

## **Influence of Classroom Instructional Resources on Mastery of Number Activity Concepts among Pre-Primary Learners in Embakasi Sub County, Nairobi**

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### **Abstract**

*This study investigated the influence of classroom instructional resources on pre-primary learners' mastery of number activity concepts in public preschool schools in Embakasi Sub County Nairobi County. The target population comprised of the 25 public preschools, 75 pre-school teachers, 25 centre managers, 3 Sub County coordinator and 1536 preschool learners. A sample size of 461 learners, 75 pre-primary teachers, 25 Centre managers and 3 Sub County Coordinators were considered. The study utilized cluster, simple random and saturation sampling techniques to select the sample size while questionnaires, interview Schedule, and observation checklist were used to collect data. Descriptive and inferential statistics were used to analyse quantitative data with the aid of Statistical Package for Social Sciences (SPSS) version 23 while qualitative data was analysed thematically. Findings indicated that instructional resources statistically and positively affected mastery of number activity concepts in Embakasi Sub County. The study recommends that adequate instructional resources be provided in public preschools to enhance holistic development of the child. In addition, the government, teachers and parents should take the leading role in the acquisition, appropriate use and storage of instructional resources to help in improving mastery of concepts in learners.*

**Keywords:** *Classroom instructional resources, pre-primary learners, learning materials, learning resources, learning environment*

### **1. Introduction**

Educating young children before the age of entering primary education promote positive developmental and independency which optimize learning. A study done in Australia by Dockett and Perry, (2017) noted that learner's initial experiences in school is critical and remain remarkably stable after the first years of school and adaptation to learners' earliest school experience, led to long-term implications to cognitive and social development. (Agbenyega and Klibthong, 2015) confirmed that early learning enable learners to acquire skills necessary for future learning and academic performance in school by ensuring that learners get the best education as per the national goals of education.

Sustainable development goal four Agenda aim to ensure inclusive and equitable quality education which promotes lifelong learning opportunities for all by 2030. To ensure this, Kenya aims at providing a globally competitive and quality education, training and research and this can be achieved by integrating early childhood education into primary education. With the competence based curriculum (2017), Kenya aims to develop skills and knowledge in early

years which is seen as an import of pre-primary school readiness based on the acknowledgement that learners need to possess a predetermined set of capabilities to succeed in later schooling. However, the National ECD Policy Framework (2018) eludes that to succeed in education, an enabling quality learning environment which is learner friendly need to be created as cited by the ECD Service Standard Guidelines for Kenya (2008). From the aforementioned background to the study, the significance of the learning environment is publicized as a silent curriculum whereby learners evolve their hidden talent to transit to other levels of learning. In addition, the performance of learners in number activity has been on the downward trend as indicated by Uwezo reports.

Uwezo's sixth learning assessment report (2015) indicated no significant improvement in learning outcomes. The analysis by Uwezo presented a depressing picture of achievement of number activity of the three activity area as revealed by the report. Zonal analysis 2019 revealed that most learners fall in the category of below expectation which is an indication that performance is way below average. The report reflected that Embakasi East zone had the highest number of learners (74.47%) who had met the KICD (2017) expectations in psychomotor then language activities followed closely by 72.46% score. Environment and religious learning areas scored 64.45% while number activity scored 49.3% respectively.

It is evident that early childhood is crucial in building a strong early number concept foundation among pre-primary learners although number activity concept had been witnessed by a downward trend. This begs for the question as to whether instructional resources could be the cause or any other variable in the environment. Evidently from the foregoing background, early mastery of concepts is advanced by an upward progression unlike what is found in Embakasi, a reason enough to conduct a study on the influence of instructional resources on mastery of number activity concepts in Embakasi Sub- County, Nairobi County.

While studying on manipulative in teaching number activity in the Morden age of technology and standardized testing in USA, (Furner and Worrell, 2017) found out that manipulative are valuable tools which bridge representation and enhance understanding of abstract concepts. Swan and Marshal (2010) for the case of Australia argue that materials are always appealing to several senses.

