

**INFLUENCE OF PLAY METHOD ON ACADEMIC PERFORMANCE IN MATHEMATICS
OF PRESCHOOL CHILDREN IN CHOGORIA ZONE, NITHI COUNTY, KENYA**

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**A Research Project Report Submitted in Partial fulfillment for the Requirements of
Master of Education in Early Childhood education in the Department of Educational
Communication and Technology, University of Nairobi**

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DECLARATION

This research report is my own original work and has not been presented for degree award in any other university.

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This research report is presented for examination with my approval as university supervisor

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DEDICATION

I dedicate this research report to my Husband Rev. Benjamin Muthungu and my children: Jefken, Lillian and Linabel for their understanding during the entire period of study and support.

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NEBE Kenya Environmental & Natural Resources

MAEP Kenya Environmental Policy in Primary Education

EDTA Kenya Environmental Education Curriculum

YTHCB Kenya Primary with Comprehensive for Technical Education

WFP World Food Programme for Technical Education

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ABBREVIATIONS AND ACRONYMS

ECE	Early Childhood Education
KCSE	Kenya Certificate of Secondary Examination
KCPE	Kenya Certificate of Primary Education
KNEC	Kenya National Examination Council
UNHCR	United Nations High Commission for Human Rights
SPSS	Statistical Package for Social Science

ABSTRACT

The purpose of the study was to assess influence of play method on academic performance in mathematics of preschool children in chogoria zone, Nithi County, Kenya. The study was guided by the following objectives: Examine the influence of types of play method on mathematics performance in preschool children in Chogoria zone; Establish the influence of attitudes of children towards play method on mathematics performance of preschool children in Chogoria zone; Examine the influence of time allocation to play method on mathematics performance of preschool children in Chogoria zone; and establish the influence of learning environment to play method on mathematics performance of preschool children in Chogoria zone. To obtain the sample, stratified random sampling procedure was used on a target population of 1200. The study adopted the quasi-experiment research design. The data was gathered from the preschoolers and preschool teachers from Chogoria Zone and was collected using questionnaires, interviews, and observation schedule. Data was analyzed using both descriptive by utilization of Statistical Packages for Social Service (SPSS). The research found out that the preschoolers' mathematics academic performance improved when teachers adopted play method in their teaching. The study established that for each of the play methods applied by the preschool teacher, there was a skill projection which the children were expected to learn. The study also established that the majority of the children had a positive attitude towards learning. The positive attitude of children contributed to good performance in mathematics. The researcher also established that high involvement led to high performance in mathematics. The study concluded that the preschool teachers utilized play method when teaching mathematics to a great extent. The play methods were perceived by the preschool teachers to make learning interesting and enhanced the rate of understanding of different concepts that they taught the children. The researcher also concluded that high involvement of children in play method led to high performance in mathematics. Thus, the play method being instrumental in making learning in mathematics should be made an integral part of teaching of mathematics. From the study, it was established when use of play method especially music/ songs in teaching mathematics was used, performance was good. The study recommends that the Ministry of Education make music mandatory as a subject in preschools in Kenya. The Ministry should also ensure incorporation of affective and social aspects in the curriculum.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Mathematics is all around us, and we use it every day yet it is seldom taught well in preschools, where it really counts. Research shows a solid early introduction to the “big ideas” in mathematics can help a child succeed in school later on. Yet too many childhood teachers neglect mathematics. These teachers do not realize young children are eager to learn core mathematical concepts. The early intervention programs have a positive impact on children’s achievement McKenzie. (2002).

Varol and Faran (2006) believe that it is not just enough to attend a high quality pre-school. These children need to be provided with challenging and accessible mathematics education because experiences during the early years influence later performance in school. A preschool programme that recognizes the importance of play is able to offer the child the best opportunities to learn (Saracho and Spodek, 1995). According to Saracho and Spodek, play helps children to understand their world or environment, develop critical thinking skills necessary to ask questions and figure out how things work. Through these activities children strengthen their language development. Play is so important to optimal child development that it has been recognized by the United Nations High commission for Human Rights (UNHCHR) as a right for every child.

According to Librera, (2004), imagination is more important than knowledge. Through play, children learn that their personal gratification is often dependent on their cooperation with others children. Play teaches children about partnership, teamwork, and fair play. It is through play that a child's primitive understanding about "rules" is reinforced because most games have rules.

Play has long been regarded as a critical element of early childhood curriculum and pedagogy. In addition to being recognized as a vehicle for learning, play is described as a context in which children can demonstrate their own learning and help scaffold the learning of others (Wood, 2008). Despite this, educators often struggle to explain what it is about play that promotes learning and ways in which they can actively facilitate both play and learning (Hanline, 1999). While this situation applies generally, Hanline, (1999) notes that the potential of play to facilitate children's mathematical thinking depends largely on educators' ability to "seize on the teaching opportunities in an adequate way."

For a child to excel in mathematics, he/she has to have a good basis, which is normally formed at the preschool stage. Without this basis, then the children find it difficult to excel in mathematics even in subsequent classes. Therefore, it is important for preschool teachers to be keen on how they introduce mathematics to the preschoolers at that early age in their lives and there is no better way of doing this than through integrated play. It is thus very important for children to be able to hold on to something like blocks, to be able to build with them. When they are building with blocks they are developing their gross motor skills as well as developing numeracy concepts. When children are working with art materials, this is

a chance for them to be creative. This is an opportunity for them to use open-ended materials.

The studies reviewed show that there is contradiction between different researchers. Some argue that integrated play interferes with content covered in a lesson and teaches children to expect all learning to be effortless. Another argument is based on the amount of time spent in a given topic.

This has prompted the researcher to carry out a study to find out the influence of play method in terms of the amount of time spent and types of play method used to enhance academic performance in mathematics in Chogoria Zone in Nithi county Kenya.

1.2 Statement of the problem

For a long time, there has been a debate on the best time to introduce mathematics in the life of a child. The preschool curriculum is thus designed to include learning of mathematics since it has emerged that the best time to introduce mathematics to a child is at the preschool age. Therefore how this subject is introduced to the preschooler is very important. This means that the teacher has to do everything possible to ensure that the learner understands the basic concepts of mathematics as this age.

Nevertheless, in Kenya it has emerged through results, time to time children both at primary and secondary school levels perform below expectation in mathematics and have a very poor attitude towards any subject involving number work as noted by Howell and Kemp, (2010). For example in Maara District these are the trends of KCSE from KNEC results

2008: 2.5659, 2009:2.6064, 2010:3.9794, 2011:3.9717 and were KCPE: 2009:46.58, 2010:45.75, 2011:46.57. This has also spilled over even to higher learning institutions.

This trend the researcher felt could have emanated from the way these students were introduced to number work in preschools and the method of teaching used. Therefore, the researcher decided to use play method, which is more interactive as compared to other methods of teaching to make mathematics more interesting and fun in the hope that if these children are followed to higher levels of learning, their performance would be better.

1.3 The Purpose of the study

The purpose of this study was to establish the influence of play method on academic performance in mathematics in preschools in Chogoria Zone, Maara District of Nithi County in Kenya.

1.4 Objectives of the Study

The study's research objectives were to:

- i. Examine the influence of types of play method on mathematics performance in preschool children in Chogoria zone
- ii. Establish the influence of attitudes of children towards play method on mathematics performance of preschool children in Chogoria zone.
- iii. Examine the influence of time allocated to play method on mathematics performance of preschool children in Chogoria zone.

iv. Establish the influence of learning environment on play method on mathematics performance of preschool children in Chogoria zone.

