An Investigation of Factors Affecting Performance of Mathematics Activities in ECDE Centre among Children Aged 3-6 Years in Murang'a East District; Kenya

John Muthee Gikungu

School of Educaion, Mount Kenya University Johnmuthee09@gmail.com

Betty Wanjiru Karanja

School of Educaion, Mount Kenya University

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Abstract

Mathematics activity contributes to a crucial part in a child's life. Therefore, teaching of mathematics to learners aged 3-6 years should be done with a lot of care involving parents and teachers so that learners can gain the appropriate skills, concepts and attitudes related to the activity. The teacher should make use of the best method of teaching and appropriate teaching/learning materials in order to achieve the intended goals and objectives. This study provides some insights into how parents, caregivers and the community could contribute to teaching of mathematics activity to learners aged 3-6 years.

1. Background Of Study

According to Harold Jowitt (1976) mathematics is the science of counting, measuring and describing shapes of objects. It deals with logical thinking or reasoning and science of structure, order and relation as cited by Joseph Vasquez (1982). According to Sylvester Bartt (1999) mathematics mostly started with primitive man in counting of fingers and toes for recording stock or what was brought back from hunting expeditions. William Heineinan (1962) cited history records of Babylonians to be the most advanced in calculations which was passed on to the Greek astronomers and later to Islamic world which made considerable contributions in the Middle Ages.

Harold Jowitt (1976) argues that the recognition of shapes and volume came gradually until it reached the era of Ancient Egyptians who not only counted large numbers but also demarcated large areas of fertile lands along the Nile Valley and built huge pyramids involving complex calculations. Alexander Forbes (2001) cited that the world is becoming more technical and scientific every year. people who wish to keep in touch with new developments and inventions need a wider knowledge of mathematics which lies behind science and technology. In Kenya, most people have discovered the importance of being competent in mathematics, since well-paying jobs which involve working with numbers engage people who passed well in mathematics. Bergeman Davis (1984) discusses that children acquire mathematical skills and concepts at an early age. By the age of four, for example, children can be heard making statements such as:-"I want three mangoes." In pre-school the teacher needs to build on this and continue developing these skills and concepts through usage of appropriate activities and materials.

2. Factors Affecting Performance of Mathematics Activity in ECDE Centers among children aged 3-6 years

2.1 Teachers

Sydney Brown (1989) reported that untrained teachers do not deliver the content satisfactorily. This is due to lack of adequate and relevant knowledge and skills in teaching. Pre-school learners do not grasp the content when a teacher fails to present the concepts in a systematic way that is from simple to complex ones. For example, the teacher should introduce sums by using concrete before learners are able to deal with abstract objects:



Mike Anderson (2004) cited that teachers have a crucial role to play in the contribution to success of a child. He noted that teachers who go to class without prior preparation right from using the syllabus to prepare termly programme of activities and then extract daily programme of activity makes their learners to lose greatly. It's through the usage of the syllabus that the teacher is able to plan his work that is supposed to be covered at various levels in ECDE centers within a year.

Pre-school learners need a variety of teaching/ learning materials. Teachers who do not prepare their teaching and learning aids in advance face difficulties in delivering the concepts when they go to look for resources during the mathematics lesson or even send their learners to go and look for them even when they are not sure where to get them. Jerry Collins (1980) reports that young learners participate fully when they are involved in a variety of activities. Teachers who give their learners limited activities end up making them inactive hence losing interest in math's activity. Mathematics activities become quite enjoyable when learners engage in various kinds of activities for example, classifying cereals, fruits utensils etc.

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According to Harold Jowitt (1976) teacher's failure to evaluate their learners may give them surprises when they discover the pictures created during the learning period may be quite opposite when they are given evaluation tests. Evaluation gives a clear picture of how learners understand various concepts. It is necessary after the end of every theme in order to know if it is necessary to repeat the activity or to proceed to new themes. Jerry Collins (1980) cited that teachers discouraged learners when they fail to praise or reward work well done by learners. Learners who are not acknowledged for doing activities quite well lose their moral bearing and eventually tend to lower their performances. In the Daily Nation Wednesday August 15/2008 pg 25, teachers' negative attitude towards mathematics was noted as one of the main reason leading to poor performance of mathematics activities.