Saritas and Akdemir (2009) in Turkey noted that the only way to alleviate problems related to quality in early childhood is through effective instructional design in number work activity. The study used Likert scale to obtain reliability while One-Way ANOVA revealed that only school context and facilities was a significant factor on number activity achievement of learners. Franzen (2013) highlighted pre-primary teachers' emphasis on the body as a tool in learning number activities since pre-primary learners often use their bodies as a tool for understanding number activity concepts in Sweden. In a quasi-experimental design with non-equivalent control group pre-test and post-test research design Chin and zakaria, (2015) found a significant effect on pre- test and post-test interaction of the control group in Malaysia. The study further argued that a suitable selection of games for children during their learning stage is essential for the positive development of minds, social skills, physical and creativity. Similarly, (Cohrssen,

Churchl and Taylerl, 2016) carried out a multiple case study to explore how early childhood educators' implement play based number work activity concept in children aged 3 to 5 years old in Melbourne, Australia. The study found out that those who used the activities all the time reported an increase in self-confidence and growth in learners' number work activity thinking.

In New York, Leslie (2014) noted that Curiosity drives innovation, creativity, and authentic progress in learners whose interaction is directed into manipulative. The study suggests learners' curiosity should be directed into hands on activity to enable them take risks, be intellectually playful, try things out, make productive mistakes which leads them to deeper learning .However, Gray (2013) noted that learners are part of an evolution which is structured in their biological and cultural context. According to Pham (2015), manipulative skills enrich learners' experience and connect concrete and abstract concepts in number activities, narrowing the gap between the concepts. The result of the study revealed that learners prefer visual aids, recall better, learn faster, achieve more and prefer contact with teacher-made instructional materials. This sentiment were affirmed by Vinale, (2015) that Instructional materials are key factors for learners' exposure and development of skills, knowledge, attitudes, and behaviours to achieve competencies in education. In Philippines, Magulod (2019) observed that multisensory instructional materials are good enough and suitable to be used in the elementary classroom to teach number activity concepts. The study agrees with Stoffers (2011) who carried out a study in USA to examine how multi-sensory education impacts Learning and community in a second grade general education classroom. The study emphasized that multi-sensory materials connect learner to the outside world and aid in fostering a positive classroom environment.

In a study to investigate the power of tablets use to 4 to 6year to play ( Dejonckheere, Hillaert and Coppenolle, 2015) focused on specific skills and reported gain in achievement. These researchers used tablets to allow 4- to 6-year-olds to play on a digital number line exploring concepts related to estimation to play. The study focused on one numeracy concept but applied different strategies for estimation which recorded significant gain. Similarly, in Northern Ireland Clarke and Abbott (2015) investigated the impact of iPad project technology in literacy and numeracy in primary schools and found a greater readiness in learners' ability to grasp early key concepts in literacy and numeracy, including lower ability and special needs children. The study further suggested that primary schools should create conducive environments in accessing various instructional media that facilitate academic improvement on learners' mastery of reading and writing skills.

Sanders (2011) argues that attributes such as temperature, lighting, paint colors, teaching techniques, classroom rules, procedures, discipline, and teaching strategies form the classroom environment whereby physical characteristics such as tables, chairs, books and layout are included. The study further argue that despite ensuring these attributes, the physical environment should be easily accessible to allow easy access, adaptive to both group project learning, accessible and foster effective teacher-student engagement. The same sentiments were shared by Dusenbury (2016) that to create environment that make the learners feel safe, comfortable and welcoming, learners become academically successful. Cockett and Kilgour

(2015) carried out a quantitative survey study which examined the impact of using manipulative skills in number work activity on student understanding, efficiency, engagement and enjoyment in a lower primary classroom in Australia. Through questionnaire, the study affirmed that students were more engaged when using manipulative skills and the perception of their learning environment improved areas of enjoyment, understanding and efficiency. Similarly, Jolicoeur (2011) carried an action research to examine the influence of virtual and physical manipulative while investigating place value in second grade students in Florida. Data from pretest and posttest were compared to examine learners' abilities to demonstrate place value knowledge which revealed that virtual manipulative skills influence the achievement of place value concepts among learners.

