

**EFFECT OF OUTDOOR ACTIVITIES ON ACQUISITION OF COUNTING
SKILLS AMONG EARLY CHILDHOOD EDUCATION LEARNERS IN
NYANDO SUB-COUNTY KISUMU COUNTY**

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DECLARATION

This project is my original work and has not been presented to any other academic award or any other university for approval.

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DEDICATION

This piece of work is dedicated to my beloved husband Benard Otieno, my sons Bramwel Ochieng', Eddy Onunga, Shivartry Otombo and daughter Keryn Agallo.

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LIST OF ABBREVIATIONS

ANOVA	-	Analysis of Variance
ECE	-	Early Childhood Education
ECDE	-	Early Childhood Development Education
EFA	-	Education for All
KICD	-	Kenya Institute of Curriculum Development
KIE	-	Kenya Institute of Education
KEPSHA	-	Kenya Primary Schools Headteachers Association
MKO	-	More Knowledgeable Other
MOEST	-	Ministry Of Education Science and Technology
MDGS	-	Millennium Development Goals
NACECE	-	National Centre for Early Childhood Education
PRIMR		Primary Maths and Reading Initiative
RCERP	-	Renee Centre for Education Research and Policy
RTI	-	Research Trial Institute
SPSS	-	Statistical Package for Social Sciences
UNESCO	-	United Nations Educational, Scientific and Cultural Organization
UNEP	-	United Nations Environmental Program
UNHCR	-	United Nations High Commission for Human Rights

ABSTRACT

Outdoor activities influence acquisition of counting skills by learners. Effective adoption of outdoor activities in ECE has a positive effect on learner acquisition of skills whereas ineffective use of such activities tend to dwindle the learner's efforts to acquire counting skills. Despite the existence of KICD policy on ECE learners' activities implementation focusing attention on outdoor learning, a great percentage of ECE learners lack the basic counting skills. The purpose of this study was to investigate the effect of outdoor activities on number counting by learners in Nyando Sub County. The study sought to determine the effect of rope skipping on number counting among ECE learners in Nyando Sub County, determine the effect of ball bouncing among learners, and determine the effect of tyre activities among learners and to determine the effect of seesaw swinging on number counting among ECE learners in Nyando Sub County. The limitations of the study were lack of adequate finances and questions which were not properly framed. The population included 38 headteachers, 85 pre school teachers and 1000 pre school learners which is a total of 1123 respondents. The study used questionnaires which were administered on headteachers and teachers. The observation checklists were used to collect data on observations to indicate the existence or non existence of outdoor materials. Face validity of instruments was ensured where evidence of validity was used to validate the developed instruments by preparing the instrument and presented to the supervisor who made corrections and took care of omissions. A pilot study was conducted to find out whether the instrument had ambiguous? and if they were accurate and consistent. A 10% sample out of the total population took part in the pilot study. The piloted respondents did not participate in the main study. The researcher administered the questionnaire and the respondents returned. However, a few requested for time to answer the questionnaire which was granted. Primary data was checked for completeness, consistency, accuracy coded and then fed into a computer using (SPSS) program for analysis and interpretation of results. There was a positive correlation between skipping rope, ball bouncing, bicycles tyres activities racing activities and sea saw swinging. This indicates that the independent variable and dependent variable move in the same direction. The study concluded that there is a significant effect of outdoor activities on learners' ability to acquire counting skills as rope skipping was found to influence acquisition of numbers values, fluency and positioning, ball bouncing influence acquisition of number positioning ,progressive counting and fluency, racing activities influence acquisition of number values ,number identification and number positioning. Sea saw swinging influence number values and number approximation. The study recommended that the county government should encourage teachers to participate in outdoor activities by supply of outdoor play materials as the activities enhanced learners acquisition of progressive counting, number – values number approximation, number positioning, number sequencing and fluency in counting.

CHAPTER ONE

INTRODUCTION

1.0. Background to the Study

Outdoor activities influence acquisition of counting skills which determine the ability of learners to count numbers, Njoki (2007) posits that affective adoption of outdoor activities in Early Childhood Education (ECE) Centres tend to facilitate counting by learners. KENPRO (2014) holds that in ECE centres where outdoor activities are integrated in counting lessons, learners are seen to count and the counting content sinks in deeply. However, in instances where outdoor activities are not employed and counting lesson are merely undertaken indoors, there is inability of learners to count, Lindy, (2012). Bouncing balls in a counting lesson for example tends to hasten the mastery of fluency and sequencing of numbers Montessori, (1952), Rousseau (1778). Maya, (2013), stresses on the importance of outdoor activities in enhancing a child's learning abilities.

Simultaneously, skipping rope influences ability of learners to count numbers as it enables learners to acquire rote counting skills resulting in progressive counting, Mahindu, 2011). Effective adoption of outdoor activities like jumping rope and counting number or speed counting and jumping also tend to influence acquisition of counting skills like sequencing and number values, (Montessori, 1952, Lindy, 2012). In his study Ellis (2000) contends that for counting to be real, instructors in ECE centres should let learners skip rope during counting lessons as this will trigger more counting sessions by learners. On the contrary, ineffective use of the rope will slug acquisition of counting skills. Froebel (1852) strongly admits that children will learn in a prepared environment like a playground where they can skip rope or bounce balls. The opposite occasionally happens where counting lessons are conducted indoors thereby undermining the very

nature of such instructions in ECE (Moureen, 1999). This view is supported by Langford (2010) who coins that children play for the purposes of practicing a skill. As they play, they bring their own interpretations and understandings and so coin meanings.

Outdoor activities and number counting are an integral part of a child's life as contended by Tassoni (2000). All human activities revolve around numbers Njoki, (2007). Children will realize that they have to count books, pens, shoes, sweets, only to mention a few. It will of course be fun as they realize the importance of knowing number values for themselves. According to Frankel(1999) children unfold their uniqueness in play. On the other hand Maya, (2013) asserts that children will learn counting of numbers best in a prepared environment like a playground where they can skip rope, bounce balls or swing tubes around their waists. The sentiments are likewise echoed by Amanda (2012) who stresses that number counting is one of the topics requiring outdoor learning. In support of this isLangford (2012) reporting that child play and learning are inseparable. Therefore, in this study for learner to acquire counting skills, outdoor activities are necessary.

Moureen (1999), contends that whenever human life is found, there has to be play in some form. The Kenya Institute of Curriculum Development (KICD, 2006) describes the young child as curious, active and ready to learn by doing various activities they are exposed to. When children engage in outdoor activities and make believe situations, they seem to invent conflicts that need solving Elkonin (1969). The same sentiments are shared by Mahindu (2011) positing that in number counting, a child may be playing alone using toy, cars to race around and still give position according to how the cars arrived. In Finland outdoor activities developed by Friedrich Froebel formed the background for the

emergence of outdoor activities. Uno Cygnaeus was assigned the task of planning public folk education where he incorporated influences into the pedagogical method where physical education and drawing were integrated. Hanna Rothman set up a folk kindergarten in 1888 and supplemented the education by outdoor activities with the aim of keeping children occupied while their mothers went to work. Delivering a report on how pre-schools should operate Lindy (2012) stresses on the need to give children valuable commitments during their free time. This was to spread in cities and industrial towns. Frankel (1999) outlines the importance of integrating outdoor activities in classroom learning contending that the activities speed up the acquisition of learning skills.

In UK there are policies that point to the need for an outdoor learning strategy which include the Early Years Framework Hurwit, (2000). The report identifies ways to give all children the best start in life. This is supported by the Children's Charter (2003), which involves support agencies putting the child at the centre of all educational developments. The UK government has introduced a National Performance Framework Supported by launch of local community places for 2012 – 2017. Pallegriani and Smith, (1998) contend that the UK governments perceive that when outdoor activities are enhanced, learners tend to unveil their potential so outdoor activities and counting of numbers will enable learners to acquire counting skills fast, Erickson (1985), In U.S.A. many settings provide a range of opportunities for physical activity outdoors and children are keen on the activities Arnold, (2006). The children mostly enjoy child initiated number activities outdoors for competing and recording the best performers. The learners use Swings, climbing frames or riding bicycles. They also perform other activities like hoping, jumping, balancing and kicking footballs and counting numbers as they perform. On this

note Zins, (2004) posits that in child-minded settings adults become play partners or supporters and thereby boost morale of children in play. In Scotland, outdoor activities were found to sustain the developmental process of children. According to HelanBergstan, in Chalmers, Annual Report, (2006) sustainable learning is a vision which should be pursued. Maya (2013) explains that ECE learners should be led to learn through play. In Kenya, families and communities are more concerned with child survival rather than offering meaningful education.

Traditional cultures are attentive to the environment rather than children's education. To this end very little basic counting is learnt by the ECE learners (UNHCR, 2006), Tzuo (2007) and Kiruki (2011). Improvisation is an important element in ECE learning. Whereas the developed nations may use sophisticated ropes for skipping a local school in Kenya could just use sisal woven ropes. Adaptation to the environment can help learners to get the necessary experiences, Gichuba (2009). An analysis by Rennie Centre for Education Research and Policy (RCERP) (2012) indicates the need for teachers to focus on induced learning. ECE teachers should involve learners in outdoor activities like bouncing balls and counting to impact positively on skill acquisition.

The general objectives of pre-school education in Kenya are prescribed in the Early Childhood Guideline (2006) that outlines eleven objectives. Among them, the third objective states that a child should enjoy living and learning through play. Hobard (1999), Kiruki, (2011) strengthened use of outdoor activities in counting numbers to enhance acquisition of counting skills like fluency and sequencing. Thus, pre schools are supposed to cater for the pre school children physically, mentally, emotionally and orally to get ready for formal school education. This may only be possible through provision of

numerous informal outdoor activities that involve play (Lindy, 2012). Children have an innate need to relate with others Wartella *et al.* (2012). In a learning environment, they copy from teachers and play mates the appropriate actions and phrases, KICD (2008). Mohammad (2013) stresses that in number counting for instance the learners will copy the sequence of counting numbers orally and thereby master the number counting in a sequential manner.

Education for All UNESCO (1990) posited that learners' values and ideas must first be taken into account and teachers must not impose their values. Play should be child driven and not teacher imposed (RCERP, 2012). ECE as the first formal agent of socialization in a child's life calls for attention inadequate time for outdoor activities (Kibera and Kimokoti 2007). To this end Coalahan (2000), children who frequent outdoor play tend to count numbers fast and well as opposed to learners who do counting only in indoor activities. The children's Act 2001 reaffirms that it is the responsibility of parents and educators to create room for play at home and school respectively. UNHCR (2006), policy on the rights of a child likewise supports integration of outdoor activities in a child's learning process. However, studies conducted in this field fail to give reliable solutions to the problem. In his report on child play Mohammad (2012), says that children should relate with the environment through play in order to achieve meaningful learning.

A study conducted by Mahindu (2011) on influence of play on the development of pre school learners social skills found that ECE centres lack adequate play fields, lack enough play materials and fail to allocate time for play as it is in the Kenya Institute of Curriculum Development (KICD, 2006), guideline for ECE centres. The

recommendations of this finding fail to provide long and lasting solutions to this problem. Another study conducted by Waithera. (2006) fail to give the effects of poor teacher training of learners' ability to acquire counting skills. KICD guideline for ECE centres (1984) acknowledges that the playful nature of the child makes play the only most natural developing technique which would ensure fewer crises during the transition from the home environment to a formal school. Kiruki (2011) advises that play teaching and number counting will promote positive attitude to the studying of mathematics at later stages as it will strengthen learner desire to interact with others through play. As they interact, children develop fluency to count numbers, number sequencing and number writing. This study will seek to find solutions to inadequate teacher training and effect of outdoor activities on number counting among ECE learners. Writing a report on concepts of play, Fler (2010) enunciates common play activities in math lesson; ball bouncing, racing, swinging and rope jumping.

Nyando Sub County is fast becoming a cosmopolitan Zone. Many buildings are mushrooming, there is high rate of population growth due to the fact that Ahero is now an urban centre. According to Nyando Sub County Administration Report (2014). This may interfere with provision of adequate playgrounds which may lead to indoor activities. Ellis (2000) explains that children use the playground as a learning environment with corresponding behavioural consequences that enable them to learn For example when they skip rope and count, children learn basic counting skills. Sharidan, (2001), andWolfgan(2004) contended that children all over the world have the desire to explain limits and venture into new experiences that will enable them to practice what was learnt in indoor lessons. School playgrounds need to have designated outdoor areas located in the school where children play or participate in play with or without stationary

and manipulative equipment, for example, a pre-school child can sing one, two three, four five upto twenty even without manipulating a tool. In Nyando Sub County teachers tend to confine ECE learners to indoor lessons during counting lessons thus resulting in slow acquisition of counting skills.

1.2. Statement of the Problem

The research problem addressed in this study was that according to KEPSHA annual report of 2014 there had been public complaints about poor performance in mathematics nationally. Although education studies on the methods of teaching mathematics at all levels of education in Kenya had been acknowledged and results of the findings approved and followed, this had not promoted results as concerns achievement. This made the study to advocate for studies at ECE level and more so on the teaching methods. As demanded by the children's Charter of UK (2008), there was need for quality and accessible mathematics education for 3 – 8 years olds as it is a foundation for future mathematics skills at higher levels of learning.

Early Childhood Education was part of the basic education undertaken by the Kenyan government aimed at laying a good foundation not only for the children at the level but for the entire education system. Research in early childhood development had verified that experiences gained in early childhood influence cognitive and social skills at higher levels of education. This then meant that improving mathematics achievement at the E.C.E. level should improve mathematics skills at higher levels. Some of the habits of improving this foundation level were through use of interactive teaching methods (outdoor play) in place of non – interactive teaching methods (rote counting). The use of

non interactive methods like lecture method, drill and practice had failed to effectively communicate the mathematical concepts to learners.