2.2 Learners

According to Harold Jowitt (1976) observed that initially pre-school learners don't attach any importance to particular order of numbers e.g. they don't see any reasons as to why number 2 has to come before number 5 such a child when counting may do so without sequencing i.e. 1345267. Some learners have difficulties in recognizing certain numbers due to failure to identify numbers before he/she comes to write it down e.g. 6 and 9.

Jean Piajet (1980) observed that learners lack conservation. They experience problems in understanding conservation of numbers of measurements. E.g. A child might think that 5 stories which are spread out are more than 5 stones which are put together. Likewise they might think that mass of clay modeled into a ball is more than the same mass made mode into a sausage.



In the Standard Newspaper Saturday 4th January 2009 pg 12, noted that regular absenteeism of learners contribute to poor performance of mathematical activity since the teachers are not able to keep on repeating certain sub-themes just because some learners missed to attend school on a certain day. Such learners lag behind and their progress is adversely affected since they don't understand the concept learnt the day they missed school and concepts are usually

related. Clemson Moloney (1994) reports that children who lack a good firm foundation of mathematical activity tend to lack confidence and interest in mathematical activity. Such learners are not mature enough at pre-school to learn abstract mathematical ideas. Clemson also cited that individual differences among learners may interfere with their learning. Some learners are very fast in grasping concepts while others take a long time to grasp.

2.3 Teaching methods

According to Daily Nation Newspaper, August 15/2008 pg 25, the writer researched that teachers who use child-centered methods of teaching achieve more than those who use teacher centered methods. In child-centered method of teaching, the child is the centre of knowledge; children learn through practical involvement, interest and confidence is developed, plenty of materials are needed, many mathematical skills are developed and few facts are learnt and applied to life situation.

2.4 Teaching-learning resources

Lack of teaching/learning materials affect learners performance when text books, visual aids and play materials are minimal learner's morale becomes low. Physical faculties for example, the condition of the class is an important factor which contributes to the performance of the learners, very small classrooms which are poorly lit and ventilated are uncomfortable small sealed classrooms affect learners free movement. Poorly maintained floors are health hazards to learners due to jiggers. Learners' performance is also affected by the kind of furniture they use. Too low or too high benches and tables are unfavorable to children. Unmaintained furniture may hurt learners for example broken benches.

3. Methods used in teaching Mathematical Activities

Most teachers in public schools use teacher centered methods of teaching whereby the teacher is the centre of interest while those in private schools use learner centered method whereby the teacher acts as a facilitator.

4. Measures to be taken to improve the performance of Mathematics Activity

4.1 Teachers

Government will ensure all teachers teaching in pre-schools are qualified from recognized colleges. Teachers will present the concepts to be taught in a systematic way (i.e.) from simple to complex. Mike Anderson (2004) cited that teachers should prepare the content to be learnt from the syllabus, make per term program of activity and make daily program of activity which acts a guide. Teachers to prepare in advance the teaching/ learning materials so as to avoid unnecessary delay when trying to look for them during the teaching session.

Jerry Collins (1980) researched that teachers should give their learners a variety of activities for example: to classify, sort and match, order and sequence etc. According to Daily Nation (Wednesday August 15 2008 pg 25) teachers should have positive attitude towards mathematic activities. Teachers to ensure that learners grasp concepts e.g. recognize numbers before they write them in order to sequence correctly.Teachers to keep on evaluating learners regularly in order to identify areas where learners could be facing difficulties.

4.2 Learners

Harold Jowitt (1976) cited that learners should be considered individually since they originate from different backgrounds. Learners will be involved in activities which are relevant to their standard and also interesting. Learners will be sensitized on the importance of avoiding unnecessary absenteeism through their parents. Learners will be shown the importance of being fully involved in school activities and also healthy relationship with their teachers.

Learners will be made aware that they are wonderfully created however different they might look.

4.3 Teaching methods

According to Daily Nation (Wednesday August 15 2008 pg 25) the writer recommends that teachers should keep on varying the teaching methods and use those which are child-centered.

4.4 Teaching/ learning resources

Variety of teaching/ learning materials will be used during teaching because when used learners grasp concepts quickly and easily. They also raise learner's interest.