Feez (2018) noted that the youngest children in a Montessori primary classroom are taught to fold cloths as napkins resulting in squares, rectangles, and triangles as geometry in practical life and sensorial and by doing so they learn names of different shapes, and later come to apply them to other material. Learners compared objects and arranged them in order and learn earlier sensorial activities. Montessori presents materials that lead children to discover how to write, read and do number activity while Learners were taught to take care of them and get along with others. Sprenger and Bentz (2020) investigated how 5-year-olds perceive structures in visually presented sets and found out that children's ability to perceive structures in sets and use them to determine further arithmetic. Learners were set to determine the number of eggs in a 10-egg box using an eye-tracking device by recording their utterances and gestures. The eye-tracking data showed that many of the children were able to see structures and use them to determine a quantity without having to count all the objects. The same sentiments were cited by Karsli's (2016) in a study which investigated the use of video-ethnography in a pre-kindergarten classroom. The study found out that young children's hand and body movements hold rich potential for engaging them in number activity. The study further affirmed the benefit of early childhood teachers' attention to the way learners engage with number activity, with the potential to create teachable moments.

In his studies in Zambia, Najumba (2013) identified that the major factor that ignite teacher effectiveness towards teaching is the availability of instructional materials which the study identified as charts, textbooks and syllabi. The study further noted that learners can only fail if teachers lack pedagogical skills to utilize the resources available in any learning centre. While Mavhundutse (2014) advanced the argument that experience is a major contributor towards effective teaching. Brown and Oke (2010) in Nigeria, carried a case study and observed how teachers used symbols, shapes and concrete models instructional materials to convey concepts to learners. The study used descriptive-comparative method to analyze data while questionnaire and interviews were used to collect data. According to Brown and Oke (2010), instructional materials vary from simple to expensive. The study further noted that these materials are broadly grouped into printed and non-printed ones. Similarly, Anini (2011) asserted that local teachers had difficulties to improvise and use instructional materials. The study opined that locally-rooted materials such as palm leaves indigenous to some communities, bamboo, chicken feet and local baskets were used in learning. The study reported that instructional resources improved learning procedure which led to development of skills.

Yeboah (2011) carried out a study on learning to teach reading and number activity and its influence on teaching practice in Ghana. The study found out that majority (94.23%) of the student teachers and newly qualified teachers had the perception that concrete and practical examples was one of the best ways to help children understand basic concepts in number activity. However, they found out that experienced teachers never used teaching and learning materials a reason for poor mastery of concepts.

Mwaniki (2015) investigated on the influence of instructional resources on pre-primary learners' performance in number work in Kairuri Zone Embu county Kenya. The study analyzed data through Statistical Package for Social Sciences version 21 and descriptive statistics was computed and presented using tables and themes. The study revealed that different instructional resources and teachers experience influenced performance of pre-primary learners' number activity performance.

In an experimental design involving pre-test and post-test on the impact of instructional resources in number activity achievement in Siaya County, Apondi (2013) concluded that both groups were statistically significant ( $t(8) = -5.482$ ,  $p = .004$ , two tailed). This meant that learners who are taught number activity using instructional materials performed better than those who are taught number activity using abstract symbols. Further findings revealed that the control group scored higher marks when they used place value blocks than children in experimental group where instructional materials were applied.

In study carried out by Ashiona, Mwoma and Murungi (2018) teachers were set to utilized tablets during instruction to investigate whether ICT empower teachers to teach mathematics better in lower primary in Mombasa. The study adopted an exploratory sequential mixed methods research design and data was collected and analyzed qualitatively using descriptive phenomenological analysis in which data was transcribed into themes and sub-themes related to phenomena under study. The study found that ICT was capable of empowering teachers to teach number activity concepts better. Similarly, Nsiza and Murungi (2017) carried out a study to find out strategies that can be used to enhance teachers' use of teaching aids in teaching and learning in selected schools in Isinya Sub- County. The study identified improvisation of teaching aids from locally available resources as creating awareness to learners and teachers on what is around them and its importance in enhancing learning in pre-primary.