The methods were one of the contributing factors for the poor achievement. Those who used these methods had their classes obtaining below average mean score. The study noted that the use of outdoor activities such as racing and skipping had their classes score above average. This is a fact attributed to the ability of the methods to create interest as learners learn by getting involved. The study tried to resolve the issue by trying to find out how the pre school teachers were using these methods during their teaching /learning sessions of number counting. The study was conducted in Nyando Sub County, Ahero Zone.

Despite the existence of KICD policy on ECE learners activities implementation focusing attention on outdoor activities to strengthen the acquisition of counting skills, 40% of ECE learners in Ahero Zone do not have the ability to count numbers (KEPSHA Nyando Report 2013). This therefore poses a challenge to class one teachers in handling learners in their first term of primary education. This implies that the learners lack basic counting skills like, sequencing, positioning or valuing. It is apparent that the instructions employed by teachers may not offer best opportunities for learners to conceptualize counting of numbers. This study was carried out so as to encourage and motivate pre-school teachers to appreciate interactive learning with the aim of making learners acquire counting skills faster.

1.3. Purpose of the Study

The purpose of the study was to investigate the effect of outdoor activities on number counting by learners in Nyando Sub County.

1.4. Research Objectives

The objectives of the study were to:

- i. Assess the effect of rope skipping on counting skills among ECE learners in Nyando Sub County.
- ii. Assess the effect of tube tyres activities on counting skills among ECDE learners in Nyando Sub County.
- iii. Assess the effect of ball bouncing on counting skills among ECE learners in Nyando Sub County.
- iv. Assess the effect of recording positions in racing activity on counting skills among learners in Nyando Sub County.
- v. Assess the effect of sea saw swinging on counting skills among ECE learners in Nyando Sub County.

1.5. Research Questions

The research questions of the study were;-

- i) What effect does rope skipping have on counting skills among ECE learners in Nyando Sub County?
- ii) What effect does ball bouncing have on counting skills among ECE learners in Nyando Sub County?
- iii) What effect do tube tyre activities have on counting skills among ECE learners in Nyando Sub County?
- iv) What effect does recording positions in racing activities have on counting skills among learners in Nyando Sub County?
- v) What effect does sea saw swinging have on counting skills among ECE learners in Nyando Sub County?

1.6. Research Hypothesis

The study was guided by the following null and alternative hypotheses.

H₀; There is no significant effect of outdoor activities on number counting among ECE learners in Nyando sub- county

H_a; There is significant effect of outdoor activities on number counting among ECE learners in Nyando sub- county

1.7. Significance of the Study

The findings of this study are important in several ways .First the findings will be important to the teachers at Early Childhood Education in realizing how outdoor activities affect the ability of learners to count numbers.

The findings are also important to the school administration in identifying the importance of outdoor activities and hence provide adequate facilities for play. The findings may also be important to the ECE teacher training institutions in training and stressing on the importance of child play. Teachers may also benefit from this study as the findings may require in-service courses to sensitize teachers on the importance of outdoor activities on counting.

1.8. Assumptions of the Study

The researcher had several assumptions about the study. First the researcher assumed that ECE learners skip rope during counting lessons in Nyando Sub County. Secondly, researcher assumed that there were adequate balls that learners could use to perform different activities when performing different activities. Thirdly the research assumed that ECE centres had adequate bicycle tyres used to perform different tyre activities during counting lessons. Fourthly, the researcher assumed that teachers allowed learners to participate in racing activities during counting lessons and thus record positions. Fifth, the researcher assumed that the ECE centres had swings where learners would swing and

count the number of successful times thus acquiring approximation skills. lastly, the study assumed that ECE services are equally available in all centres in Nyando Sub County.

1.9. Limitations of the Study

Limitations are defined by Mugenda and Mugenda (1999) as factors of the study that the researcher is aware may negatively affect the generalizations of results but which he/she has no control. The design used was teaching experiment which had an inherent limitation as the term 'control' groups lacked generality and may not give correct data about the ECE learners. The study was conducted in public pre-schools and the findings may not reflect the situation in private schools. This was because the private pre schools are mainly financial institutions and often are of different management and organization.

The researcher used questionnaire as one of the research instruments. In measuring the reliability of the questionnaires, there were printing errors which made the discovery a difficult exercise. For instance open ended questions had some disadvantages where questionnaires were not properly written and used. The other limitation was that the observation method was not reliable as the ECE teachers may have borrowed the play materials for the sake of the interview since the researcher had to book appointments beforehand. There was lack of adequate finances to exhaustively choose a larger population target.

1.10 Delimitations of the Study

The study was undertaken in ECE public centres in Nyando Sub-county. The respondents were Headteachers, ECE learners and two education officers in Nyando sub county. Observation was done in ECE centres about materials and learners. The content of the study was basically outdoor activities and how they affect the ability of learners to count numbers. ECE learners were observed performing outdoor activities and whether they had adequate space for performing the said outdoor activities and whether they had the necessary playing materials.

Although the study was set to investigate the Effect of Outdoor Activities on Acquisition of Counting Skills among Early Childhood Education Learners it did not look at other aspects as learners' level of motivation, observations, nutritional level among others. The study mainly used questionnaires, observation as its main methods of collecting information; it also used an open forum to allow subjects choice to ask probing questions. The research was conducted in Ahero Zone, Nyando Sub County though the factors the study sought to investigate were nationwide. Although the study was to be conducted in all public schools in Ahero Zone, only selected learners in each school were to be considered.

1.11. Definition of Terms

- Ball bouncing activities** ability to bounce ball successfully and there by being able to count fluently
- Number counting-** this refers to counting numbers after every successful step of an activity and being able to sequence the number in order of appearance
- Outdoor activities-** These are learners' activities, action mostly in form of play that occur outside formal classroom settings. The activities are mainly rope skipping, ball bouncing, swinging tube

- tyres, racing round the field and sea saw swinging.
- Childrens`play** an activity that refreshes, is freely chosen, self motivated and performed by ECE learners.
- Racing activities** running in the field and striving to get the best position by running fastest bearing in mind number values.
- Rope skipping activities** ability to skip rope successfully and counting numbers sequentially so as to acquire fluency in counting.
- Sea saw swinging activities**balancing and swinging on the sea saw in turns and making sure to approximate so as not to lose the game and thereby acquire number sequencing and number valuing
- Tube tyre activity-** swinging tubeless tyres on the waist.
- Zone of Proximal Development** - the difference between what a learner can achieve when aided and what he\she can achieve unaided. Learners can bounce balls count from 1-5 needed assistance from a make knowledge other to count from 6-10. They could learners could skip rope successfully and count from 1-10 but needed intervention of their peers to transcend from 16-20.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This section focuses on the literature review. It deals with characteristic of outdoor activities, type of outdoor activities which involve number counting important theoretical and conceptual framework of the study.

2.2 Outdoor Activities

Outdoor learning greatly promotes counting skills in learners. As contended by Otunga *et al.* (2011), the activities range from children's self initiated games involving one or more members to teacher designed games with the aim of meeting specially planned objectives. Lindy (2012) observe that the activities involve manipulation of materials, counting numbers backwards, counting numbers backwards, counting numbers forwards. The same belief is held by Amanda, 2012, that outdoor activities involving number counting can be performed by ECE learners whole class or in groups. In this study racing activities were performed in groups involving the whole class, the swinging activities were also performed by learners grouping themselves into pairs. Equally skipping rope also involved grouping. On the other hand, tyre activities and ball bouncing were either performed singly or in pairs. During the performance of the activities the learners counted 1 – 10 after every successful step of an activity. Outdoor activities are seen to have an impact on development and acquisition of number counting skills. According to Agango (2014), ECE learners in Nyangoma Zone got inspiration and repeatedly performed the mathematical games and developed the skills of mental

arithmetic which drove them to perform the whole activities again so as to do better for the second time.

In this study, children are not allowed enough outdoor experience and this is seen to hinder development of relevant skills in learners. Equally, teachers do not allow enough time in school for outdoor based learning. These views were echoed by Fler M. (2010) and also Maya P. (2013). A study by UNESCO (2014) on EFA global Monitoring Report stressed on the need for teachers to lay emphasis on child based learning for development of relevant skills in learners. The report emphasized that teachers do not seem to recognize the relevance of play in number counting thus resulting in inability of learners to count numbers. Same sentiments have been shared by Okune *et al.* (2016) while writing on implications of instructional materials on oral skills among ECE learners in Kisumu County.

In his report on identification of learning disabilities among standard 3 pupils, of Public Primary Schools in Butere District, Wafula *et al.* points out that outdoor activities in a counting lesson positively impacts on acquisition of counting skills. An analysis by Rennie Centre for Education Research and Policy (2012) encourages teachers to provide varied resources that can induce learning. In this study teachers in support of this view is Wartella *et al.* (2010) who opined that teachers creativity and improvisational will go along way in ensuring learners acquire the necessary counting skills. With this view in mind, Mohammad and Mohammad (2012) explains that ECE curriculum should directly relate to child development and learning enshrined in children's needs and interests. Early childhood Education is the seedbed and foundation upon which children learn. This ins according to the revised ECDE framework of 2008 – which stressed that the

government is committed to ensuring there are quality services of ECE learning countrywide. The teachers therefore should adopt strategies like outdoor learning to strengthen indoor learning. Number counting from 1 to 10 will be learnt in classrooms and later number counting should be learnt outdoors through activities like ball bouncing, jumping, racing, tyre activities and swinging with teachers' guidance. Outdoor learning with teacher's guidance helps learners acquire learning skills without constraints. In this study skipping rope, ball bouncing, tyre activities and swinging will enhance acquisition of learning skills like fluency, number values, number positioning or approximation. Conclusively, outdoor activities are the nourishments given to learning concepts that rocket high achievements.

Outdoor learning fulfils vision for childhood. The activities are supposed to be self driven and do not require rewards or extrinsic motivation. Piaget (1962), Maya (2013), posits that play is assimilation or the children effort to make environmental stimuli to match his or her own concept. Children will engage in skipping rope and counting, passing through car tyres and counting number of times, bouncing balls and counting, racing and counting or swinging in sea saws and counting Montessori (1952) asserted that children learn best in prepared environment like play ground where opportunity for play is provided and materials like skipping ropes, tyres, field, balls and seesaw are available. A study conducted by Mahindu (2011) on concepts of play revealed that ball bouncing, rope skipping, racing and swinging help to enhance math concept learning. In support, is Lindy (2012), conducting a study on how pre schools should operate coining that outdoor learning is a motivator to learning.

2.2.1 Skipping Rope and Number Counting

Skipping rope is a very impotent tool used by instructors in number counting. One or more participants may jump over a rope swung so that it passes under their feet and over their heads the learner may count simultaneously as he or she jumps. Kiruki (2011) suggests adoption of a child based outdoor learning to strengthen acquisition of learning skills. In this study, constant ball bouncing and counting, rope skipping or racing will rocket the acquisition of counting numbers, USAID (2013). The jumper uses alternate feet to jump off the ground as she counts numbers. Edward Jackoski says that side swing is a basic technique where the rope passes the side of the skipper's body without jumping it and counting the number of successful jumps studies by Otunga *et al.* (2011) and Githinji *et al.* (2011) confirms this.

In double under the participant jumps higher than usual while swinging the rope twice under his feet, thrice under the feet or triple under the feet Peter Skolnik (1975) While performing double Dutch, skipping two long jump rope turning in opposite directions are jumped by one or more players as counting of numbers goes on Vase Lack (2015). In Basic jump the jumper keeps jump feet slightly apart and jumps at the same time over the rope. This technique is mastered more easily by learners thus the one "easy jump"

Other skipping games may take chant rhymes while skipping. The skipper counts the number of jumps without stumbling for example,

"Big Ben strikes one,

"Big Ben strikes two,

"Big Ben strikes three,

"Big Ben strikes four,

And so on and so on

Speed rhymes can also be used to count numbers and test the agility of the jumper by turning the rope more rapidly. The key word to start turning fast is often pepper to indicate speed such as;

Mable, Mable,

Set the table,

Don't forget the salt,

Vinegar,

Mustard,

Peper! (Rapid turning follows)

While writing a report on Concepts in play in Early Childhood, Flear (2010), explains that young children adopt counting skills like fluency, progressive counting and number values if they are able to have frequent successful jumping games in Support of these sentiments, is Ord and Leather while writing a report on constructivism (2011), explains that outdoor learning such as jumping and chanting rhymes allows room for acquisition of counting skills like progressive counting, number values and fluency due to repetition of the activities. Outdoor learning hastens the ability of learners to acquire skills fast, as is believed by Lindy (2012), in this study jumping while chanting rhymes in counting hastened the acquisition progressive counting number values, fluency, number identification, positioning and sequencing. Writing a report on types of play, Amanda (2012) explains that number counting is one of the areas requiring outdoor learning. The idea is that outdoor learning is a freely chosen activity that is engineered by learners. If learners jump, skip rope while counting numbers there will be a natural unfolding of the

skills of acquisition of number values, number positioning, fluency in counting numbers and also number sequencing.

Writing about challenges facing ECD in Kenya KENPRO (2014) points out that varied opportunities offered to learners tend to rocket the acquisition of learning skills. In this study skipping rope while chanting counting songs will help learners acquire fluency in counting numbers very fast, learners acquired number sequencing as constant repetition offered the learners chances to keep on revising the same order of counting. While conducting a workshop for class one teachers in Ahero Zone, Kisumu County, RTI (2014) enforced that learners need the given opportunity to initiate plays and manipulate learning tools for faster acquisition of mathematical concepts. In this study ECE learners will acquire number values, progressive counting or number sequencing as they jump rope and chant counting rhymes. The same views are held by Vaselock *et al.* (2015) on raindrops on Roses and Toes. He coins that turn taking in child play enhances acquisition of tolerance. In this study as learners skip rope, they will learn to wait for their turn, as some will swing the rope while others jump and count as they wait to alternate at the opportune time.

