and make sense of their social world as they actively participate in learning. In this regard, children who involve in quality play experiences are more likely to acquire quality developed numerical memory skills than those who are not subjected to play-based learning (Sandlie, 2013). Hence, the teacher ought to provide opportunities for the children to engage in effective learning within a safe and secure environment for learning.

Syomwene (2013) opines that the benefits of play cannot be overstated with respect to acquisition of numeracy skills among children. Plays develop the fundamental skills of numeracy, provides rich platforms for developing such skills as observing, organizing, recording, interpreting and prediction provides opportunities to learn in a practical way and manipulative skills, and gives the children chances for exploration, investigation, problem-solving and decision-making skills. Also in learning numeracy skills, play is also significant in promoting children's creativity, helping children to deal with hard situations, allowing children understand and identify their abilities and interests in addition, matching and pairing values and numbers (Maheshwari, 2013).

A recent study was investigated on Teachers' use of play as a teaching strategy in Pre-primary schools in Mwanza district, Kilimanjaro region, Tanzania using a sample 30 out of 83 schools having 40 teachers as the accessible respondents (Tarimo, 2013). Findings showed that 57.5% of the schools had no play materials. Furthermore, 76.5% of the non-users respondents had no play materials hence there was a tendency of not using play as a teaching strategy by teachers. Chi-square test revealed that X^2 calculated (6.155) was greater than X^2 tabulated (3.87) at a 0.05 significance level. This showed that there is a relationship between availability of play materials and use of play as a teaching strategy. This implies that availability of play materials had significant influence on teachers' use of play as a teaching strategy. The study concluded that lack of access to a variety of play materials may bring about a loss of teachers' interest and creativity in teaching a subject.

In a study which involved 96 four-year-olds in joint music making, for example, Kirschner and Tomasello (2010) showed that these children significantly increased subsequent spontaneous cooperative and helpful behaviour, relative to a carefully matched control condition with the same level of social and linguistic interaction but no music. Findings reported by Mwangi (2007) who reported absence of instructional resources together with unattractive classroom conditions in pre-primary schools hindered teachers from effective teaching methods.

There is an urgent need for pre-school teachers to comprehend the significance of play in order to provide suitable

approaches for introducing numeracy activities (Pyle & Danniels, 2017). As a result, this would aid in providing practical, interactive and enjoyable experience in learning activities involving numeracy skills teaching. The utilization of play also assists children to develop solving problems like simple addition, matching, recognition of symbols, developing eye-hand coordination and shapes of numbers. Hence, aspects and types of plays in numeracy learning are important in quality acquisition for numeracy skills.

According to Millar and Eden (2012) children should be provided with opportunities that stimulate them to play with sounds, rhythm, language, materials and space in order to advance in physical and intellectual competence. Kioko (2010) advocates that play has been neglected as an approach of teaching numeracy by many schools in Kenya as pre-teachers do not consider play as essential in child numeracy learning. Despite the significant role of play in comprehending number value, symbols and number recognition, children are not provided with enough time and opportunities to play as a result.

Waweru (2013) explored how play materials affected social and passionate development in pre-primary school children in Kiambu County. In her discoveries, play materials had a positive social and enthusiastic impact on Pre-primary school children. Kericho (2015) surveyed the accessibility of play materials in Pre-primary schools situated inside Bungoma County. His discoveries uncovered that the majority of the tested pre-primary school settings improved children's physical advancement in all movement territories to an insignificant degree. All the more thus, the study uncovered that the vast majority of the Pre-primary schools don't give children space for getting their insight through their considerations (psychological advancement). of teaching numeracy other than the use of guided play to enhance learning of children.

A study by Njangi (2013) explored on a strategy in pre-primary schools called attention that most teaching in pre-schools is conducted through direct guidance utilizing slate and chalk. In addition, he suggested that numerous pre-schools need physical offices and playing fields that are helpful for comprehensive development and advancement of children. It is the endeavor of this study to underscore and identify forms of play forming instructional component in the acquisition of numeracy skills among pre-school children in Bungoma South Sub-County, Kenya.

II. PURPOSE OF THE STUDY

The purpose of this study was to identify play materials used by pre-primary school teachers in the teaching of numeracy skills in Bungoma South, Bungoma County Kenya.

III. REVIEW OF RELATED LITERATURE

Nature of play and acquisition of numeracy skills

Generally, play enhances quality of understanding, abilities and interest in numeracy skills like addition, matching symbols, identifying patterns and paring numbers and values. Play may be physical, social, intellectual or emotional. Nevertheless, its nature and complexity varies as the child grows older and thus pre-school teachers would need to select the appropriate types of play activities, materials and environment for the play (Lundreth, 2015). Frost (2010) argues that as with all other types of play, play with objects often also incorporates other types of play, as it clearly has physical and manipulative aspects.

