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DO LEARNING FACILITIES IN A PRE-SCHOOL SET UP INFLUENCE USE OF GAMES IN TEACHING MATHEMATICAL CONCEPTS?

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ABSTRACT

Availability of learning materials, tools and equipments is key in the game based learning of mathematical concepts. The purpose of this study was to establish the extent to which learning facilities influence use of games in teaching of mathematical concepts in preschools. This study employed a descriptive survey design. Stratified sampling technique was used to ensure proper representation of the whole region. Standardized formula was used to arrive at a sample size of 29 pre-school teachers. Data was analyzed using descriptive statistics such as frequency, percentages, mode, mean and standard with the help of Statistical Package for Social Science (SPSS). Tables were used to present the results. Qualitative data was summarized and presented in prose form. The findings indicated that learners only engaged in games during break time as stipulated by the extra-curricular curriculum, but without the guidance of their teachers. The study recommends that mathematics should have enough periods to accommodate the use of games in the classroom to enable teachers achieve their objectives based on acquisition of specified mathematic concepts.

Keywords: Learning facilities, teaching, games, mathematical concepts, pre-school

1. INTRODUCTION

In the past years, many studies have broadly reported discussions based on the educational disadvantages based on facilities for teaching especially in pre-schools. In many cases, most of the attention has been paid to establish if smaller classes can lead to better academic performance for learners. According to studies done by Goodrum, Hackling & Rennie (2001); Gee, (2003), the adequacy of the use of games in teaching Mathematics highly depends on the size of classrooms or platforms where such games can be practiced.

The availability of conducive learning facilities encourages active learning as well as collaboration and interactivity (Reuben, 1999). Participation in an activity requires the use of facilities thus ensuring learners are working with the ideas that are being taught in class and applying them in the right manner.

When children are using relevant learning facilities in mathematics games, it provides them with the opportunity to interact with each other and be rewarded for collaborating and problem solving hence promoting cooperative learning (Schwartzman, 1997). Moreover, games help in transition of skills, knowledge and attitudes since every learner is required to actively participate and stay obedient to the rules and regulations to be followed in all the games in which they participate (Cruickshank & Telfer, 2001). These opportunities give the learners a chance to put into practice all that they have learned in class such as in a game or simulation. Relevant learning facilities in mathematics assist the learner to carry out activities that help in creating a connection between the concepts and procedures acquired in a classroom and applying them in solving real life problems by coming up with adaptable solutions. Wenzler and Chartier (1999: 78) made an effective case for the use of games in organizational learning by asserting that;

> *"Games and simulations help organizations develop symbolic thinking and gestalt understanding; help them create memories of the future, enable shared experiences and the building of shared intelligence and possibly most important develop their members' motivation and confidence to act."*

Christopher, (1999) states that the role of the facilitator or the teacher cannot be underestimated. The teacher can help in grouping the children according to their strengths and assign each group different tasks enabling the teacher to monitor the contribution of each child. The learning facilities should match to the ability level of the learners in the in the context of established goals, and creates challenges and motivates the learners to persist. Another important role for facilitators is that of managing expectations and presenting the advantages and disadvantages of the available facilities in active learning.

Kabita, Marea and Grace (2013) in his study found that over half (58%) of the participants had mathematics and science corner in their centres, while only 1/3rd (33%) indicated that they used the mathematics and science corners on every day, and the rest used up to a maximum of thrice a week only. Interestingly, a very small percentage (9%)

though, indicated that they did not have mathematics corners but engaged children in mathematics activities, almost thrice a week, probably by building up an in- formal set up for doing activities indoors. The findings thus prove that mostly Mathematics activities are done outdoors and hence, one tends to believe that the teachers encounter with some difficulty in doing them in- doors. Perhaps, the teachers do not use mathematics and science corner due to lack of required skills and competencies. The most popular material was used materials included puzzles (77%), building blocks (73%), writing materials (53%), and bottles (52%). Materials like themed books (44%) and sand water basin (44%) were used, but less as compared to others, may be because they are difficult to arrange and cumbersome to handle in the classrooms. This study therefore, established the extent to which learning facilities influence use of games in teaching of mathematical concepts.