5. Research Methodology

The study used survey design in order to investigate factors which affect performance of mathematics and the importance of mathematics to children aged 3-6 years. The study targeted all children in four public schools in Muranga East. The children involved came from all economic status i.e. from high income groups. The main aim was to investigate factors affecting performance of mathematics activities and identify the importance of mathematics among children aged 3-6 years. The researchers collected data in stages. In stage one; they administered the questionnaires to teachers; in stage two they interviewed the teachers and children, and in stage three they conducted observations. After data was collected, it was presented on tables where frequencies and percentages were calculated after which interpretation of the data were made to identify the trends. Pie charts and graphs were also used to represent the data visually. This was done using the statistical package for social sciences (SPSS version 20)

6. Data Analysis, Findings and Discussions

This chapter presents data analysis, findings and discussions on the factors affecting the performance of mathematical activities in ECDE children aged 3-6 year. This chapter includes presentation of results, obtained discussions of findings and summery.

School	Boys	Girls	Total	Degrees
Matithi	20	22	42	100.8°
Mirira	10	15	25	60°
Kayuyu	30	20	50	120º
Gikuu	18	15	33	79.2°
Total	78	72	150	360°

Table 4.1: Enrollment of sampled schools for ECDE learners in Murang'a East District

 Table 4.2: Causes of poor performance of mathematics activity in ECDE centers in Murang'a East district among children aged 3-6 years

Factors/causes	Frequency	Percentage
Teacher	9	37.5%
Learners	6	25%
T /learning materials	6	25%
Parents	3	12%
Total	23	100%

Figure 4.2.1: A bar graph showing causes of poor performance in mathematics among children aged 3-6 years



7. Interpretation

Table 4.2 and the figure above shows the major causes of poor performance of mathematics activities. Teaching factor is the highest contributor with a frequency of 9; learners' factor and teaching/ learning resources had the same frequency of 6 while parent's factor had the least with a frequency of 3. From the interpretation above it was evident that the major contributor of poor performance in mathematics activities in children aged 3-6 years is the teacher.

Table 4.4: How poor teaching methods affect the performance of mathematics activities among children aged 3-6 years in ECDE centres in Murang'a East District

Schools	Performance above 50%	Performance below 50%
Matithi	5	4
Mirira	1	5
Kayuyu	2	1
Gikuu	3	3



The table and the figure above show that in Matithi pre-school achievement was higher than 50%. In Mirira and Kayuyu the number of learners who scored above 50% were less than those who scored below 50%. Gikuu pre-school has the same number of learners achieving above 50% with those scoring less than 50%.

8. Methods used in teaching of mathematics activities in ECDE centers in Murang'a East District

Schools	Learner centered	Teacher centered	
00110015	Ecumer contered	reacher centerea	
Matithi	\checkmark	Х	
Mirira	Х		
Kayuyu	Х		
Gikuu	Х	\checkmark	
Total	1	3	

Figure 4.4:



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The table and the figure above show that the biggest fraction in the pie-chart presented teacher-centered method of teaching occupying 270° while the smallest fraction represented learner-centered method with 90°. Hence, learners performed poorly in the three public pre-schools (Mirira, Kayuyu and Gikuu) due to the approach used by teachers to teach mathematics activities.

9. Data analysis – Teachers questionnaires

9.1 Descriptive

Descriptive Statistics								
	N	Minimum	Maximum	Mean	Std. Deviation			
AGE	20	21	61	36.10	12.251			
CHALLENGES	20	1	2	1.65	.489			
PERFORMANCE	20	1	5	2.05	1.099			
GOVTSUPPORT	20	2	2	2.00	.000			
PCOOPERATION	20	1	2	1.75	.444			
PARTICIPATIONL EARNERS	20	1	3	2.25	.639			
GENDER	21	1	2	1.76	.436			
Valid N (listwise)	20							

9.2 Frequencies

[DataSet0] C:\Program Files (x86)\SPSS Evaluation\PARENTS QUESTIONAIRE.sav

							PARTICIP	
			CHALLE	PERFOR	GOVTSU	PCOOPE	ATIONLE	
		AGE	NGES	MANCE	PPORT	RATION	ARNERS	GENDER
N	Valid	20	20	20	20	20	20	20
	Missing	2	2	2	2	2	2	2
Mean		36.10	1.65	2.05	2.00	1.75	2.25	1.75
Median		33.00	2.00	2.00	2.00	2.00	2.00	2.00
Mode		25 ^a	2	2	2	2	2	2
Std. Deviation		12.251	.489	1.099	.000	.444	.639	.444
Variance		150.095	.239	1.208	.000	.197	.408	.197
Skewness		.772	681	1.214		-1.251	253	-1.251
Std. Error of Sk	ewness	.512	.512	.512	.512	.512	.512	.512
Range		40	1	4	0	1	2	1
Minimum		21	1	1	2	1	1	1
Maximum		61	2	5	2	2	3	2