Okune, Gudo and Odongo,( 2016) carried out a study to establish the implications of instructional materials on oral skills among early childhood learners. With the adoption of descriptive survey design and a target population of 42 head teachers, 126 teachers and 3180 learners the study found out that; teaching using instructional materials improved the performance of learners in various learning activities such as repetition of letters, repetition of words and ability to write dictated words. The same sentiments were advanced by (Abaya, 2017) that adequate instructional materials affect achievement of number activity concepts.

In pursuit of more and better education for the children in Kenya, parents have increasingly used ECDE centers as a head-start, institutions concentrate on advocating for the 3RS (writing, reading and arithmetic) in preparation for entry into primary school. The ministry of education has aligned early childhood under the management of County governments whereby the board of management assume the responsibility of outlining the standard quality of pre-primary centres as enshrined in the early childhood development education declaration policy (2018). According to Kenya institute of curriculum development (KICD 2017), learners are supposed to be assessed regarding mastery of number activity concepts. The requirement is that the end of each level, learners achieve concepts expected at that level (KICD, 2017), however, not all learners meet these expectations.

Nevertheless, there is scarce literature available on the possible contribution to achievement of number activity area in Kenya, which could be inadequate hence to unlock the potential of achieving number activity concepts. Based on this premise, the current study investigates the predictive power of instructional resources on mastery of number activity concept in early childhood in Embakasi Sub County. These will contribute to both theory and empirical evidence for necessary policy framework to enhance quality of learning in preschools. This study therefore sought to examine the influence of classroom instructional resources on pre-primary learners' mastery of number activity concepts in public preschool schools in Embakasi Sub County Nairobi County.

## 2. Methodology

The study adopted concurrent triangulation design within the mixed method approach whereby quantitative and qualitative data were collected concurrently in one phase then analyzed separately, compared and combined Creswell (2014). The method was used to confirm and cross-validate findings. The purpose of choosing this design was to obtain different but complementary data from the same topic. The design brought together the differing strengths and non-overlapping weaknesses of quantitative methods with those of qualitative methods (Creswell, 2014).

The target population comprised of the 25 public preschools, 75 pre-school teachers, 25 centre managers, 3 Sub County Coordinators, 1536 preschool learners totalling to 1662 respondents. The sample size consisted of 25 centre managers, 75 pre-school teachers and 3 Sub County Coordinator who were chosen through saturation sampling. The study sampled two-stage cluster sampling and random sampling techniques to sample 30% of the learners from each cluster whereby 155 learners were selected from Zone A, 157 learners from Zone B and 149 learners from Zone C totalling to 461 learners.

Data was collected using Pre-school teachers' questionnaire, interview Schedule and observation checklist while Rubrics assessment scale was used to rate learners' achievement. Both quantitative and qualitative methods were employed to collect data. Quantitative data from

questionnaires and rubrics assessment tool was coded and entered into SPSS version 23 where both descriptive and inferential statistics were generated.

Descriptive statistics was analyzed through means, standard deviations, maximum, minimums and percentages of variables under investigation. Inferential analysis involved correlation and regressions analysis. Linear regression analysis was contracted to establish the influence of instructional resources on mastery of number activity concepts. Qualitative data from interview guide and observation schedule was analyzed thematically. Multiple regressions were conducted to help in investigating the predictive power and uniqueness of instructional resources on mastery of number activity concepts among the pre-primary learners.

### 3. Results

#### 3.1 Demographic Characteristics

The study revealed that majority (95.1%) of pre-school teachers was female, while the fewer (4.9%) respondents were male. This imply that pre-school teaching in Embakasi Sub-County is female dominated. This could also mean that there are more female ECDE professionals than their male counterparts.