1.5 Research Questions

The research questions for this study were:

- i. How do types of play method influence mathematics performance in preschool children in Chogoria zone?
- ii. How do attitudes of children influence play method on mathematics performance of preschool children in Chogoria zone?
- iii. How does time allocated influence play method on mathematics performance of preschool children in Chogoria zone?
- iv. How does learning environment influence play method on mathematics performance of preschool children in Chogoria zone?

1.6 Significance of the research

The beneficiary of the findings of this study are the preschool policy makers by providing crucial clues with regard the influence of play method on mathematics performance. The school management and administration will also benefit from the study in that the findings may challenge them to change the methodology of delivering content in the teaching of mathematics in their preschools. The teachers will also use the results to explore and find out what types of play methods may be more effective in teaching mathematics in order to enhance its performance.

1.7 Limitation of the Study

The research findings cannot be generalized and applied to other areas in Kenya owing to the fact that different areas in the country have different factors that affect academic performance.

1.8 Delimitation of the Study

The study was limited to Chogoria zone in Nithi County and involved preschool children and their teachers. Preschools from other zones were excluded from the study

1.9 Assumption of the Study

The assumption of the study were that all preschoolers would portray positive attitude towards play method as play is children's work.

1.10 Definition of significant terms

The following terms were important in this study:

Academic performance is the outcome of education that is the extent to which preschool children have achieved their educational goals in mathematics.

Child- a person between 3 – 6 years in the early childhood education (ECE)

Children- These are a number of persons between ages 3-6 years in attending school.

County- This is a geographical region of a country used for administrative or other

purposes.

Influence- the process of producing some effects to the preschool children.

Mathematics- according to this study it means number work and algebra.

Play-an activity that children consider as fun while engaging in.

Preschool- learning institution where children of less than six years are taught.

Zone- a zone is an administrative division.

1.11 Organization of the Study

The study is organized in five chapters. The first chapter started with the background to the problem, followed by statement of the problem. In the same chapter the purpose of the study was outlined, followed by highlighting of research objectives and the research questions. Then the limitations and delimitations of the study followed. The significance of the study was also given and the chapter concluded with basic assumptions and the organization of the study. In Chapter two, related literature review on mathematics performance using play method was outlined. This chapter was sub-divided into sub-themes which were based on influence of play method on mathematics performance. Chapter three covered the research methods which looked into research design, target population, sampling procedures, instruments, validity and reliability of the research instruments and data collection procedure. Chapter four contains findings and discussion while chapter five has summary of findings, conclusions and recommendations.

CHAPTER TWO:

LITERATURE REVIEW

2.0 Introduction

This section of literature review gave some account of influence of play method on Mathematics performance among preschool children education in Kenya and what various researchers found about it. Discussions were covered on the various forms of play methods used in teaching mathematics, learning environment, children's attitudes towards play method and time allocated and how they affect the performance of preschool children.

2.1 Performance in Early Childhood Education

Education and care of young children is of crucial importance for their development. It ensures that children grow up into strong and healthy adults mentally, physically, emotionally and intellectually. Psychologists generally agree that the period below five years is critical in the development of a human being. Theories of intellectual development suggest that intellectual development takes place in stages. It follows therefore that certain concepts must be developed at particular periods in a child, failing which such concepts can be stunted or missed completely.

Otunga (1993) observes that the earliest centers were places where breastfeeding mothers could leave their children under the care of a custodian while they went to work. The centre was originally not meant for teaching or formal education. It was for this reason that they acquired the name nursery especially in Russia and in Eastern Europe. They were called

kindergarten in Germany, which translates, into gardens for nurturing the children (Otunga, 1993).

According to Oyagi, (2003)), the first function of pre-school services developed to provide substitute care for children whose parents both worked or where conditions of home living were considered detrimental for development. The second trend was more positively educational and advocated the value of complementing children's experiences at home by providing carefully planned learning activities in the company of other children, which would promote all aspects of their personal development.

Homes (1997) agree with this by saying that the teachers' factors such as professional status and experience have been reported to be positive teachers' factors. Teachers' professional status is related to teaching behaviors and interactions they have with children. Teachers who are more experienced on early childhood education have positive relationships with their pre- schoolchildren as compared to their colleagues who are less experienced.

Schools for poor people often lack basic instructional materials. Textbooks often reach remote schools well after the beginning of the school year if they arrive at all (Tietjen, Raman, and Splaulding, 2003). In Kenya for example, for less than half of the seventh and eighth grade students' present in class had required textbooks (Paciorek, M. & Joyce, 2003). Availability of books in general poses a challenge to education in the poorest developing countries. More than half of all the sixth grade students in eight countries participating in the southern and eastern Africa consortium for monitoring educational quality (SACMEQ) sample attended school without books. Providing books in second and third languages.

especially those that are tailored to the language requirements of the minority groups, is out of the question. Even when basic textbooks are available, schools in poor areas often lack other instructional materials. Study of poor district in India found that while most schools in these districts have sufficient textbooks and learning materials for students, classrooms lack supplementary materials as teacher guides, dictionaries, maps, globes and instructional kits (UNICEF 2010).

Early childhood development and education can lead to increased school success. In the Perry Pre – School study, persons who had attended pre – school had better grades, fewer failing marks, and fewer advances in elementary school, they required fewer special education services, were more likely to continue with their education or get vocational training after school than non pre – school counterparts. The picture of detailed and content improvement in school performance is also reflected in increased commitment: those youths who attended pre – school had a more favourable attitude towards high school. The economic analysis of these findings indicate that ECDE can substantially increase the efficiency of late schooling and that the effect of pre – school education on school systems alone is sufficient to cover the cost of Early Childhood Education (ECE).

In the guideline for early childhood development and education in Kenya (MoE, 2010), it is noted that research has proved that, early years (3 – 6) are important in laying the foundation for adulthood. This is the period when children undergo fast growth changes in mental, physical, social, emotional and spiritual development. During the early years, young children require good health, nutrition and proper orientation to the learning environments.

Children from disadvantaged background therefore need to be given all the necessary support both in school and in life so as to have better future (MoE, 2010).

Nasibi s (2005), studies in intelligence reveal that, intelligence measured at the age of 17; at least 20% is developed at age 1, 50% at age 4, 80% by age 8 and 92% by age 13. Early ability (at least 4 years – 6 years) is an important determination of an adult's level of ability as measured by Intelligence Quotient (IQ) tests.

The Government of the Republic of Kenya recognizes the importance of ECDE as the most important lever for accelerating the attainment of Education for All (EFA) and the Millennium Development Goals (MDGs) (Republic of Kenya, 2006 (a)). The government has further demonstrated its commitments to the well - being of young children by signing various global policy frameworks such as the 1989 United Nations Convention on the Rights of the Child (UNCRC), the 1990 Jomtien world conference on EFA, the 2000 World Education Forum (Dakar, Senegal) and the 2000 Millennium Development Goals (MDGs). These forums underscored the importance of EFA (Republic of Kenya, 2006 (b)).

Basing on the above-mentioned importance, The Ministry of Education encourages the establishment of ECDE units within primary schools (Republic of Kenya, 2005). This is done with a view of creating stronger ties between the two schools and to ensure closer supervision and continuity. The establishment of ECDE centres in Kenya has been on racial lines (Ministry of Education, 1992). The first known ECDE centre in Kenya was established among the white community in 1942, this was followed by the establishment of ECDE centres among the Asian community and later for the Indigenous Africans. The first ECDE

centre for Africans were started in the 1950's with custodial care and security of concern, the educational component being least pronounced (Ndani, 1994).