Writing a report on implications of instructional materials on oral skills among ECE learners in Kisumu County, Okune (2016) explains that outdoor leaning will help steer acquisition of skills in learning. In this study ECE learners will jump rope and count numbers 1- 10 and thus acquire fluency in counting, sequencing, progressive counting and number values skills. Lindy (2012) and Amanda (2012) equally agree that jumping in counting lessons triggering acquisition of learning skills. In this study jumping will trigger the acquisition of fluency in counting numbers 1 – 10 , sequencing numbers from

1 – 10 and number valuing from 1 – 10. In his journal on Selection of Developmentally Appropriate Early Childhood Education Environment, Serving Ages 4 – 6 in Nairobi County, Odundo *et al.* (2016) holds that these developmental ages are in dire need of the right learning environment which may not be provided by outdoor activities. In this study skipping games may provide opportunity for learners to acquire fluency in counting and count progressively. Teachers need to choose activities that offer inspiration to develop counting skills at the learner's level.

According to Sitatiet *al.* outdoor learning arouses learners interests as they are guided from one step to another. The findings in this study concur that as the learners bounce balls and count from 1 to 10 successfully, they develop interest and strive to count from 11 to 20. Bouncing balls are self performed activities that gives the learner control and responsibility of managing the learning areas. This is according to Okune (2016) contending that learners are managers and owners of their own learning. Wartella (2012), observes that learners integrate self management with self monitoring. In this study learners will swing ropes as their friends jump and count numbers and others check that the rope is not stepped on. As the activity goes on, learners try new things, view problems and challenges, dislikes and enjoy demonstrations. In this study a skipping game entailed change in jumping style for example sideways jumping to jumping in movement. Other activities in this study that entailed change are bouncing balls at a position while counting to ball bouncing in walking and even to ball bouncing in running. Okone (2016) exploits that self direction in learners lead to invention and creativity.

2.2.2 Tube Tyres and Counting Numbers

Six to ten inner-tube is made into tower is then tied up between 2 trees or firm bars and is tilted a little. In explaining tube games Montessori, (1952) says that an object lies inside the tower which a child must take out before friends count from one up to ten KENPRO (2011), examined the effects of selected play materials on children's social skills development and found that varied opportunities given to learners tend to rocket the acquisition of learning. In this study, tyre activities should help learners acquire fluency in counting and sequencing of numbers. In support of this statement, is Research Triangle International (2013).

In the inner tube tunnel or crawling, still approximately six to ten inner tubes are made into a tunnel with cord or strong tape the kids must crawl through the tunnel before their friends count the tunnel can also be used as an obstacle. This activity enable learners to master counting faster. This view is supported by Sitati, *et al.* (2016), The other activity is jumping from inner tube tower to tower towards of 3 inner tubes are tied together and make up towers. Several towers are now placed at a distance of approximately 11.5 meters from each other. The first is to jump from tower to tower without missing the tower and touching the floor with the feet before their friends count one to ten. PRIMR (2013) explains that the skill learnt there is to be able to count on as the activity is done all over again, While writing a report on linking play to Early Childhood Development, Kagan, (2009) points out that play strengthens relationships which in turn instill confidence and attitude of acceptance. In this study if learners are allowed to perform outdoor activities together, room will be created for learning since learners will respect other learners. In Swinging tube tyres around their waists, while they count from 1 – 10

learners will acquire fluency in counting skills, number sequencing, number positioning and progressive counting.

In his report, Kiruki (2011) suggests adoption of child based learning to strengthen acquisition of learning skills, in this study swinging tube tyre around the waists as learners counted 1 to 10 helped learners to acquire fluency in counting from numbers 1 – 10. In support of this is Maya (2013), writing a report on the relevance of play in Child development stressing that outdoor learning is important in acquisition of skills. If learners jump from inner tube tower towards another tower together as their mates count without missing the number or the tower touching the floor and before their mates count from 1 to 10 , then they win. This activity enhances approximation skills. RTI (2015) and RTI (2014) supports the idea. The idea is that as the learner approximates stepping on the tyre and feet not touching the ground, the learner is careful not to miss the tyres and thus acquiring approximation skills. While conducting a workshop for class one teachers in Ahero Zone, Kisumu County, RTI International (2014) offered that learners need to be given opportunity to initiate play and manipulate learning toolssince there will be faster acquisition of concepts. In this study ECE learners acquired number values, progressive counting on number sequencing as they swungtyres around their waists and as they run fromtyre to tyre without missing out they acquired approximation skills. Writing about how children learn Vaselack (2015) stress that outdoor learning will hasten the acquisition counting faster . As they swing tyres, around their waists, the swing becomes faster and faster as counting progresses thus the acquisition of fast counting. A report by UNESCO (2014) on Education for All Global Monitoring Report urges stakeholders to embrace varied teaching and learning strategies that can have a permanent mark on the learners. In this study outdoor activities like tube tyre activities such as

swinging tyres on the waists while counting from numbers 1 to 10 will help learners to acquire fluency in counting skills, number sequencing skills and number valuing skills. On the same note, stepping from one tube to another helped learners to acquire basic counting skills like sequencing, fluency and positioning.

Same sentiments are shared by Vaselacket *al.* (2015) contending that outdoor learning catalyses acquisition of number skills such as fluency number values, positing and sequencing. Math forum org (2015) cites that a teacher and learner should form meaning and build knowledge about learning together. The teacher will interact with the learner as the learner runs from one tunnel to another and be careful not to miss a step while ensuring speed. Such interactive methods have a positive impact on acquisition of learning skills as revealed by Agango (2014).

2.2.3 Ball Bouncing and Number Counting

One learner may hold the ball using the forehand only, while a partner may count how many times this is done. The repetition of this activity helps the learners to be fluent, in counting Rousesau (1712 – 1778) purported that plays should be free. ECE learners should be allowed to manipulate the balls and bounce them on the ground or walls provided they can count as this will make them learn basic counting skills without constraints. Another game is bouncing the ball on the ground and not missing it while the bouncer counts the number of successful bounces. This will make the bouncer master the numbers and also be fluent in counting. Delivering a report on types of play, Amanda, (2012) points out that outdoor games are ones that help to revive one's memory. In this study, ball bouncing will help learners to remember number positions, valuing and sequencing as the activities were repeated.

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In shuttle run players need 2 cones a whistle, a ball a table tennis bat and a tapes measure two players work together. First player stand at one cone with the ball in one hand a bat in the other. On the whistle, one runs with the ball balanced on the bat to the second cone round the cone and back again. If he drops the ball, the other picks it up and goes back to the start cone to continue. One complete circuit is equal to 1 point. Player 2 counts the number of circuits completed until second whistle blows. The partner tells the leader the score and they change over. In counting points the learners develops the skill of mastering counting and writing positions as revealed by Kagan, (2009). In his report on curriculum instruction, Otunga (2011) stresses on outdoor learning to enhance acquisition of learning skills, such as number values, approximation and positioning.

Ball bouncing is an effective activity in helping us to acquire learning skills. Fleer (2010) points out that ECE learners adapt counting skills like fluency, progressive counting, sequencing and positioning. In this study when learners had frequent successful bouncing of balls form 1 – 10 they were fluent in counting numbers from 1 – 10, they were able to count on progressively and thereby acquired even sequencing of number skills. These views are also held by Ord and Leather (2011) while writing on constructivism. He coins that outdoor learning allows room for acquisition of counting skills like progressive counting, number values and fluency. The more the learner engages in bouncing ball while counting, the more he /she develops fluency in counting numbers as constant repetition helps to gauge one's memory.

The same views are shared by Lindy (2012) who posits that outdoor activities hasten the acquisition of progressive counting, number values, fluency and sequencing. In this

study, learners bounce balls and count numbers, they are able to acquire skills necessary in counting numbers progressively and thereby be able to count or master number sequencing and also number identification. While delivering a report on types of play, Amanda (2012) points out that number counting is one of the areas in child learning that requires outdoor learning. In this study ball bouncing on the ground by learners while counting from numbers 1 – 10 helped learners to be fluent in counting numbers. Learners will likewise acquire sequencing skills and number positioning.

Conducting a workshop for class one teachers in Bolo Zone RTI international (2013) stressed on the need for teachers to adopt learning activities where learners can freely choose activities and thereby manipulate the learning materials. In this study ball bouncing is one of the activities that should be adopted by teachers and let learners freely choose to bounce balls on the ground or on the walls or on the forehead as they count from numbers 1 to 10. This will give room for the natural unfolding of the acquisition of number values, number positions, fluency in counting from numbers 1 to 10 and also sequencing from numbers 1 to 10 and also sequencing from numbers 1 to 10. Writing about challenges facing ECD in Kenya, KENPRO (2014) points out that varied opportunities offered to learners tend to speed up the acquisition of learning skills. In this study ball bouncing while counting numbers will help learners to acquire fluency in counting numbers fast, learners will also acquire sequencing of numbers from 1 to 10 since constant repetition will offer them the opportunity to revise the same order in counting.

Writing a report on implementation of ECDE services in Kakamega County, Sitati *et al* (2016) points out that there is an urgent need for teachers to seriously adopt learning

strategies that will speed up acquisition of learning skills. In this study ball bouncing and number counting will speed up ability of learners to acquire fluency in counting skills as they will coordinate bouncing of balls and counting from numbers 1 – 10. Learners will also acquire correct order of sequencing numbers and number positioning due to constant counting while bouncing successfully. Writing about Rain drops on Noses and Toes, Vaselacket *al.* (2015) stresses that Outdoor learning hastens the acquisition of tolerance. The idea in this study is that as learners bounce ball and count from 1 – 10 successfully they learn to wait for their turn as the balls may be shared amongst their peers. They of course listen and watch as they wait for their turn. There is a lot that learners learn from their peers as they endeavor to copy and emulate them. Webinar (2015). While writing on implications of instructional materials on oral skills among ECE learners in Kisumu County, Okune (2016) is of the belief that outdoor learning will go along way in strengthening acquisition of learning skills. Writing on types of play, Amanda (2012) points out that ball bouncing enables learners to acquire learning without reasoning. It promotes learning without constraints. Learners will acquire counting skills like fluency due to constant performance of the activities.

2.2.5 Racing and Counting Number Activities

In racing activities a class was divided into groups or teams. Team A. gave out their representative who competed with the representative from team B. The two participants ran fast to the best of their ability. The rest cheered on and had to be very keen in rewarding positions 1, 2 and 3. Recording helped in ECE learners to master counting of numbers as it was repeated time and again. In relay racing again a class is divided into teams. Each team is given a stick which its members will pass on to the other members of their team. On the whistle each representative of the team runs targeting to reach the

second representative first before the other representatives reach and pass the stick on the until the fourth representative is the one who finishes the race. It should be recorded accurately who was number one and from which team, the numbers really helps learners to be competent in number identification since they will be striving to be the best. Delivering a report on implications of instructional materials on oral skills development among ECE learners, Okune, *et al.* (2016) is of the view that outdoor activity coupled with a learning concept will steer learning towards the right direction. In this study, racing and recording positions will enhance acquisition of number values, sequencing and positions

Racing activities are activities that will help steer teaching and learning towards achievement of appropriate learning skills. Writing a handbook for curriculum and instruction, Otunga *et al.*(2011) enunciates that outdoor activities are a definite drive towards acquisition of learning skills. In this study racing with cars helped learners to acquire skills necessary for mastering number positioning, number sequencing and number values. Equally, running relays helped learners to acquire number positioning skills, number values and number sequencing. Writing on how pre schools should operate, Lindy (2012) is of the opinion that in the absence of outdoor learning, there is inability of learners to acquire learning skills. On this note, Maya (2013), on relevance of play in children's learning urges pre school teachers to engage in outdoor activities frequently so as to enhance acquisition of learning skills in learners. In this study, when learners raced in relays and recorded positions, their ability to acquire number positioning were enhanced. The same opinion is held by RTI (2013) and also RTI (2014) while on an induction workshop for class one and two teachers in Ahero Zone.

Coupled with reinforcements racing activities are effective tools in instilling positive attitudes towards learning among children. Explaining operant condition in learning, Piaget, (2000) explains that positive rewards help to stimulate more activity while negative reinforcements dwindle activity thus dwindling the ability of learners to acquire learning skills. In this study when learners raced in the field and their peers cheered on and the best positions awarded taken, there was a tendency of learners to engage more and more in the racing activities as they strived to get the rewards. As this happens, chances of acquiring learning skills are high. Vaselacket *al.* (2015) writing on Raindrops on Noses and Toes stresses that repetition of an activity hastens acquisition of learning skills. In this study constant racing activities rocketed the acquisition of number values, number position and number sequencing as learners were recording positions according to how the athletes arrived.

Writing a report on implementation of ECDE services in Kakamega County, Sitaliet *al* (2016) points out there is an urgent need for teachers to adopt teaching and learning strategies that will speed up the ability of learners to acquire learning skills. In this study racing activities like relays enhanced the ability of learners to acquire skills necessary in number positioning, and number values. Recording positions on arrival by athletes enhanced the skills on number positioning. In his report on implications of instructional materials on oral skills among ECE learners in Kisumu County, Okune (2016) asserts that outdoor learning will help learners acquire learning skills in Mathematics like number values, number position and sequencing.

Writing on challenges facing ECD in Kenya, KENPRO (2014) points out that when learners are given different learning experiences, there is a positive effect on acquisition

of desired skills. In this study when learners raced and their peers recorded positions, they acquired skills necessary in positioning numbers, number values and number sequencing. While conducting a workshop for class one and two teachers in Ahero Zone, Ministry of Education (2016) offered that learners should be given ample opportunity to conduct outdoor learning and manipulate learning tools. On the same note learners interaction is of necessity. In this study the learners recorded positions according to how the runners arrived and got an opportunity of giving positions, sequencing the position and also know the value of ordinal placements.

This was revealed as the 1st to arrive became the best, followed by the second then the third, fourth in that order. In his journal on selection of Developmentally Appropriate Early Childhood Education Environment serving Ages 4 – 6 in Nairobi County, Odundo (2016) holds that selecting appropriate materials that allow for learner participation greatly impacts on positive acquisition of learning skills Vaselacket *al.* (2015) explains that. If learners participate in racing while their peers cheer on and place positions, they will be able to acquire number positioning skills and number values.