2. METHODOLOGY

i. Research Design

Descriptive survey research design was used in this study. Descriptive survey design was appropriate for this study because it enabled the research to directly collect data on use of games in teaching mathematical concepts as they happen and without manipulation. Descriptive research design also helps to collect information on people's attitudes, opinions and habits hence it was used to establish the extent to which pre-school teachers use games as a medium for teaching mathematical concepts.
The dependent variable of the study was the status of teaching of mathematical concepts based on games. This was measured by assessing use of games in teaching mathematics and acquisition of skills through the use of questionnaires for teachers. And the independent variable measured by the frequency of using games in teaching mathematical concepts:-this was measured by assessing the number and types of games the preschool teachers used to teach mathematics.

ii. Location of the Study

The study was conducted in Kajiado County. The purposive sampling was used. Kajiado County is about 90km south west of Nairobi along Nairobi – Namanga road. Kajiado County borders Narok County to the West, Nakuru, Kiambu and Nairobi Counties to the north, Machakos, Makueni and Taita-Taveta Counties to the east and Tanzania to the south. It has a population of 406,054 and an area of 21,903 km². The main ethnic community of Kajiado County is the Maasai who are renowned for their strong cultural heritage and exquisite jewelry. There is an increased influx of other people from various regions of the county who flock the area and boost the millions acquired from tourism sector of the County.

iii. Target Population

The target population of this study was teachers in all public pre-schools that had been in existence for the previous one year within Kajiado. There are approximately 5,000 pre-school teachers in Kajiado County. However, this study targeted 290 pre-school teachers specifically in Kajiado Central Sub-County.

iv. Sampling Techniques

Kajiado Central Sub-County is sub-divided into three zones (Enkorika, Elangata, and Kajiado Zones). Therefore the three zones formed the strata of the study. Subsequently, stratified sampling technique was used to proportionally select 13 pre-school teachers from Enkorik Zone, 9 pre-school teachers from Elangata Zone, and 7 pre-school teachers from Kajiado Zone leading to a total sample of 29 pre-school teachers.

v. Sample Size

Formula by Kothari (2004):

$$n = \frac{t^2 \times p(1-p)}{m^2}$$

Where: n = required sample size.
t = standard normal deviation at the required confidence level.
p = proportion in the target population estimated to have the characteristics being measured.
m = the level of statistical significance set (margin of error).
The sample size was estimated within 95% confidence interval (t=1.96) and a significance level of 0.05 as follows;

$n = (1.96)^2. (0.019). (0.981)/ (0.05)^2 = 29$ (approximate)

For this research a total sample size of 29 was adequate. Stratified sampling was used to proportionately select a total of 29 pre-school teachers in three zones (Enkorika, Elangata and Kajiazo Zones). This represents 10% of the total pre-school teachers in the Sub-County. This is in accordance with Best and Kahn (2006) who argue that at least 10% sample size is ideal for a bigger population and 30% for a smaller population. Table 1, presents population and sample size of pre-school teachers.

Table 1: Population and Sample Size

Zone	Population of Teachers	Sample size	Percentage
Enkorika zone	130	13	10%
Elangata zone	90	9	10%
Kajiado Central zone	70	7	10%
Total	**290**	**29**	**10%**

3. FINDINGS

i. Learning facilities and use of games in teaching of mathematical concepts.

This study sought to establish the extent to which learning facilities influence use of games in teaching of mathematical concepts. Teachers were required to indicate their level of agreement on influence of learning facilities on use of games in the teaching of mathematical concepts. Observation of learning facilities in 12 public pre-schools was also managed and compiled through checklist and physical observation of these facilities. The findings from the observation schedule were summarized in table 2

Table 2: Adequacy of Learning Facilities

Facilities	Pre-primary schools					
	Have standard facilities		Have sub-standards facilities		No facilities	
	Freq	%	Freq	%	Freq	%
Playing materials	3	25	9	75	-	-
Library	3	25	-	-	9	75
Desk top	-	-	12	100	-	-
Play ground	3	25	9	75	-	-
Classroom	-	-	12	100	-	-
Computer games			1	8.3	11	91.7

The findings in table 2 reveal that 9(175%) of the Pre-primary schools had no library at all. The findings further showed that all 12(100%) of the pre-primary schools had classrooms but did not meet the required standards. Eleven (91.7%) out of the sampled pre-primary schools had no computer games. It was observed that learners only engaged in games during break time as stipulated by the extra-curricular curriculum, but without the guidance of their teachers. This implies that learners' games were not directed towards the achievement of any academic goal. Cruickshank & Telfer (2001) posit that learning facilities should match to the ability level of the learners in the context of established goals creates challenges and motivates the learners to persist. It was further revealed that at least more than half of pre-schools under the study had gaming equipment.