Similar views are shared by Nolan (2002). They point out that in some districts, the ECDE centres were started as nutrition centres where children could sing, listen to stories and play organized games while milk or soup was prepared. Ministry of Education (1992), points out that, the growth of ECDE centres, especially in rural Kenya was a community based affair: usually a group of individuals got together and decided to establish a preschool in their village. The Kenya government made initial direct involvement in ECDE programs in the early 1960s when the then Ministry of Home Affairs and Health were changed with the responsibility of inspecting pre – schools to ensure children's health and safety. By 1966 the Ministry of Housing and Social Services (later known as Culture and Social Services) started organizing courses for ECDE teachers.

Sifuna and Karagu (1988) reveal that there was no national Curriculum and therefore, each individual ECDE Centre had its own Curriculum, which was mainly determined by the social status of the school. Ndani (1993) explains that the institutions that catered for children from upper and middle classes of the society, emphasized academic education modeled on foreign educational systems. The majority of ECDE centres catering for children from lowest class of the society offered non – academic programs. A lot of time was spent on singing and there was little variation in activities offered to the children.

Report of the National Committee on Educational Objectives and Policies (Republic of Kenya, 1976) recommends that the K.I.E should produce a Curriculum with culturally

relevant material to be used in Kenyan ECDE centres. In 1984, the Ministry of Education introduced in – service training model through the central administrative, supervisory and inspection unit at its headquarters known as, National Centre for Early Childhood Education (NACECE) and later formed a network of sub – centres known as, the District Centre for Early Childhood Education (DICECE) which were established in 1985. This measure was aimed at addressing the human resource quality in ECDE programs.

The Ministry of Culture and Social Services was until 1983 responsible for coordination of ECDE (Republic of Kenya, 1988). Based on the Presidential Circular Number 1 of 1980, ECDE program was transferred from the Ministry of Culture and Social Services to the Ministry of Education (MOE). However, up to date ECDE is not compulsory hence, attendance in ECDE is not a prerequisite for joining class one (Republic of Kenya, 1999).

Odada and Otieno (1990) report that; by 1986 there were 16,681 ECDE teachers, of which 69% were untrained with National Centre for Early Childhood Education (NACECE) established in 1984 at the Kenya Institute of Education (KIE) to: train ECDE teachers, develop ECDE Curriculum and undertake research on ECDE in Kenya. Despite all the benefits that may accrue from ECDE, training of more teachers as stated above and the commitments made by the Government of Kenya to achieve Basic Education for All (BEFA) through ECDE, there is still poor performance of ECDE sub-sector characterized by low enrolment of children and failure of children to master the 3Rs; Reading, Writing and Simple arithmetic (Republic of Kenya, 2006, (b)). This makes the public confidence in it to wane, as government support is in question (Republic of Kenya, 1998).

2.2 Teacher in Role

Teacher in Role, TIR, is a special tool functioning as an extended hand, which the teacher uses in order to support and challenge the student's thoughts. This technique fully engages the teacher in drama and gives him/her an opportunity to influence the whole process from within the context. It is done by adopting a suitable role thus controlling the action and fulfilling the teaching purpose through this role.

TIR is a drama convention which allows the teacher to work alongside with the students and as said by Neelands (2000) giving "a chance for students and teacher to lay aside their actual roles and take on role relationships". Nevertheless, the role with its own social status raises an opportunity for the teacher to decide whether to accept a more or less controlling role, depending on the level of influence required to play.

Another type of T-I-R is 'Hot seating'. It is a well-known technique used in theatre which became very popular in schools during 1990's. This method involves one or more people sitting in front of the whole class and acting out a character while the rest of the students keep asking questions concerning the story, the characters' emotions, and attitude towards other characters as well as their relationships. What needs to be emphasized it that this activity is not about acting but about trying to imagine oneself being in another person's shoes.

In addition, this activity engages students' creativity, motivation and provides a great stimulus. It also helps to build careful listening in order to react and raise more questions.

especially the multiple variation of the technique. There should be an inclination to the multiple variations in order to decrease the stress level. Students might be too nervous or insecure when sitting by themselves in front of the whole class. Consequently, having more people participate makes it more embraceable, interesting and promotes more focus on listening.

2.3 Importance of teaching Mathematics

Research, conducted by a generation of researchers over the past 25 years, has revealed that mathematical knowledge begins during infancy (Geary, 1994) and undergoes extensive development over the first five years of life (Ginsburg, Klein, and Starkey, 1998). This knowledge includes enumerative abilities such as subsidizing (Starkey and Cooper, 1995) and counting, arithmetic problem solving, spatial reasoning and geometric knowledge (Graham, 1997). This knowledge undergoes considerable development during the preschool years and provides a necessary foundation for the acquisition of formal mathematical knowledge in elementary school (Geary, 1994; Ginsburg, 1989). This highly successful program of research has changed the view of young children as pre-mathematical to one in which it is just as natural for children to acquire and use knowledge of mathematics as it is for them to acquire and use language.

According to Graham (1997) the goals of teaching mathematics are: to develop the mathematical skills like speed, accuracy, neatness, brevity, estimation, etc.; to develop logical thinking, reasoning power, analytical thinking, critical-thinking; to develop power of decision-making; to develop the technique of problem solving; to recognize the adequacy or

inadequacy of given data in relation to any problem; to develop scientific attitude i.e. to estimate, find and verify results; to develop ability to analyze, to draw inferences and to generalize from the collected data and evidences; to develop heuristic attitude and to discover solutions and proofs with the own independent efforts; to develop mathematical perspective and outlook for observing the realm of nature and society.

According to Phillips, activities "encourage children and give them the chance to communicate, even with limited language, using non-verbal communication, such as body movements and facial expressions. Thus give the teacher an immense opportunity to engage event those who would not more often than not get involved in the lesson.

2.4 Different Types of play methods as a means of teaching Mathematics

According to Gordon, (2003), play and daily activities, children often explore mathematical ideas and processes: for example, they sort and classify, compare quantities, and notice shapes and patterns. There is a well-established consensus among early childhood professionals that play is an essential element of developmentally appropriate, high-quality early education programs (NAEYC, 2003). American Academy of Pediatrics, (2006); Elkind, (2007) realized that play provides benefits for cognitive, social, emotional, physical, and moral development for children from all socio-economic, cultural, and linguistic backgrounds. Zigler, (2006) also added that to provide these benefits, play must be consciously facilitated by skilled teachers, who are well-trained in observing children and in understanding how play contributes to the children's mastery of concepts and skills.

2.4.1 Music's effects on Mathematics

Neurological Research February 28, (1997) shows that piano students are better equipped to comprehend mathematical and scientific concepts .A group of preschoolers received private piano keyboard lessons and singing lessons. A second group received private computer lessons. Those children who received piano/keyboard training performed 34% higher on tests measuring spatial-temporal ability than the others —even those who received computer training (*Neurological Research February 28, 1997*).