Numeracy scales ranging from tuning in, perusing, including, arranging by shapes, counting in groups, arranging in sequence and number-crunching diversion form the fundamental components of proficient numeracy abilities. These activities are exercised by teachers in teaching numeracy skills and help improve the learning of arithmetic in pre-primary schools (Popoola, 2010). Henceforth, teachers need to expand on existing great practice in pre-primary schools and set the establishment of the most suitable approach based on play (Danniels & Pyle, 2018).

Tarimo (2013) conducted a study on the Teacher' use of play as a teaching strategy in pre-primary schools in Mwanza District, Tanzania basing on a sample of 40 teachers in 30 schools out of 83 schools and the results showed that 57.5% of the schools had no play materials. Chi-square test revealed that X^2 calculated (6.155) was greater than X^2 tabulated (3.87) at a significance level of 0.05. This finding implied that there is a significant relationship between availability of play materials and use of play as a teaching strategy. Musical play is a significant area which has been found to impact on acquisition of numeracy skills among children both at early and advanced stages (Pound). In a study which involved 96 four-year-olds in joint music making, for example, Kirschner and Tomasello (2010) showed that these children significantly increased subsequent spontaneous cooperative and helpful behaviour, relative to a carefully matched control condition with the same level of social and linguistic interaction but no music.

Studies in Kenya have clearly demonstrated the importance of play in teaching and learning basic concepts in reading, numeracy and writing skills. Waithaka (2009) explored the children's engagement in informal and how play materials affected social and passionate development in pre-primary school children in Kiambu County. Findings showed that play materials had a positive social and enthusiastic impact on Pre-primary school children. Kericho (2015) surveyed the accessibility of play materials in Pre-primary schools situated inside Bungoma County. However, the studies did not focus and exhaust specifically on the types of play and their aspects on the acquisition of numeracy skills.

IV. RESEARCH DESIGN AND METHODOLOGY

Research Design

This study used a descriptive research design since it includes gathering information that portrays the nature and attributes of pre-school utilization of play.

Study Population

This study targeted a total of 282 pre-primary teachers were targeted from 141 Pre-primary schools in Bungoma South Sub-County

Sampling Technique and Sample Size

Simple random sampling strategy was used to select 29 public Pre-primary and 14 private Pre-primary from a sum of 141 Pre-primary schools utilizing randomized numbers. A total of 86 pre-primary school teachers were selected using random sampling technique.

Data Instruments

Questionnaires comprising of both open-ended and closed ended inquiries structured in accordance with the study objective were used. Observation schedule was also used to score the availability of play materials for both indoor and outdoor.

Data Collection Procedures and Analysis

The researcher made a visit to the sampled schools to brief the heads of schools about the research and set date for data collection. Collected data were cleaned, edited and arranged according as per the study variables and entered into a computer. The data were analyzed using SPSS and the results were discussed using descriptive statistics such as mean, frequencies, and rates. Data were presented using graphs, tables and pie-charts. Marks were awarded against the impact of each type of play (ranging from 0-100%) to represent the performance. Observation was further carried out to determine the extent to which pre-school teachers used games in teaching numeracy skills. The frequencies were measured on a scale ranging: (**MF**-Most Frequently, **F**-Frequently, **R**-Rarely and **N**-Never). To verify the variance between the availability of play material and use of play as a teaching strategy for numeracy skills, the results were subjected to ANOVA and results were indicated in Table 4.

V. RESULTS OF THE STUDY

This section presents the data collected from the field and the data analysis procedures done to achieve the purpose of the study.

Types of play and play materials

First and foremost, teachers were asked to state whether play materials in their schools were either adequate or not. The table below presents data on play materials available in the classrooms.

Table 1: Play Materials Available in the Classrooms

Play materials	Available		Not available	
	Frequency	Percentage	Frequency	Percentage
Balls				
Swings				
Slides				
Beanbags				
Tyres				
Dolls				
Toy cars				
Sand play areas				
Play corners				
Bottle tops				

The above Table shows that majority of teachers 57(71.25%) reported that their schools had play corners, followed by bottle tops 48(60.0%) and balls 47(58.75%). However, such play materials as beanbags (10.0%), swings (18.75%) and Toy cars (22.50%) were not sufficient in schools yet they were crucial in teaching early numeracy skills and basic mathematics. The study further sought to establish some of the play methods that the pre-school teachers engaged children mostly while teaching numeracy skills. Marks were also awarded against the impact of each type of play (ranging from 0-100%) to represent the performance. The results are as shown in Table 2.

Table 2: Types of Play used in Teaching in Numeracy Skills verse Performance

Play	Performance (marks awarded)	Frequency	Percentage
Role play	55	45	56.25
Games	70	39	48.75
Music/songs	96	49	61.25
Pretend play	50	35	43.75

N=80

From Table 2 it was found that when music/songs were used while teaching numeracy skills the performance was very good as shown by 96%, followed by games at 70%, Role placing at 55% and pretend play at 50%. This depicts that majority of the preschool teachers used play method when teaching numeracy skills. It also illustrates that the most significant play method in influencing numeracy skill performance was music/songs, games, role playing and pretend play respectively. These findings are similar to that of Ashiabi (2007) who point out that when teaching numeracy skills, the incorporation of various games creates a desire in learners for learning the subject and makes it easy for children to gain interest in learning numeracy skills.