Findings from teachers' questionnaires indicated that learning environment was not friendly. This was confirmed by one of the teachers who reported:

> *"Most of the institutions are located next to littered backstreets, overcrowded market centres and dilapidated buildings. Our institution is also* lying *on a less than half an acre piece of land*

leaving no room for playgrounds and therefore games like hide and seek that requires spaces are not applicable to our children."

To establish whether there was a relationship between available learning facilities and use of games, mean scores of games were calculated and presented alongside the availability of learning facilities. Mean scores were calculated, Table 3 summarizes the findings.

Table 3: Influence of Learning Facilities on the Use of Games in Teaching of Mathematical Concepts

Facilities	Available and standards	Freq	%	Mean score of teacher's use of games in teaching Mathematics
Playing materials	Available and meets the required standards	1	25	1.94
	Available and does not meet the required standards	3	75	1.71
	Not available	0	0	0
Library	Available and meets the required standards	1	25	1.19
	Available and does not meet the required standards	0	0	0
	Not available	3	75	1.09
Desktop	Available and meets the required standards	0	0	0
	Available and does not meet the required standards	4	100	0.89
	Not available	0	0	00
Playground	Available and meets the required standards	1	25	1.75
	Available and does not meet the required standards	3	75	0.89
	Not available	0	0	0
Classroom	Available and meets the required standards	0	0	0
	Available and does not meet the required standards	4	100	1.76
	Not available	0	0	0
Computer games	Available and meets the required standards	4	100	1.24
	Available and does not meet the required standards	0	0	0
	Not available	0	0	0
	Available and does not meet the required standards	0	0	0
	Not available	4	100	1.79

The result from Table 3, shows that Pre-primary schools that had playing materials, library, desktops, playgrounds, classrooms and computer games which meet the required standards had a high mean score compared to those which did not meet standards or were not available. The more the availability of physical facilities the higher the use of games in teaching mathematical concepts by teachers. There was a slight difference in pre-primary schools that had libraries with required standards and those that did not have. This implies that learning facilities influence the use of games in teaching mathematical concepts. Thus, the more the availability of physical facilities with the required standards the higher the use of games in teaching mathematical concepts by teachers in pre-schools.

The school's administrations need to take note of such essential resources as today's child needs to gain a wide variety of knowledge and skills in mathematics and this cannot be achieved without relevant materials, supporting curriculum coupled with teacher competencies and skills. Pre-primary school teachers need to be prepared to do activities indoors, as well as outdoors as they are the catalysts of the learning process and the success of education

rests on them. Perhaps an emphasis on comprehensive specialized training in ECE needs to be made here. Just any teacher training programme cannot prepare them to work with the young ones at various set ups.
These findings agree with Gee (2003) who advocate smaller classes because they influence children's academic performance. Reuben (1999) adds that the availability of conducive learning facilities encourages active learning as well as collaboration and interactivity (Reuben, 1999). Wenzler and Chartier (1999: 78) made an effective case for the use of games in organizational learning by asserting that games and simulations help organizations develop symbolic thinking and gestalt understanding; help them create memories of the future, enable shared experiences and the building of shared intelligence and possibly most important develop their members' motivation and confidence to act.

4. CONCLUSIONS

This study sought to establish the extent to which learning facilities influence use of games in teaching of mathematical concepts. The findings revealed that pre-primary schools that had playing materials, library, desktops, playgrounds, classrooms and computer games meet the required standards had a high mean score compared to those which did not meet standards or were not available. It was observed that learners only engaged in games during break time as stipulated by the extra-curricular curriculum, but without the guidance of their teachers.

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