“Spatial-temporal” is basically proportional reasoning — ratios, fractions, proportions and thinking in space and time. This concept has long been considered a major obstacle in the teaching of elementary math and science. (*Neurological Research February 28, 1997*)

2.4.2 Role Playing in Mathematics

Role playing is a methodology derived from socio drama that may be used to help students understand the more subtle aspects of literature, social studies, and even some aspects of science or mathematics (Blatner, Adam, 1995). Further, it can help them become more interested and involved, not only learning about the material, but learning also to integrate the knowledge in action, by addressing problems, exploring alternatives, and seeking novel and creative solutions. Role playing is the best way to develop the skills of initiative, communication, problem-solving, self-awareness, and working cooperatively in teams, and these are above all certainly the learning of mere facts, many if not most of which will be

obsolete or irrelevant in a few years will help these young people be prepared for dealing with the challenges of the Twenty-First Century (Blatner, Adam, 1995)

2.4.3 Pretend Play

Mathematics in constructive play is often enhanced when dramatic play is added. Two children making block buildings next to each other, for example, may begin arguing that their own skyscraper is the biggest (Lewis, Boucher, Lupton and Watson 2000).

For example, from a preschool classroom in which some children are playing store. Gabi is the shopkeeper. Tamika hands her a "five card," which shows the number 5, along with five dots, as her order. Gabi counts out five toy dinosaurs (Lewis, Boucher, Lupton and Watson, 2000).

The teacher asks Tamika, "How many did you buy?" "Five," she responds. "How do you know?" "I know because Gabi counted," says Tamika. Tamika is still working on her counting skills, and she trusts Gabi's counting more than her own knowledge of "five." By exploring this concept within the safety of familiar pretend play, she can further develop her knowledge (Lewis, Boucher, Lupton and Watson, 2000). Garvey, 1984) concluded that as children develop the ability to represent experience symbolically; pretend play becomes a prominent activity. In this complex type of play, children carry out action plans, take on roles, and transform objects as they express their ideas and feelings about the social world.

2.4.4 Games with Rules

According to World Bank, (2003) games with rules can easily be modified to create opportunities to learn math ideas, skills, and reasoning. Games such as Memory (or Concentration) encourage your child to use memory strategies and gain experience with arrays (rows and columns), encourage him to declare whether he found a match and how he knows. Games such as Tic-Tac-Toe also promote thinking about spatial relations and strategies. "Race" or "path" games (like Candy Land) are similarly valuable (Rowling 2012). Rowling (2012) further said that they usually involve generating a number with dice or a spinner and moving the number of spaces indicated. This provides a different, complementary way of making sense of numbers, closely connected to measurement. Games such as "I Spy" (something with 4 sides the same length, for example) or "I'm Thinking of a Number" (with clues about whether the right number is "smaller" or "larger") sharpen older children's knowledge of attributes and logical reasoning.

Sometimes children desire to be as grown-up as possible. This is when children take on the roles of adults whom they wish to emulate because of their perceived power or freedom. Peller saw this type of play as early attempts of self-identification, which follows the functionalist approach. At other times, children take on submissive or immature roles. Peller saw this choice as being guided by a desire to emphasize the difference between such roles and the child's reality. She imagined the child may be thinking: "If I make believe these things, they will not cling to me in real life." This model of play does not follow a functionalist approach, and is more suited to Freudian interpretations of play. Through her

study of the different impulses behind children's play. Peller showed that play is a very complex institution that affects multiple aspects of childhood development.

2.4.5 Building Blocks

World Bank, (2003) noted that when preschoolers build with blocks, they also build their math, science, and general reasoning abilities. Classic wooden blocks and other construction materials, such as connecting blocks, give children entry into a world where objects have predictable similarities and relationships.

Preschoolers use, at least at the intuitive level, more sophisticated geometric concepts than most children experience throughout elementary school. World Bank, (2003) noted that many children intuitively use concepts of parallel and perpendicular and that a longitudinal study measured the complexity of children's block play at age 4 and then tracked their academic performance through high school. Researchers found that the complexity of block play predicted kids' mathematics achievements in high school. In particular, those who had used blocks in more sophisticated ways as preschoolers had better math grades and took more math courses (including honors' courses) as teenagers (Wolfgang, Stannard, and Jones, 2001).

2.4.6 Improvisation and role-plays

Improvisation and role-playing is very flexible, creative and effective technique for teaching math. It has a great advantage over other methods, such as the permission to take part with various linguistic abilities by using proper intonation, gestures and pose. Young learners.

who do not have the vocabulary range, may be able to act out a situation or play a character by engaging the level of emotional commitment, thus substituting the missing skill. Improvisation is considered to be very valuable from the beginning of the learning process.

There is a great deal of role-play activities including story dramatization, interviews, conversations or problem solving situations. Starting with a simple role-plays for weaker students using lines that are not complicated and progressing to more sophisticated situations where advanced students employ not only their linguistic ability but also their emotions, opinions or their intelligence.

As Butterfield (23) mentions, in practice the role player is not pushed to get as deep into a character as an actor would do. Some will find themselves in a role that is closer to their own experience or a direct personal identification; others may find it easier towards acting. Either way, nobody should be forced and decide himself/herself which way to take, considering the time and place.

These activities may involve a diverse number of participants, sometimes the whole class, depending on the scene or characters. More successful activities may be formed by the existence of an element of conflict or a problem solving as suggested by Philips and Butterfiel. Spicing up the action can bring the learners into producing the most fantastic scenes, being fully involved and excited about the project.

Nevertheless, simple role plays should follow basic key stages. The first stage is preparation. This typically involves the introduction of vocabulary, which might be used, the

introduction of characters and scenario. The necessary grammatical structure may be introduced such that students are not limited by their knowledge. The second key stage is the actual role play or improvisation performed by the learners. At this stage the teacher should step aside and act as an observer. Once the play finishes, that is the third and last stage, the teacher has the opportunity to reflect and discuss upon the activity giving the learners important feedback.

2.5 Attitude of children

According to Burgum (1993) there is a positive correlation between attitude and achievement in mathematics. They further added that, stakeholders in the learning process, such as the principal and parents, also influence children's attitudes towards mathematics. Children's success with mathematics builds their positive attitudes and confidence.

Mason, (2001) documented the positive attitudes and responses that children have when they first make sense of a concept and build new connections. Children who build such connections increase their self-confidence in mathematics and develop positive attitudes towards the subject. Increased self-confidence and positive attitudes encourage children to make further explorations and additional discoveries.

2.6 Time allocation

In many early childhood programmes across the country, time for play is dwindling away. Time in instruction has been significantly linked to students' math achievement in elementary and secondary grades as well as among kindergartners (Bodovski and Farkas.

2007). However, in preschool learning environments, very little time is dedicated to explicit instruction in any subject matter and consequently little time is allocated specifically for mathematics instruction (Graham, Nash Paul, 1997). Findings from the National Center for Early Development and Learning's Multi-State Study of Pre-K (NCEDL-MS) indicated that children were engaged in math activities for 6% of the school day (Bodovski and Farkas, 2007). The time in math instruction was less than the amount of time spent in gross motor (7%), science (8%), art/music (9%), social studies (13%), or literacy/writing (13%). For the remaining 44% of the time observed, children were not engaged in any learning activity.