Table 3 shows the responses from the observation covering 40 pre-primary schools.

Table 3: Frequency of which Pre-School Teachers Use Play Activities in Teaching Numeracy skills

Games	Response (N=40)						Mean	Std dev
		Most Frequent	Frequent	Rare	Never			
Numeracy skills Bingo	F	10	18	12	0	1.28	0.89	
	%	25.0	45.0	30.0	0			
Guessing game	F	0	20	11	9	1.68	1.05	
	%	0	50	27.5	22.5			
Snake and ladders	F	0	31	5	4	1.82	0.86	
	%	0	77.5	12.5	10			
Cross-number puzzles	F	2	13	5	10	1.97	1.03	
	%	5.0	32.5	12.5	25.0			
Catching ball	F	12	16	8	4	2.13	1.18	
	%	30.0	40.0	20.0	10.0			
Hiding game	F	34	6	0	0	2.48	1.05	
	%	85.0	15.0	0	0			
Big ten	F	40	0	0	0	2.67	1.16	
	%	100	0	0	0			
Average Score						1.97	1.42	

Results in Table 3 indicated that all 40(100%) pre-schools under study in pre-schools agreed that they used big ten game in teaching numeracy skills in pre-schools. Despite the fact that majority 31(77.5%) utilized snake and ladders, 4(10%) reported that they rarely used it. Interestingly, 9(22.5%) out of the 40 pre-schools did not use guessing game at all. These findings imply that the frequency at which teachers utilized games in teaching numeracy skills was generally low (Overall Mean=1.97 and Standard Deviation=1.42). In relation to the socio-cultural theory of Vygotsky, children are active seekers of knowledge and not solitary agents, and their collaboration with the social environment moulds cognition in culturally adaptive ways through games and other materials. The theory provides that games provide a temporary platform or support (Scaffolding) through which children can accomplish a range of tasks that are within their Zone and cannot yet handle alone. According to Essa (2011), games promote abstract thought that allow children to reach beyond their actual development in their cognition and self-regulation and achieve a mental representation of social roles.

It is evident in this study that all games that were used in teaching numeracy skills not adequately utilized as indicated by low overall mean score (mean=1.97). Similar findings were also revealed by Weisberg and Zosh (2018) that teachers' use of games as instructional approaches was very inadequate and this invariably had impact on pupil's performance in their primary school final examination.

To verify the variance between the availability of play material and use of play as a teaching strategy for numeracy skills, the results were subjected to ANOVA and results were indicated in Table 4.

Table 4: ANOVA Analysis between Availability of play resources and Class Two Pupils' Performance in Numeracy Skills

Item	Sum of Squares	Df	Mean Square	F	Sig
Availability of play materials	1209.367	5	241.873	12.056	.002

From the ANOVA statistics in Table 4, the processed data (which is the population parameters), availability of play materials (p-value=0.02) was statistically significant since it had significance level of 5% (p-value<0.05). Hence the hypotheses test summary was computed and summarized as presented in Table 5.

Table 5: Hypothesis Test Summary

Hypothesis	Value of Sig	Verdict
Ho₁: Type of play materials used does not influence Pre-primary school teachers' use of play as a teaching strategy for numeracy skills.	.001	Rejected

Results in Table 5 shows the verdict of the research hypotheses and it can be comprehended that they type and availability of play materials significantly influenced pre-primary school teachers' use of play as a teaching strategy for numeracy skills. Hence the hypothesis, '*Ho₁: Type of play materials used does not influence Pre-primary school teachers' use of play as a teaching strategy for numeracy skills*' was rejected.

VI. CONCLUSIONS

The study concluded that availability of play materials (p-value=0.02) was statistically significant since they had significance level of 5% (p-value<0.05). Hence the hypothesis, '*Ho₁: Type of play materials used do not influence Pre-primary school teachers' use of play as a teaching strategy for numeracy skills*' was rejected. This implies that a unit change in availability of play materials would significantly lead to a change in the use of play in teaching numeracy skills in pre-schools.

VII. RECOMMENDATIONS FOR PRACTICE

The study makes the following recommendations:

- i) ECDE teachers need to remain constant learners on issues concerning children education and development and also training on usage of different forms of play as part of instruction of numeracy skills.
- ii) The study further recommends that the school management should seek to develop positive attitude among the pre-school children in order to enhance their performance.

- iii) The County government, through DICECE, need to organize seminars, conferences and workshops to sensitize ECDE teachers to comprehend that the use of play is educational component which serves to improve teaching and learning of numeracy in ECDE centres.
- iv) The Ministry of Education, Science and Technology should enforce the utilization of variety of play as an essential component of pedagogy in ECDE centres.

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