#### 3.2 Influence of Classroom Instructional Resources on Mastery of Number Activity Concepts among Pre-Primary Learners

To gain more insights into the link between the use of instructional resources and mastery of number activity concepts, the study conducted Pearson's moment correlation and regression analyses. Table 1 presents the results of correlation analysis.

Table 1

*Correlation of performance and use of instructional resources*

		Use of Instructional Resources	Pre-primary Learners' Mastery of Number activity Concepts
Use of Instructional Resources	Pearson Correlation	1	.470**
	Sig. (2-tailed)		.000
	N	61	61
Pre-primary Learners' Mastery of Number activity Concepts	Pearson Correlation	.470**	1
	Sig. (2-tailed)	.000	
	N	61	61

\*\* . Correlation is significant at the 0.01 level (2-tailed).  
Source: Author, 2019

The finding of the study shows that there was statistically significant positive correlation between the use of instructional resources and pre-primary learners' mastery of number activity concepts (n=61;  $r = .470$ ;  $p < .05$ ). Since p-value is less than 0.05, the null hypothesis was rejected. Therefore, there existed enough evidence to conclude that there is statistically

significant positive relationship between the use of instructional resources and pre-primary learners' mastery of number activity concepts. High level use of instructional resources was associated with improvement of pre-primary learners' mastery of number activity concepts. Next, Table 2 shows that regression model summary.

Table 2

*Model Summary of performance and use of instructional resources*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.470 <sup>a</sup>	.220	.207	.42025
a. Predictors: (Constant), Use of Instructional Resources				

The analysis indicates that instructional resources accounted for 20.7% (Adjusted  $R^2=.207$ ) of the variation on pre-primary mastery of number activity concepts in Embakasi sub-county. This represents a fairly large influence of the instructional resources on the mastery of number activity in pre-primary. Nevertheless, to establish if the influence of use of instructional resources was significant predictor of pre-primary mastery in number activity concepts, variance analysis (ANOVA) was calculated and the results are summarized in Table 3.

Table 3

*ANOVA results for of performance and use of instructional resources*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.947	1	2.947	16.686	.000 <sup>b</sup>
	Residual	10.420	59	.177		
	Total	13.367	60			

According to the findings, the  $F$ -ratio predicts that the general model of regression is a good fit. The estimates show that use of instructional resources is statistically significant predictor of performance in number activity concepts among the pre-primary ( $F(1, 59) = 16.686, p < .05$ ). With a mean of 3.81 and a standard deviation of 1.18 it can be concluded that instructional resources in early years of learning, improves mastery of number activity concepts as indicated in the estimate table of coefficient below. Table 4 presents the coefficients estimated.

Table 4

*Coefficients for performance and use of instructional resources*

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig	95.0% Confidence Interval for B	
	B	Std. Error				Lower Bound	Upper Bound
(Constant)	.1936	.213	.	9.068	.000	1.508	2.364
Use of Instructional Resources	.125	.070	.267	1.777	.011	-.016	.266

*a. Dependent Variable: Pre-primary Learners' Mastery of Number activity Concepts*

The results indicate an existence of a positive and significant relationship between instructional resources and mastery of number activity concepts. The size of the standardized coefficient 0.267 implies that a unit increase in the utilization /adoption of instructional material, could lead to an increase in performance of number activity by approximately 26.7 percentage points. This is in line with a study carried out by Jekayinta, (2012) which noted that audiovisual learning materials are an integral part of teaching-learning which bring permanent and meaningful experience in any learning. The study asserted that proper selection of content material helped in-depth understanding of concept and motivated learners to take up tasks.

The implication is that instructional resources enriched learners' learning experience and connected concrete and abstract concepts in number activity narrowing the gap between the concepts. Various studies have established similar results for instant, Pham (2015) observed that most learners prefer visual aids which help them to recall better, learn faster, achieve more and prefer contact with teacher-made instructional materials. According to Brown and Oke (2010), instructional materials vary from simple to expensive. The study further noted that these materials are broadly grouped into printed and non-printed ones.