2.7 Learning environment

The learning environment as well as the resources used by the preschool children is essential to their development (Librera, Anderson, Atherly, Battista- Werner, and Benejan. 2004). "A preschool classroom environment must provide welcoming, safe, warm and stimulating areas to promote the development of the whole child, especially to strengthen, expands and deepen learning (Librera, Anderson, Atherly, Battista- Werner, and Benejan.2004). The teacher is expected to create this environment as well as forth resources he or she feels are most beneficial. The instructional materials provide opportunities for children to broaden and deepen their knowledge (Librera, Anderson, Atherly, Battista- Werner, and Benejan, 2004)

2.8 Theoretical Frame work

The researcher based the study on the Constructivist Theoretical framework by Bruner (1966). This theoretical framework states that learning is an active process in which learners

construct new ideas or concepts based upon their current/past knowledge. The learner selects and transforms information, constructs hypotheses, and makes decisions, relying on a cognitive structure to do so.

The more traditional formulation of this idea involves the terminology of the active learner stressing that the learner needs to do something; that learning is not the passive acceptance of knowledge, which exists “out there” but that learning involves the learner’s engaging with the world. Physical actions, hands-on experience may be necessary for learning, especially for children, but it is not sufficient; we need to provide activities, which engage the mind as well as the hands called reflective activity (Bodovski and Farkas, 2007).

Use of play as a teaching method in mathematics in preschools call for children’s active participation and provision of different play methods that engage the mind of a child such as music, role-playing and pretending among others. Therefore, the content should be structured in such a way that the child in a spiral manner can easily grasp it. Thus, the study was based on this theoretical framework.

2.9 Conceptual Framework

The conceptual framework shows the relationship between the independent and the dependent variables (Figure 1). Further, it shows any other factor that may have any effect of the two variables. The conceptual framework in this particular study shows that the academic performance in mathematics is influenced by: types of play methods, attitude of the children, time allocation and learning environment. Moderating variables include the government policy and the local community. It is then through this conceptual frame that the

researcher was able to find out whether the independent variables (attitude of children, time allocation, types of play method and learning environment) had any influence on the academic performance of mathematics in preschool children in Chogoria Zone, Nithi County.

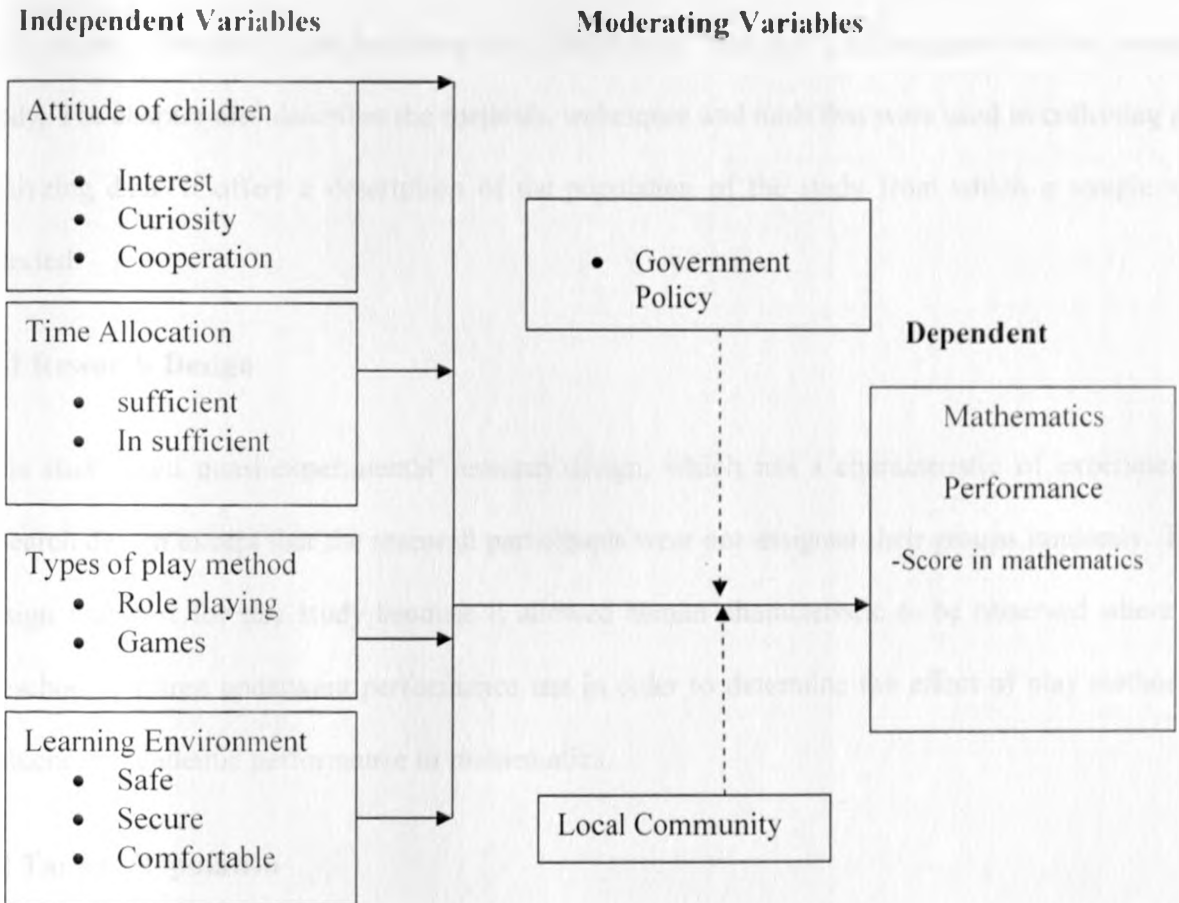


Figure 1: Conceptual frame work the relationship between play method (Independent variable) and performance in mathematics (Dependent variable).

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter introduces and describes the methodology that was used to carry out the research study. The chapter also describes the methods, techniques and tools that were used in collecting and analyzing data. It offers a description of the population of the study from which a sample was selected.

3.1 Research Design

This study used quasi-experimental research design, which has a characteristic of experimental research design except that the research participants were not assigned their groups randomly. This design was best for this study because it allowed human characteristic to be observed where by preschool children underwent performance test in order to determine the effect of play method in influencing academic performance in mathematics.

3.2 Target Population

Kothari (2004) defines target population as all members of a real or hypothetical set of subjects/people/vents to which a researcher wishes to generalize the results of the study. In this study the target population was 20 public and 9 private preschools in Chogoria zone. The study also included 820 preschool children in public and 311 in private preschools and 29 public plus 17 preschool teachers in Chogoria zone.

3.3 Sampling Procedure

The researcher employed stratified random sampling procedure in selecting the respondents from both private and public preschools. In order to get the sample size the researcher used Mugenda and Mugenda (2003) thumb rule of 10% sample size from the target population.

Sampling frame

The table below shows the sample size as sampled using Mugenda and Mugenda (2003) 10% formulae sample size. This table shows the distribution of the sampled population.

Table 3.1: Sampling frame

Category of Respondent	Total Population	Public Population	Private Population	Public sample (10%)	Private Sample (10%)
Preschools	20	9	2	1	
Preschoolers	820	311	82	32	
Teachers	29	17	3	2	
Total	869	337	87	35	
Sample					

From the table 2 public and 1 private preschools were sampled, 82 public and 32 private preschoolers were sampled, while 3 teachers from public and 2 private Sample were sampled making a total sample of 122.

3.4 Instruments

In designing research instruments, the researcher considered the objectives of the study and the research questions. Data was collected using observation, questionnaire interview schedules and performance test.

The researcher prepared structured questionnaires. Questionnaires addressed the teaching experience of the teacher, the teaching methodology, involvement of children, play methods used, time spent on play, space for activities in preschoolers and attitude of children.