AGE

Statistics

a. Multiple modes exist. The smallest value is shown

9.3 Frequency Table

					Cumulative
		Frequency	Percent	Valid Percent	Percent
Valid	21	1	4.5	5.0	5.0
	23	1	4.5	5.0	10.0
	24	1	4.5	5.0	15.0
	25	2	9.1	10.0	25.0
	26	1	4.5	5.0	30.0
	28	1	4.5	5.0	35.0
	29	1	4.5	5.0	40.0
	32	1	4.5	5.0	45.0
	33	2	9.1	10.0	55.0
	34	1	4.5	5.0	60.0
	36	1	4.5	5.0	65.0
	41	1	4.5	5.0	70.0
	43	1	4.5	5.0	75.0
	45	1	4.5	5.0	80.0
	50	1	4.5	5.0	85.0
	55	1	4.5	5.0	90.0
	58	1	4.5	5.0	95.0
	61	1	4.5	5.0	100.0
	Total	20	90.9	100.0	
Missing	System	2	9.1		
Total		22	100.0		

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	7	31.8	35.0	35.0
	NO	13	59.1	65.0	100.0
	Total	20	90.9	100.0	
Missing	System	2	9.1		
Total		22	100.0		

According to this table 65% of teacher did not have challenges in teaching mathematics while 35% had challenges.

		FER	ONMANCE		
					Cumulative
		Frequency	Percent	Valid Percent	Percent
Valid	V POOR	7	31.8	35.0	35.0
	POOR	8	36.4	40.0	75.0
	AVERAGE	3	13.6	15.0	90.0
	GOOD	1	4.5	5.0	95.0
	V GOOD	1	4.5	5.0	100.0
	Total	20	90.9	100.0	
Missing	System	2	9.1		
Total		22	100.0		

DEDEODMANCE

This table shows 35% of the teachers said that the performance of mathematics was very poor compared to other activity areas, while only 5% found the performance very good comparatively

GOVTSUPPORT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NO	20	90.9	100.0	100.0
Missing	System	2	9.1		
Total		22	100.0		

This table shows all the teachers (100%) agreed that there was no government support for ECDE programmes.

PCOOPERATION							
Frequency Percent Valid Percent Percent							
Valid	YES	5	22.7	25.0	25.0		
	NO	15	68.2	75.0	100.0		
	Total	20	90.9	100.0			
Missing	System	2	9.1				
Total		22	100.0				

This table shows that most of the parent are not cooperative (75%) while only 35% thought they were cooperative.

-	PARTICIPATIONLEARNERS						
		Frequency	Percent	Valid Percent	Cumulative Percent		
Valid	INACTIVE	2	9.1	10.0	10.0		
	ACTIVE	11	50.0	55.0	65.0		
	V ACTIVE	7	31.8	35.0	100.0		
	Total	20	90.9	100.0			
Missing	System	2	9.1				
Total		22	100.0				

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This table shows that 55% of learners are active participant while only a small percentage was very active

GENDER							
		Frequency	Percent	Valid Percent	Cumulative Percent		
Valid	MALE	5	22.7	25.0	25.0		
	FEMALE	15	68.2	75.0	100.0		
	Total	20	90.9	100.0			
Missing	System	2	9.1				
Total		22	100.0				

This table shows that there are more female teachers (75%) teaching in ECDE centers than men 25%

10. Data analysis - parents questionnaires

10.1 Frequencies

Statistics EACHE OCHILIGHESROVID CDEPEETING ARENT HOOLA SIGNME AGE SEX REN LEVELNEEDSYMENTENDANC ATION NDANC SISTAN Ν Valid 20 20 20 20 20 20 20 20 20 20 Missing 0 0 0 0 0 0 0 0 0 0 Mean 2.05 2.10 39.55 1.65 1.85 1.45 1.55 1.80 1.00 1.45 Median 40.50 2.00 2.00 2.00 1.00 2.00 2.00 1.00 1.00 2.00 Mode 45^a 2 2 2 1 2 14 1 1 2 Std. Deviation 1.732 .759 .671 .768 .000 2,150 .489 .510 .510 .510 Variance 7.629 .239 .576 .450 .261 .261 .589 .000 .261 4.621 Skewness -.167 -.681 -.086 .177 .218 -.218 .372 .218 4.095 Std. Error of Skewness .512 .512 .512 .512 .512 .512 .512 .512 .512 .512 Range 43 1 2 2 1 1 2 0 1 10