These findings was further straightened by qualitative data where majority of the respondents noted that instructional resources increases the attention of the learners which makes them to remain active throughout the lesson. Pre-primary teachers noted that through use of instructional material, children understand better when they manipulate materials. This was in conformity with Machaba, (2013) whose study advocated for appropriate instructional resources which promote active learning. The study further asserted that absence of adequacy and inappropriateness of instructional resources encourages passive learning and prevent enthusiastic learning.

Instructional resources are identified as instrumental in acquiring basic skills in number activity as noted by Vinale, (2015) that Instructional materials are key to learners' exposure to skills, knowledge, attitudes, and behavioural competencies in any learning environment where learners interact and share ideas. As most respondents debated, mastery of subject matter depended on

the appropriateness of instructional resources as most respondents argued that locally made instructional material are highly recognized and appreciated by learners. This idea received some objection from a section of respondents who argued that, it was hard to get resources unless parents cooperate. The findings were advocated by Nsiza and Murungi (2017) that improvisation of teaching aids from locally available resources, creating awareness to learners and teachers on the importance of using teaching aids and computerized teaching aids as Strategies to improve teaching in pre-primary.

The qualitative data sourced from centre manager, Sub County ECD Coordinator and classroom observation revealed that instructional resources provide first-hand experience with realities of social and physical environment. Similarly, instructional resources proved to enhance active participation of learners in number activity concepts as reported by Pham (2015) that most learners prefer visual aids which help them to recall better, learn faster, achieve more and prefer contact with teacher-made instructional materials.

In addition, majority of the respondents noted that instructional material increases the attention of the learners which makes them to remain active throughout the lesson. Pre-school teachers noted that through use of instructional material, children understand better during manipulation of concrete material. These are also instrumental in acquiring skills in number activity. Some respondents argued that mastery of the subject matter depends on the use of appropriate objects/material in teaching number activity. Use of locally made instructional material was highly encouraged since learners easily associated with these materials (Nsiza and Murungi, 2017). However, the challenge was the shortage of instructional material as pointed out by respondents in most schools. This findings were supported by Guloba, Wokadala & Bategeka, (2010) study which found out that inadequate teaching resources attracts teacher-centered approach of teaching hence low quality teaching.

## 5. Conclusions

Based on the findings, the study concluded that use of instructional resources in number activity, positively influence mastery of number activity concepts. This implies that the more these resources are used, the higher capability of learners to master concepts and the lower level of utilization lead to low enhancement in mastery. Secondly, it emerged that most of the public pre-primary in Embakasi did not have sufficient instructional resources in teaching of number activity. Since Embakasi is within the nerve centre of Kenya –Nairobi County, the study infers that the situation of instructional resources in public pre-primary could be worse in others parts of the country. Finally, the study concluded that the nature/type of instructional material play a pivot role in the teaching of number activity concepts. This was evident from the study that, learners at a very younger age associate better with locally made resources.

The study emphasizes on the use of the right resources as indicated in the curriculum. This was revealed through qualitative interview where majority of the pre-primary teachers argued that use of the right resources in the curriculum enhance mastery of the intended concepts.

The study recommends that, public pre-schools should be equipped with sufficient instructional resources to ensure that every pre-school going child access resources to increase the frequency

of interaction with resources. In addition, the use of locally available instructional resources should be encouraged by all learning centres to allow learning from known to unknown.

Furthermore, centre managers should advocate for improvised learning resources to ensure that learners associate well with the locally made materials. Moreover, refresher courses, workshops and conferences for the teacher to improve their improvisation skills should be conducted continuously. The study advocates the need for the ministry of Education to mount periodic training sessions for teachers who are already in the field on; recent discovery regarding use of teaching/learning resources in teaching lessons in pre-primary centers in Embakasi Sub County.

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