The researcher also adopted structured interviews. The interview schedule entailed the following items; work experience in teaching, how often play method is used, time spent, frequency of participation of preschoolers, type of play method used in teaching mathematics and the attitude of the children.

The researcher also used structured observation schedule. The observation schedule had the following items: the children's frequency of participation in play, the attitude of children as they play. Time allocated to play, the teaching environment, and instructional materials being used by the teachers. Finally, the researcher used performance test as an instrument to examine the performance of the preschoolers in relation to play. The performance test involved counting of numbers one to ten orally.

0.7 and 0.8 for performance test were realized and were accepted.

3.6 Data Collection Procedure

The researcher provided the respondent with an introductory letter certified by the University of Nairobi and a license from government offices in order to boost the respondents' confidence and acceptance in participating in the study.

In collecting data, the researcher visited the sampled preschools and administered the questionnaire and carried out the interviews. Clarifications were made on the items of the questionnaire which the respondents were not able to understand. Face to face interviews were conducted with the preschool teachers.

The researcher also attended classes where observation instrument was applied. The researcher together with an observation assistant checked how the preschool teachers were using play as a teaching method, time spent, the attitude of the children which was measured by the way they showed interest and cooperation in play activities, and the learning environment for the preschoolers. For the Performance Test the researcher prepared schemes of work and lesson plan which were given to the preschool teachers as the experimental group. For the other group of schools the researcher did not give scheme of work and lesson plan to follow and no instructions was given to them. This because it acted as the control group. After this the researcher administered performance test through the preschool teachers.

3.7 Data Analysis

Data analysis involved checking the research instruments to ensure completeness and error free. The data was then categorized according to research questions. Qualitative data were organized into themes, by organizing all the data as per objectives from each of the instruments used. For example the researcher took the questionnaires, interview and observation schedules and uplifted the information given by the respondents and categorized them as per the research objectives. The researcher was keen to find out whether the data collected answered the research questions. Quantitative data was analyzed using descriptive statistical analysis. This was after the researcher coding the data. The coded data was then entered into Statistical Package for Social Sciences (SPSS) software. From SPSS, frequencies and percentages were calculated and result were then presented inform of tables and percentages.

Performance Test: Data from these tests was analyzed by descriptive statistics; by looking at the scores. The quantitative data generated was subjected to the descriptive Statistics feature in SPSS to generate mean, median, mode, standard deviation and variance, which was presented using tables, frequencies and percentages.

Observation checklist for children: Data from the observation checklist was analyzed by descriptive statistics and content analysis. It is used when one has sets of existing written or visual documentation which require analysis (Carol Grbich 2007). The quantitative data generated was subjected to the descriptive Statistics feature in SPSS to generate mean, median, mode, standard deviation and variance, which was presented using tables.

frequencies and percentages.

Questionnaire Teachers: Data from the questionnaire was analyzed by descriptive statistics (Frequency and percentages). The quantitative data generated was subjected to the descriptive Statistics feature in SPSS to generate mean, median, mode, standard deviation and variance, which was presented using tables, frequencies and percentages.

Interview schedule for Teachers: Data from these interview schedules was analyzed by descriptive statistics and content analysis. This was by developing a thematic framework from the key issues, concepts and themes emanating from the transcripts and field notes. The information generated was then interpreted and explained.

CHAPTER FOUR

FINDINGS AND DISCUSSION

4.0 Introduction

This chapter presents the data that was found on influence of play method on academic performance in mathematics of preschool children in Chogoria Zone, Nithi County, Kenya.

4.1 Demographic information

4.1.1 Period worked at current school

The teachers were required by the study to indicate the number of years that they had been in their current school.

Table 4. 1: Working Period

	Performance in %	Frequency
Less than 2 years	1	25%
2-5 years	2	50%
More than 5 years	1	25%
Total	4	100

The findings shown in Table 4.1 indicated that majority of the teachers (50%) posited that

they had worked in their current school for 2 to 5 years while 25% had worked for either less than 2 years or for more than 5 years. This illustrates that majority of the pre-school teachers were highly experienced owing to their many years of experience while teaching.

4.2 Influence of types of play method on mathematics performance in preschool children in Chogoria zone

4.2.1 Types of play method used by pre-school teachers while teaching mathematics

The study sought to establish some of the play methods that the pre-school teachers engaged children mostly while teaching mathematics. The results are as shown in Table 4.2.

Table 4.2: Types of play method

	Performance in %	Frequency	Percent
Role Play	55	1	33.3
Games	80	3	100
Music/Songs	95	3	100
Pretend play	50	1	33.3

From Table 4.2 it was found that when music/songs were used while teaching mathematics the performance was very good as shown by 95%, followed by games at 80%. Role playing at 55% and pretend play at 50%. This depicts that majority of the preschool teachers use play method when teaching mathematics. It also illustrates that the most significant play

method in influencing mathematics performance was music/songs, games, role playing and pretend play respectively. This was in agreement with a research done by Neurological Research February 28 (1997) which found that children who received piano/keyboard training performed 34% higher on tests measuring spatial-temporal ability than the others. Role play contributed far much less towards performance as compared to other play methods as it is meant to develop the abilities of future performance. The findings are also in line with those of Blatner, (1995) which indicate that role playing is the best way to develop the skills of initiative, communication, problem-solving, self-awareness, and working cooperatively in teams, and these are above all certainly the learning of mere facts, many if not most of which will be obsolete or irrelevant in a few years will help these young people be prepared for dealing with the challenges of the Twenty-First Century.

The teachers further explained that among the play methods employed included games such as hide and seek skipping, clapping, jumping, and fishing games and songs. All these activities were carried out in and outside the classroom. The majority of preschool teachers interviewed confirmed that children enjoyed themselves in the games and were able to recall what they learnt and incorporated it more easily in their reading and writing of mathematics. Most of the preschool teachers were for the opinion, that play method should be integrated in the teaching of mathematics in preschools. This would assist children to retain the concepts learnt as the whole process was an enjoyable to them. The preschool teachers also pointed out that play method helped children to socialize and develop self confidence as well as expose their talents while relaxing their minds. The preschool teachers improvised playing devices/items like skipping ropes and balls when need arose.

4.2.2 Skills projection in the play method

The study also sought to establish the skill projection that the children were expected to learn through the games they engaged in and the findings are as shown in Table 4.3.

Table 4.3: Skill projection in the play method

	Frequency	Percentage
Counting	3	75
Counting and co-operation	1	25
Total	4	100

Table 4.3 shows that each of the play methods applied by the preschool teacher, had a skill projection, which the children were expected to learn. These included counting skills, cooperation skills, and precision skills etc. In most of the interviewed schools (75%), counting was the skill projected in most of the learning. A considerable percentage (25%) included both counting and cooperation as the skills learnt. This depicts that through the adoption of play methods by the teachers, the children developed important skills that would help them in their learning process.

4.3 Influence of attitudes of children towards play method on mathematics performance of preschool children in Chogoria zone

The study sought to establish the relationship between children attitude and their

performance in mathematics.

Table 4.4: Response of children on effect of attitude portrayed on performance

	Frequency	Percentage	performance
cooperative	80	70.1	95%
Non- cooperative	34	29.9	70
Total	114	100	

From Table 4.4, the study established that majority of the children (70.1%) had a cooperative attitude towards learning while 29.9% portrayed a non- cooperative attitude. The cooperative attitude of children contributed to 95% of good performance in mathematics. On the other hand, non-cooperative attitude contributed to a decline in performance in mathematics (70%). The findings are supported by Dossey, Mullis, Lindquist, and Chambers, (1998) who noted that there is a positive correlation between attitude and achievement in mathematics. In addition, Lawler (1981) posits that children who build such connections increase their self-confidence in mathematics and develop positive attitudes towards the subject. Increased self-confidence and positive attitudes encourage children to make further explorations and additional discoveries.