2.2.4 Sea Saw Swinging and Counting

Animal sea saw is a game of two players. Each player is given 12 animals. Players take turns to place an animal on their side of the sea saw making sure that their side of the sea saw is never heavier than the other side. Counting of number starts and continues. The winner is the player who survives the game without ever being more than 5 kg heavier than the opponent. If a player does become 5 kg heavier than their opponent, the sea saw falls, they lose and the game is over, Sitatiet *al.* (2016). This activity is so important in developing the approximation ability of learners. A player will realize that placing more

animals on his side makes his side heavier and so he or she loses the game. Therefore the learners will realize the value of number that the less the number of animals on his side the better. Vaselack(2015) warns that the teacher must be there to give instructions on how to add on the weight and also when to stop. Smith (1999) and Burthard(1982) state that play introduced to ECE learners at an early age results in features or characteristics that enhance acquisition of skills. When learners race in the field and others record positions, they will master counting on, positioning and ordinal placement. Learners will count numbers as they swing and learn the counting skills. The study on influence of play on the development of pre school Children, Mahindu (2011), coined that swinging is a soothing exercise that allows learning without constraints.

While writing a report on concepts of in play in Early Childhood Fleer (2010) coins that children acquire learning skills if they are able to have frequent exposure to learning experiences. In this study sea saw swinging helped learners to acquire skills in mastering number values, fluency in counting and approximation of number skills. As the learners added more items on their side while ensuring that their side is never heavier than the other side, the learners were able to acquire skills in mastering numbers values, fluency in counting and approximation of number skills since they may not want to loose the game. In his report on identification of learning disabilities among Standard 3 pupils of Public Primary Schools in Butere District, Wafula *et al.* contends that outdoor learning positively impacts on learning acquisition of counting skills. In this study when learners swung and counted from number 1 to 10, they acquired fluency in counting, and were able to approximate the figures. An analysis by Rennie Centre for Education Research Policy, (2012) encourages teachers to provide varied learning opportunities that can induce learning. In this study when learners were allowed to practice swinging coupled with

other outdoor activities like racing and jumping acquisition of learning skills were enhanced.. In Support of this view is Wartella *et al.* (2010) who stressed on the need for teachers to be creative and flexible towards changes and adopt new learning and teaching methodologies. In this study, sea saw swinging is one of the games to be embraced as it is the one seldom practiced. Seesaw swinging will enhance acquisition of approximation and number values supported by Mohammed and Mohammed (2012). swinging is a refreshing exercise that helps learners to feel fresh and happy,

While writing on computer integration into the Early Childhood Curriculum Mohammad explains that ECE curriculum should directly focus on child development and learning enshrined in Children's needs and interests. Swinging being one of the children's interests will greatly influence the ability of learners to develop interest in counting as one successful swing is accompanied by counting. learners may count from 1 to 10 or from 1 to 20 before the game is over. In support of this view is the RTI (2013) on Teacher Capacity Building Workshop for class one and two teachers in Ahero Zone contending that teachers should first take into account learner interests and offer them opportunities to choose activities that interest them. Learners initiated activities impacts positively on the ability of learners to acquire learning skills. In this study swinging greatly interested learners and make them eager to learn counting and thereby acquiring counting skills like fluency since they would be counting as they swung . learners also acquired approximation skills in counting as they realized that if they added more toys on their side, they would be heavier than the opposite side and thereby loose the game. (Fleer, 2010) wrote that outdoor activities enhance counting skills which may be used by learners.

2.3. Theoretical Frame Work

Constructivists origin dates back to the time of Socrates who believed that teachers and learners should interact with each other and construct the hidden knowledge by asking questions Hilav, 1990, Grubek and Voneche (1977) also state that the term constructivism refers to Piaget's constructivist views on discovery learning. Mvuduet *al.* (2012) state that constructivism endeavors to explain that children can be assisted to become better people intellectually through experience in this study learners experience in outdoor activities will help them become better intellectually as they acquire the right skills in counting. This study will be based on Lev Vygotsky's social constructivist theory . Lev Semyonovich Vygotsky was born on November 5th 1896 in Western Russia and died in 1934. Vygotsky was educated as a lawyer at the Moscow University. He started teaching science at various institutions. He also studied a range of topics like sociology, linguistic and philosophy. He began his formal work in psychology in 1924 after attending the institute of psychology in Moscow and after collaborating with other scholars like Alexei Leontier, Alexander Luria and others. He was considered a seminal thinker in psychology.

According to the social constructivist theory, Vygotsky asserted that human development results from a dynamic interaction between individuals and the society. Ord and Leather (2011) explains that constructivism is a theory about how humans learn and the thinking areas, rather than about how we can learn by heart and recite a quantity of information. In this study, pre scholars learnt number counting when they ran relays and realized that a first runner who fell in position one is the best and vice versa. Jerome Bruner (1983) asserted that children can remove themselves from situations by way of problem solving and thinking. If pre scholars can learn that in swinging sea saws a heavier side loses the

game, then they are able to solve the problem of game losing. Scaffolding is a feature of well facilitated outdoor education experiences and a discovery to learning, as explained Johnson (1990).

Vygotsky's (1978) theory promotes learning contexts in which students play an active role in learning unlike the instructionist model where a teacher transmits information to learners. For example in a mathematics lesson in class 1, a teacher may place 5 dolls at a point and then place 4 dolls at another point. The teacher then assigns a pupil to come and count all the dolls and arrive at 9. So the learner will decipher that 5 and 4 put together is equal to 9. Children, especially toddlers and pre scholars often speak aloud to themselves as they are trying to understand something. This self talk helps them to work things out in their own minds. Take an example of a counting session when they count aloud, imitate their teacher, their peers and they also memorize the number. Vygotsky (1978) believed that peer interaction is an essential part of the learning process. In order for children to learn new skills, he suggested pairing more competent learners with the less skilled ones. Taking an example of an Early Childhood Education (ECE) classroom, therefore, in all their tasks assigned to learners. The primary reading and Mathematics (PRIMR) Initiative recently piloted in every county in the country used pairing up to a very large extent. Outdoor activities are supported by a range of theories as no single theory can explain behaviour. Among the classical theories are; recapitulation theory, cathartic theory, competence reflectance theory, compensation theory, surplus energy theory or the relaxation theory.

Surplus energy theory of play as explained by Callie (2016) posits that by nature, man has excess energy which if not used can be dangerous to health and must be expended in play. In this study, learners will get relief in outdoor activities after performing indoor

lessons. The compensation theory on the other hand, explains that man expects to be rewarded after a job well done. In this study, learners will view outdoor activities as compensation after having participated in indoor learning and hence, boost their morale in counting. Jean Piaget (1980) another social constructivist strangely identified a class with interaction as a best place of children learning. In counting lesson therefore learners must possess the ability to modify, transform and operate on an object or idea such that it is understood by the operator, learning then occurs as a result of experience, both physical and logical with the objects and how they are acted upon. Thus, knowledge must be assimilated in an active process by a learner with matured mental capacity so that knowledge can build in complexity by scaffold understanding.

Understanding is scaffold by the learner through the process of equilibration where the learner balances new knowledge with the previous understanding thereby compensation for the transformation of knowledge. In an outdoor lesson the teacher may guide a racing activity and let learners award the positions of different achievers. In this study ECE learner development and learning will be achieved when learners interact with their teachers in outdoor activities, learners should manipulate play materials like barks skipping ropes, tyres and swings. Flear (2010) explains that in the effort to be fluent in counting from numbers 1 – 10, learners may bounce balls and count while the teacher acts as a guide and source of inspiration. Fluency in counting numbers will be achieved as learners repeat the activity. Learners may take turns in skipping ropes thus acquiring tolerance and when they swing ropes, their friends skip and count, counting skills like fluency are achieved.

Amanda (2012) explained constructivism being possible through accommodation and assimilation where individuals construct new knowledge from their experiences. Assimilation is about incorporating the new experience into an already existing knowledge without changing the basics. Ord and Leather explains that this may happen when individuals experiences are in line with their internal representations of the world, but may occur as a failure to change an understanding Fler (2010), inputs that they may not be serious with other people's input and may deem other inputs as unimportant. In this study ECE learners assimilated racing activity into counting of numbers and thereby acquired skills like number positioning.

Accommodation is the process of reframing on mental representation of the external world to fit new experiences. Accommodation is understood as the means by which failure leads to learning. In this study learners acquire counting skills such as number sequencing as they bounce balls and count from numbers 1 – 10. In constructivism, each learner is viewed as a unique individual with unique needs and backgrounds. In this study ECE learners in Nyando Sub County are children from diverse backgrounds as there are partial orphans, total orphans, partially challenged, autistic, hyperactive those who are either infected or affected by HIV/AIDS, and even the gifted and talented learners. It is therefore imperative that a teacher should offer learning experiences that befits such diverse backgrounds. Different cultures view different activities in a unique way. Constructivism stresses on the importance of taking into account the background and culture of the learner throughout the learning process as believed by Wertsch (1997).

Constructivists believe that in constructivism students opinion is sought and valued, assumptions and suppositions are challenged, the learning experience must be close to the

life experience and relevant to the students' lives, the constructivist teacher gives a broad understanding of a subject rather than focusing on small bits of information. In this theory seeking learners' opinion enhances acquisition of learning skills. In a relay race for example learners were asked to judge the team that emerged the winner. The mutual agreement of awarding positions on athletes led to acquisition of number positioning skills. In her study on types of play Amanda (2012) agrees with this finding.

Vygotsky (1978) lays importance on the cultural and social interactions that help to construct knowledge. He developed the zone of Proximal Development (ZPD). ZPD looks at how learners or children act first with what they can do on their own, and later progress their learning with what the teacher can assist. In this study ECE learners in Nyando County numbers from 1 – 10 then relied on the teacher or a more able peer to assist them to transit from 10 to 11, 12 and so on.

Vygotsky (1978) learning results into learner independence and that learning may take place anywhere and anytime. In this study outdoor activities strengthen classroom learning. After counting numbers 1 – 10 in a math lesson, bouncing balls or skipping ropes outside leads to acquisition of fluency in counting KENPRO (2014) Vygotsky (1978) believed that the More Knowledgeable Other (MKO) has a key role to play in learning. MKO is anyone who has a better understanding or a higher ability level than the learner relating to a specific task, concept or process in this study the MKO is the teacher or a more able peer. Other learners may be good at skipping ropes (Girls). Racing may suit girls and boys alike swinging tube tyres on the waist may be done best by girls and running from tyre to tyre done best by boys.

Vygotsky (1978) looked at the learning process in a much more serious perspective. He opts that the ZPD occurs in four different stages. In the first stage is learner assisted by the MKO. Stage two is assistance provided by Self stage three is automatization through practice. Stage Four is deautomatization, recursiveness through the previous three stages. In this study in a counting lesson outdoors, a teacher may bounce ball successfully and count from one to ten, then let the learner bounce ball successfully up to the number he she can. Later the learner may be allowed to perform the activity alone. RTI (2014). Mamoir (2005) cites that assistance by Mediation is the part played by other significant people in the learner's lives, people who enhance their learning by selecting and shaping the learning experiences presents to them. In this study a teacher or a classmate to learners were mediators. Play materials such as balls, ropes, swings and tyres were also mediators as it is through them that the learners acquired counting skills. Ord and Leather (2014), explained that mediators are people and items that assist learners to acquire the desired objectives.

2.4 Conceptual Framework

The Conceptual Framework shows the independent variable in the left hand side being Rope Skipping, ball bouncing, Tyre activities, racing activities and sea saw swinging activities. IN the idle are the mediators who encourages guide learners to perform these activities. The mediators are teachers, peer, balls, ropes, tyres, sea saws. On the right hand side are the dependent variable namely number valuing, progressive counting, number identification, number writing, number positioning, and fluency in counting.

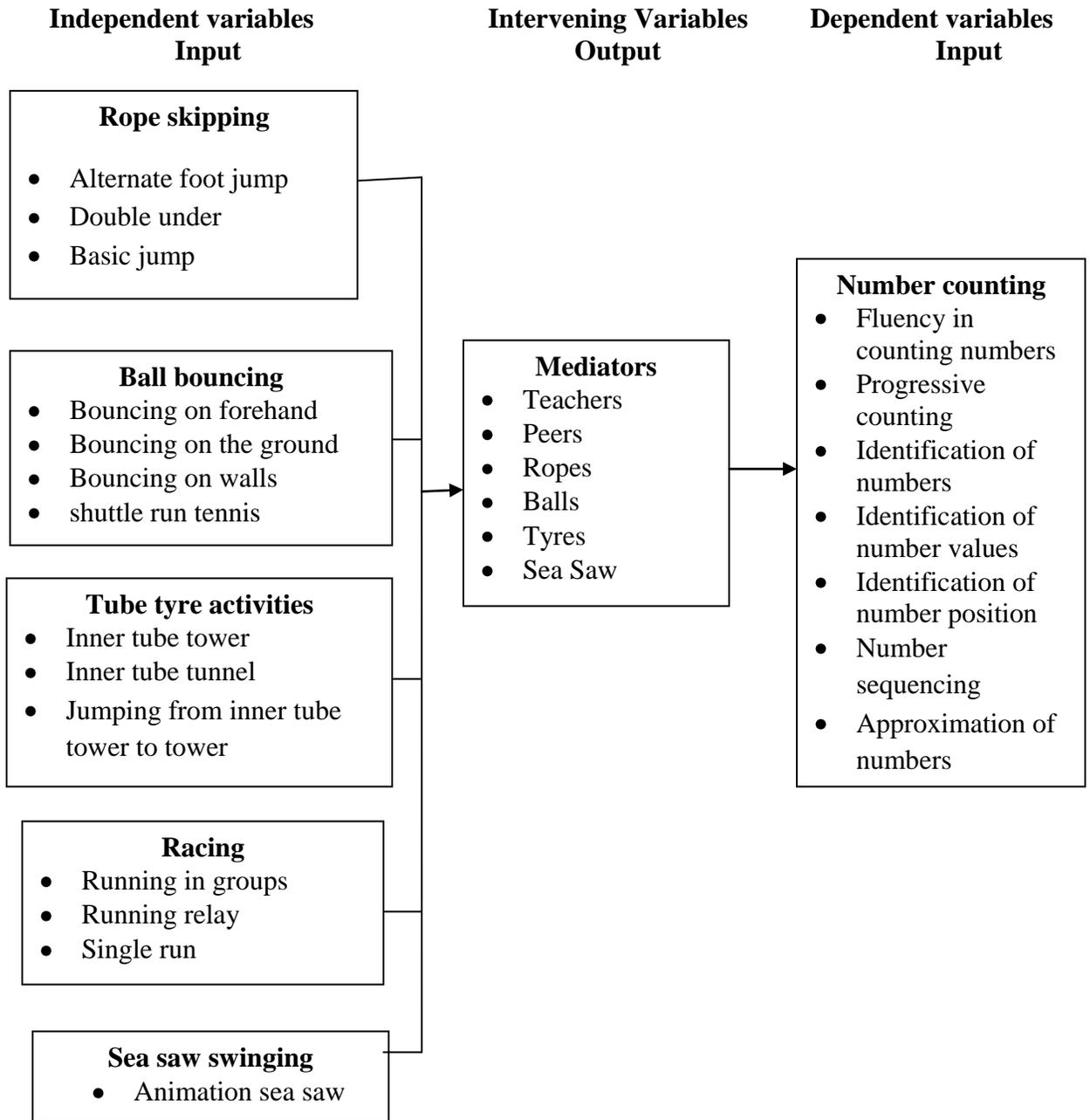


Figure 2.1: Conceptual Framework

The process described is called the input throughout process. The independent variables are the outdoor activities which the learners perform with the guidance of the teachers more able peers. In the performance of these activities the use of ropes, balls, tyres and sea saws help learners to acquire the skills necessary in the enhancement of number counting. The process is called input-thought put process. It is the through process the inputs (the independent variable) that the mediators enhance acquisition of outputs (Dependent variables.)