a Multiple modes exist. The smallest value is shown

10.2 Frequency Table

					Cumulative
		Frequency	Percent	Valid Percent	Percent
Valid	19	1	5.0	5.0	5.0
	21	1	5.0	5.0	10.0
	22	1	5.0	5.0	15.0
	25	1	5.0	5.0	20.0
	32	1	5.0	5.0	25.0
	34	1	5.0	5.0	30.0
	35	1	5.0	5.0	35.0
	37	1	5.0	5.0	40.0
	38	1	5.0	5.0	45.0
	39	1	5.0	5.0	50.0
	42	1	5.0	5.0	55.0
	44	1	5.0	5.0	60.0
	45	2	10.0	10.0	70.0
	47	2	10.0	10.0	80.0
	50	1	5.0	5.0	85.0
	51	1	5.0	5.0	90.0
	56	1	5.0	5.0	95.0
	62	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

ACE

SEX

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	7	35.0	35.0	35.0
	FEMALE	13	65.0	65.0	100.0
	Total	20	100.0	100.0	

The above table shows that out of 20 respondents 65% comprised of females parents while 35% was male parents

NOCHILDREN								
					Cumulative			
		Frequency	Percent	Valid Percent	Percent			
Valid	1-2	5	25.0	25.0	25.0			
	3-5	9	45.0	45.0	70.0			
	6ABOVE	6	30.0	30.0	100.0			
	Total	20	100.0	100.0				

The above table shows that majority of parents interviewed had three to five children (45%)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	PRIMARY	6	30.0	30.0	30.0
	SECONDARY	11	55.0	55.0	85.0
	COLLEGE/UNIVERSITY	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

The above table shows that most parent have their children reaching secondary school level (55%)

PROVIDENEEDS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	11	55.0	55.0	55.0
	NO	9	45.0	45.0	100.0
	Total	20	100.0	100.0	

The above table shows that 55% of parents interviewed are able to provide their children needs

	ESBEI ATMENT								
		Frequency	Percent	Valid Percent	Cumulative Percent				
Valid	BURSARY	9	45.0	45.0	45.0				
	OWNPOCKET	11	55.0	55.0	100.0				
	Total	20	100.0	100.0					

The above table shows that 55% of the parents pays ECDE fees from their own means while 45% depend on wellwishers.

MEETINGATTENDANCE							
		Frequency	Percent	Valid Percent	Cumulative Percent		
Valid	RARELY	8	40.0	40.0	40.0		
	MOSTLY	8	40.0	40.0	80.0		
	ALWAYS	4	20.0	20.0	100.0		
	Total	20	100.0	100.0			

The above table shows that majority of the parents do not attend ECDE parents meetings (80%) while 20% always attend parents meetings.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	WELL	20	100.0	100.0	100.0

The above table shows that all the parents interviewed had no problem in parent teacher relations

SCHOOLATTENDANCE

					Cumulative
		Frequency	Percent	Valid Percent	Percent
Valid	ALWAYS	11	55.0	55.0	55.0
	MOSTLY	9	45.0	45.0	100.0
	Total	20	100.0	100.0	

The above table shows that 55% of the parents said their children attend school always while 45% children attend often.

ASSIGNMENTASSISTANCE								
		Frequency	Percent	Valid Percent	Cumulative Percent			
Valid	YES	7	35.0	35.0	35.0			
	NO	12	60.0	60.0	95.0			
	11	1	5.0	5.0	100.0			
	Total	20	100.0	100.0				

The above table shows that 60% of the parent do not assist their children with the assignments.

11. Conclusion

In conclusion performance of mathematics activities would rise if the following is done. ECDE teacher using a variety of mathematics activities, incorporating the relevant learning and teaching aids both concrete and visual. Teachers also updating themselves with new information on how best they can handle the teaching of mathematics activities effectively as well as the government posting ECDE trained teachers. Parents of ECDE learners have a great role to play to ensure their children perform well in mathematics activities by providing any necessary support.

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