4.3.1 Level of children involvement in play method

The researcher further sought to find out the level of children involvement in play methods.

Table 4.5 indicates the findings.

Table 4.5: Level of children involvement in play methods

	Frequency	Percentage	performance
High	3	75	90%
Low	1	25	70%
Total	4	100	

Table 4.5 shows the findings on the involvement level of the children in relation to academic performance in mathematics. It was found that high involvement led to 90% performance while low involvement led to 70%. 100% of the respondents were for the opinions that play method should be integrated in the teaching of mathematics in the schooling of children. The findings depicts that high level of involvement of children in play methods adopted by the teachers enhances the development of their brain capacity to understand concepts taught in school and thus increase their academic performance.

4.4 Influence of time allocation to play method on mathematics performance of preschool children in Chogoria zone

4.4.1 Time allocated to play method

The researcher further sought to find out the association between time allocated to play and the performance in mathematics and the findings are as shown in table 4.6.

Table 4.6: Time allocated to play method

Time allocated	Time	Performance
Sufficient	20	100
Insufficient	10	70

Table 4.6 showed that when there was adequate time allocated to play method (20 minutes) the performance was very high at 100%. However, when inadequate time was allocated to a play method (10 minutes) the performance dropped significantly to 70%. This depicts that through allocation of adequate time, the performance of mathematics will be significantly improved. From experience, children require more time in any particular task as was evidenced by the findings. The findings are collaborated by those of Barr and Dreeben, (1983); Brophy, (1986) and Bodovski and Farkas, (2007) who said that time in instruction has been significantly linked to students' math achievement in elementary and secondary grades as well as among kindergartners. The findings imply that when inadequate time was allocated in the play method, the method was less effective. Thus, the amount of time that

was dedicated to the use of play method in teaching mathematics was significant in determining the rate of improvement in performance of mathematics.

4.5 Influence of learning environment to play method on mathematics performance of preschool children in Chogoria zone.

4.5.1 Learning Environment

The study also wanted to find out how the nature of learning environment affected the mathematics performance. The findings are as stipulated in table 4.7.

Table 4.7: Learning Environment

Nature of space	Performance (%)
safe	80
unsafe	65

From table 4.7 it is evident that where children were learning in a safe environment for play method the performance was 80%. However, where children were learning in unsafe condition, the performance declined to 65%. The findings are in line with the findings of Librera, Anderson, Atherly, Battista-Werner, and Benejan (2004) which found out that a preschool classroom environment must provide welcoming, safe, warm and stimulating areas to promote the development of the whole child, especially to strengthen, expands and deepen learning.

4.5.2 The performance test

The study also sought to establish the relationship between children's ability to count orally with and without play method and performance. The findings are as stipulated in table 4.8.

Table 4. 8: Performance Test on Ability to count orally with and without play method

Scores	Performance	
	Frequency	(%)
Performance with no play method	114	71
Performance with play method	114	82

Table 4.8 shows the results of a performance test that was carried out whereby each child was tested on the ability of counting orally without the use of any play method and compared with the ability of the same children counting orally by use of play methods. From the findings, it was discovered that the ability/ease was high (82%) when play method was involved than when it was not used (71.0 %) as shown on Table 4.8. This depicts that incorporating play method in the learning process enhances the children's mastery of concepts and skills being taught as it makes learning process more interesting and increases the reasoning abilities for the children. The findings are collaborated by Elkind, (2007) who attested that play provides benefits for cognitive, social, emotional, physical, and moral development for children from all socio-economic, cultural, and linguistic backgrounds.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents summary, conclusions, recommendations and suggestions for further research.

5.2 Summary

This study used quasi-experimental research design which has a characteristic of experimental research design except that the research participants were not assigned their groups randomly. The purpose of the study was to investigate on the influence of play method on academic performance in mathematics of preschool children in Chogoria zone, Nithi County, Kenya. In this study the target population was 20 public and 9 private preschools in Chogoria zone. The study also included 820 preschool children in public and 311 in private preschools and 29 public plus 17 preschool teachers in Chogoria zone.

The study sought to examine the influence of types of play method on mathematics performance in preschool children in Chogoria zone; to establish the influence of attitudes of children towards play method on mathematics performance of preschool children in Chogoria zone; to examine the influence of time allocation to play method on mathematics performance of preschool children in Chogoria zone; and to establish the influence of learning environment to play method on mathematics performance of preschool children in Chogoria zone.

Data was analyzed using descriptive statistical analysis. This was after the researcher coding the data. The coded data was then entered into Statistical Package for Social Sciences (SPSS) software. From SPSS, frequencies and percentages were calculated and result were then presented in form of tables and percentages.

The study established that majority of the preschool teachers use play method when teaching mathematics which included music/songs, games, role playing and pretend play respectively. It also illustrates that the most significant play method in influencing mathematics performance was music/songs, games, role playing and pretend play respectively. This was in agreement with a research done by Neurological Research February 28 (1997) which found that children who received piano/keyboard training performed 34% higher on tests measuring spatial-temporal ability than the others. Role play contributed far much less towards performance as compared to other play methods as it is meant to develop the abilities of future performance. The findings are also in line with those of Blatner, (1995) which indicate that role playing is the best way to develop the skills of initiative, communication, problem-solving, self-awareness, and working cooperatively in teams, and these are above all certainly the learning of mere facts, many if not most of which will be obsolete or irrelevant in a few years will help these young people be prepared for dealing with the challenges of the Twenty-First Century.

The play methods employed included games such as hide and seek skipping, clapping, jumping, and fishing games and songs. All these activities were carried out in and outside the classroom. The majority of preschool teachers interviewed confirmed that children

enjoyed themselves in the games and were able to recall what they learnt and incorporated it more easily in their reading and writing of mathematics. Most of the preschool teachers were for the opinion, that play method should be integrated in the teaching of mathematics in preschools. This would assist children to retain the concepts learnt as the whole process was an enjoyable to them. The preschool teachers also pointed out that play method helped children to socialize and develop self-confidence as well as expose their talents while relaxing their minds. The preschool teachers improvised playing devices/items like skipping ropes and balls when need arose.

The study established that for each of the play methods applied by the preschool teacher, there was a skill projection which the children were expected to learn. The skill projection included counting skills, cooperation skills, and precision skills etc. Counting was the skill projected in most of the learning. Thus, through the adoption of play methods by the teachers, the children developed important skills that would help them in their learning process.

The study also established that the majority of the children had a positive attitude towards learning. The positive attitude of children contributed to good performance in mathematics. On the other hand, negative attitude contributed to a decline in performance in mathematics. The findings are supported by Dossey, Mullis, Lindquist, and Chambers, (1998) who noted that there is a positive correlation between attitude and achievement in mathematics. In addition, Lawler (1981) posits that children who build such connections increase their self-confidence in mathematics and develop positive attitudes towards the subject. Increased

self-confidence and positive attitudes encourage children to make further explorations and additional discoveries.