When learners skipped ropes and counted from 1-10, they needed their peers to mediate by swinging the rope and helping them to count from 11-20, 20-30. When performing double under the learners needed their peers to tell them to squat lower and lower. When these activities helped the learners to acquire fluency in counting numbers and counting progressively. Ball bouncing activities needed learners to have balls and bounce them on the ground on the walls or on the forehand while their peers helped them to count numbers sequentially and thus they acquired number sequencing, progressively counting and fluency in counting. When performing the activities learners required tyres which they could swing around their waist as their peers counted from 1-20 and thus they acquired numbers sequencing, progressive counting and fluency in counting

When performing tyre activities learners required tyres which they could swing around their waist as their peers counted from 1-20 and thus they acquired numbers values and number sequencing

Racing activities required learners to run singly or in groups. Singles runners could race against other single runners. The peers' job was to cheer them on to run to the best of their ability. The peers then awarded position according to their arrivals. Running in groups entailed relay racing where runners could pass on batons to their group members who were cheered to run faster to get the best positions thus they acquired number valuing and number positioning

2.7 Summary of Literature Review

	Author	Focus	Findings	Gaps
1.	Maya (2013)	Relevance of play in a child development concepts of play	Outdoor learning is a basic element Is skills acquisition	Effects of availability of Learning materials in ECE Centres
2.	Mahindu (2011)	Concepts of play	Outdoor play help enhance math concept learning	Development of policies to encourage outdoor learning
3.	Waithera (2006)	Impact of play materials o cognitive development of pre-school children	Outdoor learning can even happen singly	Impact of single child play on learning abilities
4.	Kariuki (2011)	The impact of instructional resources on children's learning	Child based outdoor learning will strengthen learning	Impacts of Audio Visual materials to child learning
5.	Otunga et al (2011)	Curriculum and instruction	Jumping and counting helps learners to remember and thereby able to acquire skills	Effects of Outdoor learning in strengthening acquisition of counting skills
6.	Kose et al (2015)	Raindrops on noses and Joes in Dirt. Infants and toddlers in the outdoor classroom	Turn taking in child play enhances acquisition of tolerance	Effect of play on counting skills
7.	KENPRO (2014)	Classroom. Challenges facing ECD in Kenya	Varied opportunities rocket the acquisition of learning	Effects of government policy framework on ECE
8.	Sitati et al (2016)	Implementation of ECDE services in Kakamega	Outdoor activities trigger mastery of skills foster	Effects of teachers participation in outdoor learning
9.	Kagan (2009)	Linking play to ECDE	Play strengthens child relationships	Effects of teachers participation in outdoor learning
10.	Amanda (2013)	Types of play	Number counting is one of the areas requiring outdoor learning	Impacts of Strengthening play and counting in acquisition of learning skills
11.	Okone (2016)	Implications of instructional materials on oral skills among ECDE learners in Central Zone Kisumu County	Outdoor learning will help to steer acquisition of skills in learning	Effect of unavailability of outdoor learning materials on math leaning

	Author	Focus	Findings	Gaps
12.	Flee (2010)	Concept in play	Outdoor activities mirrors what is important in children's lives	Effects of different types of play on math learning
13.	Lindy (2012)	Relevance of ECDE in Tanzania	There is inability of learner to acquire skills fast in the absence of outdoor learning	Effects of Strengthening learning through play
14.	Langford (2010)	Critiquing child centered pedagogy	Children play for the purpose of practicing a skill	Effects of play on acquisition of math concepts
15.	Tzuo (2007)	Tension between teachers control and children's freedom	Teachers should follow free interaction for easy learning	Impact of child driven play on positive learning
16.	Githinji et al (2011)	Early Childhood in Kenya, A literature review on current issues	Jumping releases inner tension in learners	Effect of different types of play and their impact on learning skills
17.	NMohamed M. et al (2012)	Computer Integration into the early childhood curriculum education	Computer literacy will rouse curiosity of learners and therapy motivates them towards positive learning	Influence of computer literacy , play and mathematics learning
18.	Wartella et al (2010)	Technology in the lives of teachers and classrooms. Survey of classroom teachers and family childcare provider	Children take an innate need to relate with others	Influence of child's friendly learning on acquisition of learning skills
19.	RCERP (2012)	An analysis by RCERP	Play should be part of learning teachers and learners to coordinate	Effects of provision of play materials on acquisition of learning skills
20.	RTI (2014)	RTI Workshop on PRIMR	Teacher to first demonstrate all activities	Relevance of outdoor learning on learner acquisition of counting skills.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers the research design, target population, sampling and sampling procedures, research instruments, validity of the instruments and reliability of the instruments and lastly data analysis techniques.

3.2 Research Design

The study adopted quasi experimental design. The design was used to form four groups namely two experimental groups and two post tested control groups. A visit to the control groups was conducted to assess the acquisition of counting skills. Next there was a visit to the experimental groups to assess them during rote counting. After two weeks another visit was conducted to assess the experimental groups doing counting with outdoor activities and whether the counting skills are acquired. During the second visit the control groups was observed doing rote counting. Questionnaires were administered on the teachers to ascertain whether outdoor activities influenced the learners' ability to acquire counting skills. An analysis of the tested and observed items was then drawn to ascertain whether outdoor activities influenced the ability of learners to acquire counting skills. A pilot study was conducted where the researcher sampled 10% of the population to participate in the pilot study. This group was however exempted from the main study.

3.3 Target Population

Population is a group of independent objectives or items from which subjects, objectives or items from which samples are taken for measurement. The population consisted School teachers, headteachers, ECE learners and play materials in Nyando Sub county Ahero Zone. There are 38 public pre schools. The researcher therefore had a total of 38 headteachers, 85pre school teachers 1000 pre-school learners which is a total of 1,123 respondents. These are very important stakeholders in ECE learning and are therefore considered appropriate for providing focal points for the study of outdoor activities and number counting in ECE centres.

3.4 Sampling Techniques and Sample Size

Sampling is about taking a few people (subset of the population) and studying them. It is taking that group as representative of that population. This research adopted simple random sampling where all the schools were sampled. This was due to the small distribution of the sub county. This therefore means that 85 pre teachers and 38 head teachers were selected for the study. 10% of the study population participated in the pilot study thus 9pre school teachers, 4 head teachers and 100 for experimental and control groups respectively. Purposive sampling was used to choose Ahero zone to represent Nyando Sub-County. The Sampling frame is shown in the table below.

Table 3.1: Sampling Frame

The table presents a sample frame of the population that participated in the main study.

Category	Number	Sample size	Percentage
Pre school teachers	76	76	100
Head teachers	34	34	100
Experimental Groups	400	400	100
Control Groups	400	400	100
TOTAL	910	910	400

There was a total 76 pre-school teachers which was a 100% participation, 34 head teachers which was also a 100% participation. Experimental groups and control group both registered 400 participation which was 100% participation. This was a total of 910 respondents.

3.5. Research Instruments

The study adopted a field experiment on teachers and ECE learners during counting lessons using rote counting and counting lessons using outdoor activities Winer (1971) explains that this is a research study in which one or more independent variables are manipulated by the study under carefully controlled conditions as the situation may permit. The field experiment was chosen because it is suited to many educational problems. Since the experiment was done in actual schools, offices and classrooms, it is most appropriate. Also, the experiment was conducted in natural and loose situations like in the field where learners and teachers were free to interact. Lastly, there was an open forum after data collection with the respondents where voices of various teachers were captured.

3.5.1. Questionnaire

The questionnaires were administered to the respondents who were the head teachers and pre-school teachers. The researcher first booked appointments before the data collection day with the respondents to avoid miss-ups. Head teachers questionnaires gathered information on relevance of play in ECE learning and supply of outdoor learning materials. Data collected regarded effect of outdoor activities on learner acquisition of Counting skills, integration of outdoor learning in indoor lessons and teacher participation.

3.5.2. Observation Checklist

The study involved visiting the ECE institution to ascertain whether the centers had adequate play fields and play materials. The research used the observation schedule to indicate the items that are present and the ones that are missing. The method was suited

for this study since the researcher got first hand information as observations were done on items that were visible. Observation was done on the experimental groups doing rote counting and counting with outdoor activities to ascertain whether they activities had effect on learner acquisition of counting skills. Observation checklists were used to gather data regarding existence of play fields, play materials, integration of outdoor learning in the curriculum.

3.6 Validity of Research Instruments

Validity of a research instruments is proved if it measures what the researcher wanted it to measure (Fred N. Kerlinger 2013). For example in this case a questionnaire and the observation schedules gave the effect of outdoor activities on number counting among ECE learners in Nyando Sub-County. An instrument is valid for the scientific or practical purpose of it user. In this study the environmental assessment technique was used. The study identified the schools with adequate outdoor playing materials and ascertain whether there was a positive effect on ability of learners to count numbers. For face validity of the instruments to be ensured, content related evidence of validity was used to validate the developed instruments by preparing what each instrument was intended to measure, then presented them along with the instruments to the supervisor who examined the content of the instruments and advised on the face validity. Improvements were made according to the recommendations suggested by the supervisor before the instruments were finally taken to the field.

3.7. Reliability of Research Instruments

To establish reliability of research instruments, a pilot study was carried out using test and re-test method. Testing was done using 8 teachers drawn from 8 pre schools

randomly selected in Nyando Sub County representing 10% of the study sample, Mugenda, (2003). The two tests were administered on the same respondents at an interval of two weeks.

For quantitative data, Pearson's (r) was used for the pilot study to determine correlation of instruments which were judged to be reliable at the value of magnitude of relationship of 0.7. The research instruments were proved to be reliable because the values of magnitude of relationship of the grand mean scores obtained from the two tests for teachers questionnaires was 0.60 which lies between 0 and 0.7 (Borg and Gall, 2007). Results from the two tests were also used to revise instruments before they were used in the actual study (Borg and Gall, 2007).

For qualitative data, the pilot study was carried out to find out whether the terms used in the instruments resonated with the terms which were familiar to teachers and head teachers. The researcher also verified the instruments' contents for accuracy, consistency and ensured that information was scraped off while unclear statements were noted and corrected. The respondents who participated in the pilot study did not participate in the main study (Joppe, 2000).

3.8. Data Collection Procedure

The following data collection methods were used;

(i) **Questionnaires:**

The respondents were provided with researcher administered structured questionnaires. These Questions covered a broad spectrum of aspects that we needed to learn from the schools. A total of 110 questionnaires were used and they also influenced the sampling

criteria used..A few teachers requested for time to answer the questions which was granted, while a majority of them went through the questionnaires and answered immediately. The questionnaires were later collected and the data analyzed.

(ii) Observation:

The researcher used observation check lists to assess the presence or absence of outdoor play materials. Ropes, balls and tyres were observed to be present and available for use by the children. Others such as swings were absent.

(iii) Focus Group Discussion:

After data collection there was an open discussion forum with the teachers where voices of various teachers were captured.

3.9 Data Analysis Techniques

The records were edited to ensure exactness and consistency of information contained in the records, this was helpful in ensuring that all desired information was conceptualized, coded and verified to reduce possibility of disparity between available information and what was projected to be achieved according to the research objectives (Mugenda & Mugenda, 1999).

The primary data collected was first checked for completeness, consistency, accuracy, coded and then fed into a computer using (SPSS) program for analysis and interpretation of results. Primary data was analyzed through descriptive statistics. The study used descriptive statistics to integrate both qualitative and quantitative techniques in data analysis. The researcher used inferential statistics particularly correlation and linear regression to measure the relationship between the independent and dependent variables.

The relationship between the variables obtained from regression was modeled to:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon_i$$

Where Y = The Dependent Variable (Number Counting)

β_0 = Correlation co-efficient (a constant)

β_1 - β_5 = Regression co-efficients to be measured

X_1 = Skipping Rope

X_2 = Ball Bouncing

X_3 = Bicycle tubes/tyre Activities

X_4 = Racing Activity

X_5 = Seesaw Swinging

ε = Error term

3.10 Hypothesis Testing

Other than the results of correlation and regression analysis, the researcher conducted a post experiment valuation of the two groups of learners where the means and standard deviation of the scores were computed and Z-statistic value established.