The researcher also established that high involvement led to high performance in mathematics. The majority of the teachers were for the opinions that play method should be integrated in the teaching of mathematics in the schooling of children. The findings illustrates that high level of involvement of children in play methods adopted by the teachers enhances the development of their brain capacity to understand concepts taught in school and thus increase their academic performance.

The researcher also established that there was adequate time allocated to play method the performance was very high. This depicts that through allocation of adequate time, the performance of mathematics would be significantly improved. The findings are collaborated by those of Barr and Dreeben, (1983); Brophy, (1986) and Bodovski and Farkas, (2007) who said that time in instruction has been significantly linked to students' math achievement in elementary and secondary grades as well as among kindergartners.

The study also established that where children were given enough space for play method the performance in mathematics was high. The findings are in line with the findings of Librera, Anderson, Atherly, Battista- Werner, and Benejan (2004) which found out that a preschool classroom environment must provide welcoming, safe, warm and stimulating areas to promote the development of the whole child, especially to strengthen, expands and deepen learning.

The study also established that, the ability/ease to perform well in mathematics was high when play method was involved than when it was not used. This depicts that incorporating play method in the learning process enhances the children's mastery of concepts and skills being taught as it makes learning process more interesting and increases the reasoning abilities for the children. The findings are collaborated by Elkind. (2007) who attested that play provides benefits for cognitive, social, emotional, physical, and moral development for children from all socio-economic, cultural, and linguistic backgrounds.

5.2 Conclusions

The study concluded that the preschool teachers utilized play method when teaching mathematics to a great extent. The play methods were perceived by the preschool teachers to make learning interesting and enhanced the rate of understanding of different concepts that they taught the children. In addition, the play methods helped in developing the abilities of children's future performance. Thus, the adoption of play method was a key strategy used in teaching mathematics to enhance performance in pre-schools. Therefore, it can be concluded that when teachers used music to teach maths, performance was found to be higher than any other type of play method. This could be because music is repetitive hence; children were able to recall the concepts better. Music is also exciting, enriches the mind and gives children self-confidence.

The study concluded that play methods utilized in pre-schools included games such as hide and seek, skipping, clapping, jumping, and fishing games and songs. All these activities were carried out in and outside the classroom. Through the play methods, children enjoyed

learning and their brain capacity was developed to the extent that they could recall what they learnt and incorporated it more easily in their reading and writing of mathematics. This depicts that play method should be integrated in mathematics syllabus in preschools. This would assist children to retain the concepts learnt easily. The preschool teachers also pointed out that play method helped children to socialize and develop self-confidence as well as expose their talents while relaxing their minds. The preschool teachers improvised playing devices/items as skipping ropes and balls when need arose. The study also concluded that when the teachers used play method in teaching of maths, the performance was slightly lower. This could have been because games require some rules that are flexible and should be done in a cooperative and competitive atmosphere.

The researcher also concluded that high involvement of children in play method led to high performance in mathematics. Thus, the play method being instrumental in making learning in mathematics should be made an integral part of teaching of mathematics. The researcher also concluded that the allocation of adequate resources like time in the implementation of play method would make play method effective in the teaching of mathematics.

The performance was low where children were involved in role-play and pretend play. This could have been due to the reasons that children had to learn rules of interaction and some of them were shy and lacked confidence. They also needed to improvise character and be creative. Another problem was that not all children were involved. However, role play and pretend play assist in enhancement of imagination especially where assumes a role of another. Children also become creative.

Overall, the study concluded that the attitudinal domain is very important in the development of a child and should not be taken for granted by preschool teacher when teaching. Another implication is that through play method preschoolers develop social domain as they interact in playing.

5.3 Recommendations

From the study, it was established when use of play method especially music/ songs in teaching mathematics was used, performance was good. The study recommends that the Ministry of Education make music mandatory as a subject in preschools in Kenya. The Ministry should also ensure incorporation of affective and social aspects in the curriculum.

The study recommends that the government should come up policies that guide the recruitment of pre-school teachers to ensure that only qualified pre-school teachers are employed. This is with a view to ensure that the quality of pre-school teaching is mainstreamed and that it is offered by qualified trainers.

As the conductivity and adequacy of the play environment influenced the success rate in using play method, the study also recommends that the school management should create adequate learning environment for the children, which should be made conducive environment for learning.

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.

5.4 Suggestion for further studies

Since this study explored the influence of play method on academic performance in mathematics of preschool children in Chogoria Zone, Nithi County, Kenya, the study recommends that;

Similar study should be done in other zones in Nithi County for comparison purposes and to allow for generalization of findings on the influence of play method on academic performance in mathematics of preschool children.

Further studies should be done on the challenges facing the use of play method in teaching mathematics of preschool children.

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APPENDICES

Appendix I: Performance Test for Pre-school children

Instructions to the preschool teacher:

The performance test contains two tests. Test 1 and Test 2. The tests should be administered at an interval of one week as follows.

Counting numbers 1 to 10

Test 1: Counting orally without any play method

Test 2: Counting orally using play method.

Appendix ii : Observation checklist for children

The purpose of this Observation checklist for children is to solicit information concerning type of play methods used in preschools in Chogoria zone. The preschool identity will be treated with strict confidentiality and information obtained will be used for academic purpose only

Type of Play..... Name of preschool.....

1. Frequency of participation

High

Medium

Low

2. Level of understanding of rules

High

Medium

Low

3. Skill projected in the game

Counting

Co-operation

Precision

Other Specify.....

4. Those mostly engaged in the game

Girls

Boys

5. The attitude portrayed

Positive

Negative

6. The time allocated to play.

Adequate

In adequate

7. The resource being utilized

Adequate

In adequate

8) Learning environment

Is it spacious?

Is it safe?

Appendix III: Questionnaire: Teachers.

The purpose of this questionnaire is to solicit information concerning the mathematics performance in preschools. Kindly respond to all the items in all the sections: your identity will be treated with strict confidentiality and the information gathered will not be used for any other purpose than academic purpose

Name of preschool:

1. How long have you been a teacher in this preschool?

(Tick where appropriate)

Less than 2 years 2- 5 years More than 5 years

2. How would you describe the level of involvement of the children in games? (Tick where appropriate)

a. High

b. Medium

c. Low

3. a) What are some of the play methods that you engage children mostly while teaching mathematics?

4.

5. b) Which are the most common?

6. (i) How do you view the engagement of the children in play in relation to their mathematics performance?

7.

Give reasons

8. Do you think integration of play in the teaching of mathematics is important in the schooling of children?

Yes/No

Give reasons

9. As a teacher, what do you do when you find that a certain play item is missing for your learners?

10. What do you think the preschool stakeholders should do to promote play in the preschool?

.....

11. Is the time allocated for a lesson enough to deliver a certain theme?

.....

10 a) Is there sufficient space to carryout play activities when teaching mathematics?

.....

b) If not? What improvisation do you make?

Appendix: IV Interview schedule for Teachers

The purpose of this interview schedule is to solicit information concerning influence of play method on academic performance in Mathematics in Chogoria zone preschools. Kindly respond to all the items in the questions: Your identity will be treated with strict confidentiality and information obtained will be used for academic purpose only.

- 1) How long have you been working as a teacher in this preschool?

- 2) How often do you use play methods when teaching mathematics?
 - a) And if any which methods do you use?

- 3) Do you usually have enough time for the methods mentioned above as you deliver the content?

- 4) Where do you carry out these activities?

- 5)Do you have enough material? If not? How do you improvise?

- 7)How do children behave when undertaking these activities?