3.11 Ethical Considerations

According to Mugenda(1999), ethical deliberations are important for any research. In this study, the research ethics were upheld. Such matters included proper conduct of the researcher during the research process, evasion of plagiarism and confidentiality and privacy of the information obtained from the respondents, avoidance of physical and psychological harm to the respondents, acquiring deliberate and informed consent of the respondents and publications of the findings, these values were strictly upheld.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.0 Introduction

This chapter presents the results of the study findings are presented and discussed under thematic sub sections in line with the study objectives. The thematic areas include: the demographic characteristics of respondents and the effect of skipping rope, ball bouncing, bicycle tyres activities, racing activity and seesaw swinging on number counting among ECE learners in Nyando sub-county. Descriptive statistics namely mean rating and inferential statistics were used to analyze the data. Regression analysis was used to test the relationship between the variables under study in relation to the objectives of the study. Analysis of variance (ANOVA) was also used to confirm the findings of regression analysis.

4.1. Questionnaire Return Rate

Questionnaire with both open and closed ended questions were used to collect qualitative and quantitative data respectively, were administered. 128 questionnaires were administered. Out of 85 ECE teachers, 80 filled and returned the questionnaires which was 94% while 38 (100%) of the head teachers returned. This was 92% return rate. Mugenda and Mugenda (2003), states that response rate of 50% is adequate for analyzing and reporting 60% is good while 70% is very good for analysis and reporting.

4.2. Demographic Profile of Respondents

4.2.1. Gender of the Respondents

The study sought to know the demographic profile of teachers and headteacher by gender as shown in Table 4.1:

Table 4.1: Demographic Profile of Respondent by Gender

Response	Teachers		Headteachers	
	f	%	F	%
Male	5	2	4	10.5
Female	80	98	34	89.5
TOTAL	85	100	38	100

The respondents were asked to state their gender as shown in Table 4.1. It is evident that 80 (90%) of ECE teachers were female while 5 (10%) were male while the 4(10%) of the headteachers were male and 34 (89.5%) were female, the responses on education officer was 1 (50%) male and 1 (50%) female.

4.2.2. Professional Qualifications of Respondents

The study also sought to know the demographic information of headteachers and teachers by professional qualifications as shown in Table 4.2.

Table 4.2: Professional Qualification

The table below presents the professional qualification of ECE teachers in Nyando Sub County

Response	Teachers		Headteachers	
	f	%	f	%
P1			38	100
Certificate	30	32.3	-	-
Diploma	55	67.7	-	-
Degree	-	-	-	-
TOTAL	85	100	38	100

From the Table, data indicates that 67.7% of ECE teachers are diploma holders while 30 (32.3%) are Certificate holders in ECE where as 38 (100%) of head teachers are P1 Trained teachers. This shows that the teachers have the required knowledge to handle ECE learners. This implies that ECE teachers in Nyando Sub-County are qualified to handle ECE learners. It follows therefore that professional teachers will embrace outdoor learning and thereby learners will be in a position to acquire basic counting skills.

4.2.3. Length of service of Teachers and Head teachers

The study sought to know the frequency of teacher turnover in a school.

The table below indicates the findings

Table 4.3: Duration of Stay of Teachers and Head teachers

Response	Head Teachers		Teachers	
	f	%	f	%
1 – 5 Years	19	50	61	71.7
6 – 10 Years	19	50	24	28.3
Over 10 Years	-	-	-	-
TOTAL	38	100	85	100

Table 4.3 shows the distribution by duration of stay indicating that 19 (50%) of head teachers have been in their stations for shorter time of between 1 – 5 years this could be due to the fact that the County Government recently appointed ECE teachers. This is because most teachers work within their community hence they are not easily transferred. However 19 (50%) of the ECE teachers are new in their stations and this attributed to new employment by the county government.

4.3. Integration of Outdoor Activities in Counting Lesson

The study sought to find out whether preschool teachers regularly integrate outdoor activities in counting lessons and more so whether they are aware of a government policy on children play and learning. Table 4.4 present the data.

Table 4.4: Integration of Outdoor Activities in Counting Lesson

School	Allocated lessons	Performed lessons	Percentage
Kagimba	5	3	70
Okanja	5	4	80
Onjiko	5	5	100
Kasuna	5	4	80
Ojere	5	3	70
Obugi	5	5	100
Ogwedhi	5	4	80
Bunde	5	4	80

Data indicates that learners are exposed to outdoor activities but the number of lessons performed is inadequate. The Early Childhood Education Syllabus (2008), MOEST (2006), NACECE (2010) are in agreement that children should be exposed to outdoor activities five times a week. Lanaford (2010) posited that for meaningful learning to take place, learners must have integrated outdoor lessons. In her report on mathematics activities, RTI, (2014) is in agreement that there is need for integrating outdoor activities in counting lessons in order for counting skills to be acquired.

4.4. Teacher Participation in Play

The study further sought to find out from the teachers' if they thought that teachers' participation in outdoor activities could help enhance counting skills. Table 4.5 presents the results.

Table 4.5: Teacher Participation in Play

Response	Teachers	
	f	%
Strongly agree	49	57.6
Agree	36	42.4
Disagree	-	-
Strongly disagree	-	-
TOTAL	85	100

Data shows that 57.6% strongly agree that school teachers' participation in outdoor activities enhance acquisition of counting skills while 42.4% simply agreed.

4.5. Information on the effect of skipping rope, ball bouncing, bicycle tubes/tyres activities, racing activity and seesaw swinging on number counting among ECE learners

The researcher used a Likert scale rating scale of 1 to 4 to (where Strongly Agree=4, Agree=3, Strongly Disagree=2 and Disagree=1). The results of the analyses were captured and presented in tables thematically from sub-sections 4.5.1 to 4.5.4.

4.5.1 Descriptive Statistics on skipping rope and number counting

The research question sought to determine the respondents' agreement with given statements on skipping rope and counting activities.

Table 4.6: Skipping Rope and Number Counting, n=118

The table presents mean ratings of skipping activities and number counting skills

Statement	Mean Rating
Rope activities enhance counting skills	3.325
Alternate foot jump creates faster counting fluency	3.258
Double under is useful in acquisition of progressive counting	3.333
Basic jump influences acquisition of progressive counting	3.225
Double under is useful in acquisition of sequencing of counting numbers	3.283

Table 4.6 summarizes the views of the respondents to various aspects of rope skipping and number counting. The results show that most respondents agreed that double under is useful in acquisition of progressive counting, (MR = 3.333) and that it enhances counting skills, (MR = 3.325). There was also a significant agreement that double under is useful in acquisition of sequencing of counting numbers (MR=3.37), that alternate foot jump creates faster counting fluency (MR=3.258) and that basic jump influences acquisition of progressive counting (MR=3.225). The learner jumps with one foot and alternates with the other foot at the count of ten.

The results reveal that a great percentage of ECE teachers and head teachers strongly agreed that skipping rope enhances counting skills due to the fact that constant repetition of the skipping activity arouses constant practice which results in the learners ability to

acquire basic skills in counting like fluency in counting numbers. Edward (1995) posited that skipping is an essential activity which should be constantly used by instructors for speedy acquisition of counting skills in learners. In her study Mahindu Jane (2011), skipping rope during counting lessons will go along way to enhance counting skills and motivate learners to the counting lessons as the physical activities are likeable. In this study, one male teacher had this to say:

“ Skipping rope is one of the games that pupils enjoy most. When jumping and counting it becomes interesting and gives one the satisfaction of achieving without stepping on the rope. This helps learners to memorize numbers. Learners will also be fluent in counting”.

In support is Kiruki (2011) suggesting that when learners participate in skipping, acquisition of counting skills will be hastened. On the same note alternate foot jump and counting is done when a learner jumps with one leg as counting 1 – 20 continues and is at liberty to exchange legs provided he /she does not step on the rope. Teachers were asked to state whether alternate foot jump helps in acquisition of counting skills. A female teacher expressed her feelings thus:

“ The learner calculates the movements between skipping alternating legs and counting numbers without missing a step. It is very essential in helping the learner know that valuing numbers from 1 to 10 which one is a great achievement. Of course later when they start counting pens or books they will realize that 3 is greater than 4 and so acquire the skills of number valuing”.

4.5.2 Descriptive Statistics on ball bouncing Activities and Counting

The study also sought to find out the extent to which the respondents agreed with the effect of ball bouncing activities on number counting skills. The results of which are captured in Table 4.7.

Table 4.7: Ball Bouncing Activities and Counting, n=118

The table below presents the mean rating of ball bouncing activities and counting

Statement	Mean Rating
Bouncing and counting enhance acquisition of counting skills	3.258
Bouncing balls on forehead influences acquisition of counting in counting	3.342
Bouncing balls on the ground is useful acquisition of number sequencing	3.317
Bouncing balls on the walls influence acquisition of number values.	3.083

The study showed that bouncing balls on forehead positively influences acquisition of counting in counting (MR=3.342) and that Bouncing balls on the ground is useful acquisition of number sequencing (MR=3.317). It was also evident that bouncing and counting enhance acquisition of counting skills (MR=3.258), and that bouncing balls on the walls influence acquisition of number values (MR=3.083). It was revealed that when learners bounce balls either on the walls or on the ground, they acquire counting skills. The table shows effectiveness at 0.4712 which is a rating closure to 1.000.

Ball bouncing is an outdoor activity performed by ECE learners in counting lessons. A learner may balance the ball using the forehead as counting numbers 1 – 20 continues with the other members of the class. This activity helps to sharpen learners counting skills like progressive counting and helps in motor development. The Ministry of Education in its national art on the development of Education in Kenya (2001) cited that counting coupled with outside activities like bouncing balls make learning more learner centered in order to promote imaginative skills in the learners which will in turn enhance progressive counting. In this study teachers and head teachers were asked whether

bouncing balls in a counting lesson could enhance acquisition of counting skills in learners. The results are presented in Table 4.7. In this end, collaborative learning is developed where assimilation and accommodation sets in. New learning is connected to previous knowledge (Froyd, 2007). Having learnt 1,2,3,4,5,6,7, 8, 9, 10 the learner progresses to 11,12,13 and so on. The learner enjoys the play activity (bouncing ball) but conjoins to counting. In her on influence of play on the development of pre school children's social skills, Wamboi K. (2011) noted that counting coupled with outdoor activities like bouncing balls helps learners to master counting of numbers.

Ball bouncing enables learners to be intuitive. Intuition is the ability of a learner to acquire knowledge without the use of reasoning. When learners bounce balls on the ground and count numbers, they are able to acquire fluency in counting numbers as the process is repeated over and over again (Weiner, 1974). The learner will be occupied in bouncing the balls and counting without straining as opposed to what would happen during an indoor rote lesson. Delivering a report on types of play, Amanda (2012) points out that ball bouncing enhances acquisition of number positioning, valuing and sequencing. Strongly in agreement to this is Otunga *et al.* (2011) stressing on outdoor learning to enhance acquisition of number values approximation, and positioning.

4.5.3 Descriptive Statistics on bicycle tube/tyre activities and counting

The third research question which this study sought to answer was to what extent does bicycle tube/tyre activities affect number counting skills. The respondents rating on the scale of one to four was summarized in Table 4.8.

Table 4.8: Bicycle Tube/Tyre Activities and Counting, n=118

Table 4.8 present the mean ratings depicting how tyre activities influence acquisition of counting skills

Statement	Mean Rating
Bicycle tube/ tyre activities influence acquisition of number counting skills	3.283
Running into tunnels and counting influences acquisition of progressive counting	3.225
Swinging of bicycle tyres around the waist enhances concept of number values in ECE learners	3.342
Jumping from tube to tube affects acquisition of number values	3.158

The study revealed that swinging of bicycle tyres around the waist enhances concept of number values in ECE learners (MR= 3.342). It was also evident that bicycle tube/ tyre activities influence acquisition of number counting skills (MR= 3.283); that running into tunnels and counting influences acquisition of progressive counting (MR= 3.225) and that jumping from tube to tube affects acquisition of number values (MR= 3.158). Tyre activities are outdoor activities done by learners. Tyre are swung around the waist as learners count from 1 – 20 the number of successful swings. This study sought to find out from teachers if the tyres enhance counting skills.

The mean rating indicates that teachers strongly agreed that tyre activities influence acquisition of counting skills. A teacher commented that:

“This activity enables learners to master counting faster. It is a refreshing exercise where the learner derives satisfaction in play. A part from being interesting, the activity enhances acquisition of progressive counting. Acquisition of number values and fluency in counting is also achieved”.

These views are expressed in the relaxation theory which posits that a learner needs to relax his/her muscles through outdoor activities. In support to this RTI, (2013) in the Primary Reading and Mathematics Initiative (PRIMR) counting using outdoor activities like tyres helps learners acquire basic counting skills like sequencing, fluency and also progressive counting. Writing on relevance of play in children's learning, Maya (2013) stressed that outdoor learning should be a matter of interest in developing necessary learning skills.

Of course learners are encouraged to participate in the activity, however difficult it may appear (Cummins, 2007). In his comments about interactive learning, Chika (2012) indicated that learners' active involvement in class activities will enhance acquisition of skills and help in acquisition of lesson objectives. A study conducted by Odundo (2013) found that learner involvement greatly promotes learner achievement and this encourages teachers to allow learners to be actively involved in tyre activities as this will enhance acquisition of fluency in counting, counting numbers progressively and number values since they will realize that if they count from 1 – 5 they lose as compared to when they swing tubes and count from 1 – 10. In support of these findings, is KENPRO (2011), which examined the effects of play materials on learners skills development and found that varied opportunities given to learners will rocket acquisition of learning skills. Supporting these findings, is RTI (2013), at a workshop for teachers in Ahero Zone where teachers were encouraged to provide such outdoor learning avenues like tyre activities.

In the inner tube tunnel or crawling approximately six to ten inner tubes are made into a tunnel with cars, the kids must crawl through the tunnel before their friends' count 1 to 10. This activity helps learners to master counting of numbers as they have to count fast and crawl faster before the counting comes to an end. Thinking ability is also enhanced as approximation is acquired. Jumping from inner tube tower to tower helps learners to acquire approximation since the learner has to jump from tower to tower without missing before their friends' count one to ten. If he misses then he loses the game.

In an open forum with the teachers one teacher commented:

“This game is really interesting to the learners because it requires speed and approximation which if missed, the whole game is lost. Moreover it is very good competition which makes them acquire mastery of numbers, positioning and sequencing”.

Supporting this is Maya (2013) portending that outdoor learning will support acquisition of learning skills.

4.5.4 Descriptive Statistics on racing activities and number counting

The researcher also sought to determine the respondents' agreement with given statements on racing activities and number counting.

Table: 4.9: Racing activities and Number Counting, n=118

The table presents the mean ratings of racing activities and number counting

Statement	Mean Rating
Racing activities influence acquisition of counting skills	3.425
Running in groups and recording positions affects acquisition of number values.	3.333
Relay running enhances acquisition of sequencing of numbers	3.342

The study showed that racing activities influence acquisition of counting skills (MR=3.425) and that Relay running enhances acquisition of sequencing of numbers (MR=3.342). It was also significantly evident that Running in groups and recording positions positively affects acquisition of number values (MR=3.333). This activity allows participation by all learners and so no learner is left out as some will be cheering on the runners while others record positions.

Waithera (2006) investigated the influence of play on learner achievement. Learner achievement was seen to increase with more learner centered activities. Teachers will allow learners to race with cars or bicycles but the end results are the same that is acquisition of positioning skills and number values. As noted by Vygotsky (1978). Piaget (1980) constructivism will help the learner process stimuli from the environment and the resultant cognitive structures that the learner builds produce adaptive behaviour. In racing activities therefore RTI (2014) notes that a learner will give positions upto 10 as his /her counterparts race in the field and realize that position 1 is better than 2 and 2 better than 3 in that order. In an open forum with ECE head teaches and teachers one lady teacher had this to say:

“This is the most difficult of the outdoor activities. The teacher is required to run around the field with the learner to encourage them. At times it is not always easy. We face challenges because some of us are not in a position to do their exercises. The activity is better performed by younger teachers.”

A male teacher interjected readily:

“Racing activities has a lot. It helps learners in mastery of numbers. Learners acquire positioning skills. They also acquire number valuing. Furthermore, if planned well a teacher merely guides but not necessarily running around them.”

In his report in 2008, Adeyemi noted that learners are the ones to initiate and lead in the activities. Teacher dominated lessons often thwart learners’ efforts to achieve the

objectives intended. Consequently in a running and counting session, democratic participation is encouraged and learners are allowed free communication. In his comments about democratic participation in learning, Chika (2012), Odundo (2016), indicated that learners participation in class activities will enhance acquisition of skills and promote acquisition of instructional objectives.

In relay racing, class is divided into teams. Each team is given a stick which its members will pass on to the other and on the way each runner targets to reach the second representative first before the rest until the fourth representative gets the stick and finishes the race taking positions. According to the teams helps learners acquire number positions, number values and competence in number identification. This study established that of the teachers felt that learners may learn problem solving skills and thinking as they will realize and that the team in position one is the winner and also the best, they will strive to achieve the best Ord and Leather, (2011).

Consequently, those findings are supported by a handbook for ECD syllabus (2008). In support of this is Otunga *et al.* (2011) and Maya (2013), who state that outdoor activities initiated by learners helps learners to obtain skills necessary for counting like the approximation skills. NACECE (2000) is in line with the idea that a teacher is merely a guide in outdoor lessons and learners are the one to take a centre stage. In racing therefore learners should be left to initiate games like racing with toys, cars, tyres or bikes. On the contrary, rote counting which was being practiced by the control groups in indoor lessons was seen to dwindle the process of acquisition of counting skills as learners were not engaged in activities that could boost their morale in counting numbers.

In a rapport with the teachers, one teacher commented this of rote counting:

“ Rote counting becomes monotonous. It is also a boring activity with the results that learners lose interests in mathematics lessons. This beats the sense in learning. This is because there is not direct learner’s involvement and input.”

Amanda, (2012), posited that for intrinsic motivation to be achieved, there has to be appealing and driving forces in a lesson that can help boost morale of learners. In her report on influence of play on the development of Pre school children’s social skills, Wambui, (2011) is in agreement that motivation is a fast driving force in acquisition of desired skills in learners.

The same views are held by Freud (1920), who posited that outdoor activities like running relays helps learners to scaffold. Scaffolding when a more competent learner or teacher helps a learner to achieve something that he/she would not achieve alone. In this study, in relay races a teacher will assist learners to staff off the race, help them to identify the first, second, third and fourth positions so as to enable learners to acquire number positioning.

Vygotsky (1978), is of the same view that when a learner reaches a zone of proximal development, (ZPD) then he/she requires assistance of a more competent peer or a teacher. The zone of proximal development refers to the difference between what the learner can achieve alone and what the learner can achieve if assisted. In her report on mathematics activities for (PRIMR), Lango (2013), holds that teacher and learner interactions helps in the acquisition of counting skills. On the same note teacher intervention should be based on encouraging and praising which will in turn motivate the learners (Rosseau 1978).

As the learners run for their teams, they should be cheered to run on and on and after their game is over, they should be appreciated instantly for all before the learners move on to the next activity. Motivation is stressed as an inescapable element in children's learning (Teaching Channel, 2015). Delivering a report on implications of instructional materials, on oral skills among ECE learners, in Kisumu, Okuneet *et al.* (2016), holds the view that racing and counting, recording positions, will speed up learners' acquisition of counting like number values, positioning and sequencing. KENPRO (2014) is in agreement with this view as is the Ministry of Education (2016) offering that learners should be given ample time to conduct outdoor learning.

4.5.5 Descriptive Statistics on see saw swinging and number counting

The last research question for the study sought to answer as to what extent see saw swinging affects number counting among ECE learners in Nyando sub-county. The respondents' ratings on the scale of one to four were summarized in Table 4.10.

Table 4.10: See Saw Swinging and Number Counting, n=118

The table presents the mean ratings of swinging and number counting.

Statement	Mean Rating
Seesaw swinging activity influence acquisition of skills in counting	3.217
Faster animation sea saw influences acquisition of number sequencing	2.733
Animation sea saw swinging influences acquisition of number values	2.842
Individual swinging influences acquisition of progressive counting	3.258

Table 4.10 summarizes the views of the respondents on various statements about sea saw swinging and number counting. The findings show that most respondents agreed that Individual swinging influences acquisition of progressive counting (MR=3.258), that Seesaw swinging activity influence acquisition of skills in counting (MR=3.217), and that Animation sea saw swinging influences acquisition of number values (MR= 2.842). There was also a significant agreement that Faster animation sea saw influences acquisition of number sequencing (MR= 2.733).

These findings are shared by Lyndy (2012) that outdoor activities like sea saw swinging makes learners share experiences through interaction that improves the use of numbers that were learnt in previous activities. Added to that, learners will count books, pens or even money. Rennie Centre for Education Research and Policy (2014) contended that outdoor activities enhance counting skills to be used by learners later in life and encourages effective adoption. Evidently, approximation, positioning, number values and identification of numbers will go along way in helping the learners solve problems that they encounter in their environment, Wafula *et al.* (2012). Rote counting on the other hand may not enable learners to think but merely cram and may easily forget which number comes after which or alternatively which number comes before which one. McDowell (2001). In an open forum with the teachers one teacher had this to say:

“Let us bare in mind that time is the cause of much forgetting. For learners to acquire counting skills, repetition of sea saw swinging is necessary. The most interesting part is when a learner’s side appears to be heavier when he is brought down and his game counterpart is thrown up. Everybody laughs and game ends.”

These sentiments are supported by Edward Thorndike (1914), in the decay of memory trace. He explains that natural forgetting occurs with the lapse of time. Due to disuse the

traces of memory becomes weaker and finally fade off. Therefore the older the experience, the weaker the memory. To this end, outdoor activities should be part and parcel of an ECE counting class. The more the learners swing and count frequently the more they are going to memorize the numbers, approximate accurately, have number value and also be able to count on progressively.

4.6. Descriptive Statistics on participation in outdoor activities

The study also sought to find out the extent to which the respondents agreed with general guidelines on ECE learners' participation in outdoor activities in Nyando sub-county. The findings were summarized in Table 4.11.

Table 4.11: Participation in outdoor activities, n=118

The table below presents participation in outdoor activities as performed in Nyando Sub-County.

Statement	Mean Rating
Instructors should guide learners during outdoor activities	3.675
Outdoor materials should be provided in ECE centres	3.692
All learners should actively participate in outdoor activities	3.633

The study revealed that Outdoor materials should be provided in ECE centres (MR= 3.692), that Instructors should guide learners during outdoor activities (MR= 3.675) and that All learners should actively participate in outdoor activities (MR= 3.633).

4.7. Correlation and Regression Analysis

The researcher used correlation and regression analysis to determine the effect of ball bouncing, bicycle tube/tyres activities, racing activity and seesaw swinging activities on

number counting among ECE learners in Nyando sub-county using SPSS software. As part of the analysis, Pearson's Correlation Analysis was done on independent and dependent variables.

Table 4.12: Correlation coefficients at 5% critical value (two-tailed) = 0.2404 for n = 120

The table presents the correlation coefficients and critical values of the variables

Effectiveness	Skipping rope	Ball bouncing	Bicycle tube/tyre	Racing	Seesaw swinging	
1.0000	0.6723	0.4712	0.5481	0.6415	0.6153	Effectiveness
	1.0000	0.7181	0.8743	0.8147	0.7812	Skipping rope
		1.0000	0.7123	0.8141	0.6732	Ball bouncing
			1.000	0.7183	0.6841	Bicycle tube/tyre
				1.0000	0.8412	Racing
					1.0000	Seesaw swinging

The study assessed multicollinearity of the independent variables. A relationship existed between the five variables ranging from 0.4712 to 0.8743. From the table, it is clear that when learners skip ropes and count numbers they are able to acquire counting skills. The table reveals effectiveness at 0.6723. Ball bouncing has an effectiveness of 0.4712. These two variables are therefore considered to be effective in influencing learner acquisition of the counting skills.

It was revealed that when learners bounce balls, they acquire counting skills; the table shows the effectiveness to be at 0.4712 which is a rating closer to 1.000. Bicycle tube tyre activities coupled with counting numbers were seen to help learners acquire progressive counting number sequencing and number values since the mean rating was 0.5481.

Table 4.13: Model Summary

Model	R	R Square	Adjusted Square	R	Standard Error of the Estimate
1	.859 (a)	.800	.718		.59451

The adjusted R^2 is the coefficient of determination which highlights the variation in dependent variable due to changes in independent variable. The adjusted R^2 was 0.718 showing that there was 71.8% variation due to skipping rope, ball bouncing, bicycle tyres activities, racing activity and seesaw swinging.

Table 4.14: Analysis of Variance (ANOVA)

Model		d.f.	Sum of Squares (s.s.)	Mean Square (m.s)	F	Sig.
1	Regression	5	348.85	69.77	9.737	<.001(a)
	Residual	6	12.79	2.1317		
	Total	11	361.64			

The study used analysis of variance (ANOVA) table as per table 4.14 to establish the significance of regression model. In testing the significance level, the statistical significance was considered significant if the p-value was less than 0.005. The overall ANOVA results indicates that the model was statistically significant at $F=9.737$, $P\text{-value} = <.001$

Table 4.15: Estimate of Parameters

The table below present the estimate of parameters

		Estimate	Standard error(s.e)	t(6)	t Pr.
Model	Constant	26.19	1.07	24.47	<.001
1	Skipping rope	5.386	0.903	5.96	<.001
	Ball bouncing	3.079	0.903	3.41	0.001
	Bicycle tyre/tube activities	2.716	0.963	2.82	<.001
	Racing	3.112	0.948	3.28	0.001
	Seesaw swinging	2.489	0.871	2.86	0.002

From the table of constants, the values or coefficient for the proposed model in chapter three are provided as follows after replacement with the coefficient values: Number counting skills (Y) = 26.19 + 5.386 Skipping Rope +3.079 Ball Bouncing +2.716 Bicycle Tyre/Tube Activities +3.11 Racing Activities +2.489 Seesaw Swinging

From the above regression equation skipping rope, ball bouncing, bicycle tyres activities, racing activity and seesaw swinging would affect number counting skills by an index of

26.19. Unit increase in skipping Rope would lead to an increase in number counting skills by a factor of 5.386, unit increase in ball bouncing would lead to an increase in number counting skills by a factor of 3.079, unit increase in bicycle tube/tyre activities would lead to an increase in number counting skills by a factor of 2.716 while unit increase in racing activity would lead to an increase in number counting skills by a factor of 3.11. Unit increase in seesaw swinging would lead to an increase in number counting skills by a factor of 2.489.

4.8. Hypothesis Testing

Other than the statistically significant results from correlation and regression analysis, a post experimental test was given to the two sets of learners. The control group constituting 40 pupils ($N_1=40$) had a mean score of 54 ($\bar{x} = 54$) with a standard deviation of 8 ($\delta = 8$) while the mean score for the experimental group composed of 50 ($N_2 = 50$) pupils had a mean score of 78 ($\bar{x} = 78$) with a standard deviation of 6, ($\delta = 6$).

The Z-test involving differences of means in performance at 95% significance level between the two groups was hypothesized as:

$H_0: \mu_1 = \mu_2$; Difference is due to chance

$H_1: \mu_1 \neq \mu_2$; Significant difference exists

Under H_0 with the same population, the mean and standard deviation of the difference in means was given by:

$$\mu_{\bar{x}_1 - \bar{x}_2} = 0$$

$$\text{and } \delta_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{\delta_1^2}{N_1} + \frac{\delta_2^2}{N_2}},$$

$$= 2.32$$

Therefore,

$$Z = \frac{\bar{x}_1 - \bar{x}_2}{\delta_{\bar{x}_1 - \bar{x}_2}} = \frac{-24}{2.32}$$

$$= - 10.344$$

For a two tail test, results are significant at 0.05 confidence level if Z lies outside the range $-1.96 \leq Z \leq 1.96$.

From the results above, there is a significant difference ($Z=- 10.344$) showing that the experimental group performed better.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of the findings from chapter four, and draws conclusions and gives recommendations of the study based on the objectives of the study. The chapter finally presents the limitations of the study and suggestions for further studies and research.

5.2 Summary of Findings

The objective of this study was to determine the effect of effect of outdoor activities on number counting among ECE learners in Nyando sub- county. The results of the study show that there was significant effect of outdoor activities on number counting among ECE learners in Nyando Sub-County. It was also clear that there was a positive correlation between skipping rope, ball bouncing, bicycle tubes/tyres activities, racing activity and seesaw swinging. This indicates that the independent variables and dependent variable move in the same direction, that is as one increases, the other also increases. From the findings, R^2 has a value of 0.800 meaning that 80% of dependent variables can be explained or attributed to combination of the three independent factors being investigated in his study. There was a clear indication that skipping ropes influenced learner ability to acquire fluency in counting numbers. Learners also acquired number positioning as the mean rating was 3.325. A positive influence was also registered as ball bouncing on the ground or on the walls influenced learner acquisition of fluency number sequencing and number values as the mean rating was 3.258. Bicycle tyre

activities also influenced learner ability to acquire number positioning, fluency and number values. This was revealed by a mean rating of 3.283. Racing activities were approved to influence acquisition of counting skills with a mean rating 3.425. See Saw swinging activity having a mean rating of 3.217 thus the conclusion that it influenced learner ability a approximation skills, number acquisition and progressive counting.

5.3 Conclusion

Based on the findings, it was conclude that a great percentage of ECE teachers and headteachers strongly agreed that skipping rope enhances counting skills as constant repetition of skipping arouses constant practices which results in learners ability to acquire counting skills. It was also concluded that ball bouncing greatly increased learners ability to acquire counting skills as ball bouncing enables learners to be intuitive where learners acquire skills in counting without reasoning. According to the mean rating on Table 4.7, most school teachers and headteachers strongly agreed that ball bouncing greatly influences ability of learners to acquire counting skills like fluency.

It is evident that tyre activities influence ability of learners to acquire skills in number values and progressive counting. Findings indicate that racing activities enhance ability of learners to acquire skills in number, values and number sequencing. Findings indicate that respondents agreed that seasaw swinging influences ability of learners to cont progressively, and also number approximation.

5.4 Recommendations

Based on the findings the following recommendations were made;

1. That the county government should encourage ECE teachers to engage in skipping ropes. The teachers were seen not to participate in this activity due to evidence of non existence of ropes in ECE centres. This problem can be overcome if the government applies funds which may be used to buy the ropes. Alternatively teachers can improvise sisal woven ropes which are relatively cheaper.
2. The county government should supply enough money for purchase of balls. Improvisation and teacher creativity plays a major role as learners should be encouraged and guided to make balls out of polythene bags
3. The county government should avail enough fund for the purchase of tyres or rings. In most ECE centres learners do not get equal opportunities of performing this activity due to lack of enough materials. Learners can be asked bring used tyres from home.
4. Adequate playing fields should be made available. The problem realized is that in quite a number of centres learners do not have ample space to perform racing activities and this denies them the chance of acquiring number positioning skills and number valuing.
5. The County government should also avail resources for installing seasaw swings. It was observed that ECE public centres lacked seasaw swings. This state of affairs denies learners another opportunity of acquiring approximation skills, number valuing and progressive counting.

5.5 Suggestions for Further Research

The study suggests the following:

- i. A study on the effect of availability of play materials on number counting or since data has indicated that unavailability or lack of play materials dwindle the counting process.
- ii. Effect of teacher outdoor training on acquisition of number counting skills among ECE learners as it is evident that teacher who do not embrace outdoor learning have learners who are slow in acquiring counting skills.
- iii. Effect of teacher participation in outdoor activities on number counting among ECE learners. This is necessary as this study has established that interactive learning boosts morale of learners and thereby learner acquisition of counting skills is enhanced.
- iv. Effects of ample play field on ability of learners to acquire learning skills. This is necessary as free play is offered and strengthened in the field
- v. Influence of swinging on learners ability to acquire learning skills. This study found out that there are inadequate swings in ECE centres that deny learners opportunity of participation

Table 4.16: Contribution to body of knowledge

The table presents the contribution of objectives of the study to the body of knowledge

	Objective	Contribution
1	To assess effects of skipping ropes on number counting by ECE learners in Nyando Sub-County	The activity helps the participants to be physically fit. They learn the art of sharing as it is not a single learner activity. The activity also arouses creativity in both teachers and learners when they improvise sisal rope for skipping
2	To assess the effects of tyre activities on ability of learners to acquire counting skills	Physical fitness is achieved thus motor development is achieved when learners swing tyres on their waist.
3	To assess the effect of ball bouncing on ability of learners to acquire counting skills	Creative ability of learners is enhanced as they improvise balls. They may also play other games like football or ball tossing and here language acquisition takes place in the process. Learning by Interaction was also portended by vygotsky (1978)
4	To assess the effect of racing activities on ability of learners to acquire counting skills	Learners are encouraged to be competent as in this activity one strives to be a winner. The advantage of physical fitness is realized as the surplus energy is seen to be exhibited as explained by Callie (2016)
5	To assess the effect of seasaw swinging on ability of learner to acquire counting skills	This activity allows learners to approximate weight as they strive not to be heavier than their partners. Later in advanced mathematics, this skills will help them to understand concept like weight and measures, Agango (2014)

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APPENDICES

APPENDIX 1: QUESTIONNAIRE FOR PRE S CHOO L TEACHERS

	QUESTION	RESPONSES				INSTRUCTIONS
1.0.	BACKGROUND CHARACTERISTICS					
1.1	Name of Centre					Indicate in full
1.2	For how long have you taught in this schools?					
1.3.	How long is your professional experience	5 Years 10 Years Over 10 Years				Tick against your choice
1.4	Gender	Male : _____ Female: _____				
1.5	How old are you ?					
1.6.	Are you a trained ECE teacher?	Yes	No			
1.7.	If yes, upto which level?	Certificate1 Diploma2 Degree.....3				
1.8.	What are your roles as an ECE Teacher	-----1 -----2 -----3				
1.9.	Learners participate positively in outdoor activities.	Agree 1	Strongly agree 2	Disagree 3	Strongly disagree 4	
	QUESTION	RESPONSES				INSTRUCTIONS
2.0	SKIPPING ROPE AND COUNTING					

2.1	Are you aware that skipping rope activities enhance counting skills?	Strongly agree	Agree	Disagree	Strongly disagree	Tick against your answer
2.2	Alternate foot jump creates faster counting fluency	Strongly agree	Agree	Disagree	Strongly disagree	
2.3.	Double under is useful in acquisition of progressive counting	Strongly agree	Agree	Disagree	Strongly disagree	
2.4.	Basic jump influences acquisition of progressive counting	Strongly agree	Agree	Disagree	Strongly disagree	
2.5	Double under is useful in acquisition of sequencing of counting numbers	Strongly agree	Agree	Disagree	Strongly disagree	
3.0.	BALL BOUNCING					
3.1	Does ball bouncing and counting enhance acquisition of counting skills?	Strongly agree	Agree	Disagree	Strongly disagree	
3.2	Bouncing balls on forehead influences acquisition of counting in counting.	Strongly agree	Agree	Disagree	Strongly disagree	
3.3.	Bouncing balls on the ground is useful acquisition of number sequencing	Strongly Agree	Agree	Disagree	Strongly disagree	
3.4	Bouncing balls on the walls influence acquisition of number values.	Strongly agree	Agree	Disagree	Strongly disagree	

	QUESTION	RESPONSES				INSTRUCTIONS
4.0.	TYRE ACTIVITY					
4.1.	Does tyre activities influence acquisition of number counting skills?	Strongly agree	Agree	Disagree	Strongly disagree	
4.2.	Running into tunnels and counting influences acquisition of progressive counting	Strongly agree	Agree	Disagree	Strongly disagree	
4.3	Swinging of tyres around the waist enhances concept of number values in ECE learners	Strongly agree	Agree	Disagree	Strongly disagree	
4.4	Jumping from tyre to tyre affects acquisition of number values	Strongly agree	Agree	Disagree	Strongly Disagree	
5.0	RACING AND NUMBER COUNTING					
5.1	Do racing activities influence acquisition of counting skills	Strongly agree	Agree	Disagree	Strongly disagree	
5.2.	Running in groups and recording positions affects acquisition of number values.	Strongly agree	Agree	Disagree	Strongly disagree	
5.3.	Relay running enhances acquisition of sequencing of numbers	Strongly agree	Agree	Disagree	Strongly disagree	
6.0	SEESAW SWINGING AND COUNTING NUMBER					
6.1	Does seesaw swinging activity influence acquisition of skills in counting	Strongly agree	Agree	Disagree	Strongly disagree	
6.2	Faster animation sea saw influences acquisition of number sequencing	Strongly agree	Agree	Disagree	Strongly Disagree	
6.3.	Animation sea saw swinging influences acquisition of number values	Strongly agree	Agree	Disagree	Strongly Disagree	
	QUESTION	RESPONSES				INSTRUCTIONS

6.4.	Individual swinging influences acquisition of progressive counting	Strongly agree	Agree	Disagree	Strongly disagree	
7.0	PARTICIPATION IN OUTDOOR ACTIVITIES					
7.1.	Instructors should guide learners during outdoor activities	Strongly agree	Agree	Disagree	Strongly disagree	
7.2.	Outdoor materials should be provided in ECE centres	Strongly agree	Agree	Disagree	Strongly disagree	
7.3.	All learners should actively participate in outdoor activities	Strongly agree	Agree	Disagree	Strongly disagree	

THANK YOU FOR YOUR COOPERATION

APPENDIX 11 :QUESTIONNAIRE FOR HEAD TEACHERS

	QUESTION	RESPONSES				INSTRUCTIONS
1.0.	BACKGROUND CHARACTERISTICS					
1.1	Name of Centre					Indicate in full
1.2	For how long have you taught in this schools?					
1.3.	How long is your professional experience	5 Years 10 Years Over 10 Years				Tick against your choice
1.4	Gender	Male : _____ Female: _____				
1.5	How old are you ?					
1.6.	Are you a trained ECE teacher?	Yes	No			
1.7.	If yes, upto which level?	Certificate1 Diploma2 Degree.....3				
1.8.	What are your roles as an ECE Teacher	-----1 -----2 -----3				
1.9.	Learners participate positively in outdoor activities.	Agree	Strongly agree	Disagree	Strongly disagree	
		1	2	3	4	
	QUESTION	RESPONSES				INSTRUCTIONS
2.0	SKIPPING ROPE AND COUNTING					

2.1	Are you aware that skipping rope activities enhance counting skills?	Strongly agree	Agree	Disagree	Strongly disagree	Tick against your answer
2.2	Alternate foot jump creates faster counting fluency	Strongly agree	Agree	Disagree	Strongly disagree	
2.3.	Double under is useful in acquisition of progressive counting	Strongly agree	Agree	Disagree	Strongly disagree	
2.4.	Basic jump influences acquisition of progressive counting	Strongly agree	Agree	Disagree	Strongly disagree	
2.5	Double under is useful in acquisition of sequencing of counting numbers	Strongly agree	Agree	Disagree	Strongly disagree	
3.0.	BALL BOUNCING					
3.1	Does ball bouncing and counting enhance acquisition of counting skills?	Strongly agree	Agree	Disagree	Strongly disagree	
3.2	Bouncing balls on forehead influences acquisition of counting in counting.	Strongly agree	Agree	Disagree	Strongly disagree	
3.3.	Bouncing balls on the ground is useful acquisition of number sequencing	Strongly Agree	Agree	Disagree	Strongly disagree	
3.4	Bouncing balls on the walls influence acquisition of number values.	Strongly agree	Agree	Disagree	Strongly disagree	

	QUESTION	RESPONSES				INSTRUCTIONS
4.0.	TUBE TYRE ACTIVITY					
4.1.	Does tube tyre activities influence acquisition of number counting skills?	Strongly agree	Agree	Disagree	Strongly disagree	
4.2.	Running into tunnels and counting influences acquisition of progressive counting	Strongly agree	Agree	Disagree	Strongly disagree	
4.3	Swinging of tube tyres around the waist enhances concept of number values in ECE learners	Strongly agree	Agree	Disagree	Strongly disagree	
4.4	Jumping from tube to tube affects acquisition of number values	Strongly agree	Agree	Disagree	Strongly Disagree	
5.0	RACING AND NUMBER COUNTING					
5.1	Do racing activities influence acquisition of counting skills	Strongly agree	Agree	Disagree	Strongly disagree	
5.2.	Running in groups and recording positions affects acquisition of number values.	Strongly agree	Agree	Disagree	Strongly disagree	
5.3.	Relay running enhances acquisition of sequencing of numbers	Strongly agree	Agree	Disagree	Strongly disagree	
6.0	SEESAW SWINGING AND COUNTING NUMBER					
6.1	Does seesaw swinging activity influence acquisition of skills in counting	Strongly agree	Agree	Disagree	Strongly disagree	
6.2	Faster animation sea saw influences acquisition of number sequencing	Strongly agree	Agree	Disagree	Strongly Disagree	
6.3.	Animation sea saw swinging influences acquisition of number values	Strongly agree	Agree	Disagree	Strongly Disagree	
	QUESTION	RESPONSES				INSTRUCTIONS

6.4.	Individual swinging influences acquisition of progressive counting	Strongly agree	Agree	Disagree	Strongly disagree	
7.0	PARTICIPATION IN OUTDOOR ACTIVITIES					
7.1.	Instructors should guide learners during outdoor activities	Strongly agree	Agree	Disagree	Strongly disagree	
7.2.	Outdoor materials should be provided in ECE centres	Strongly agree	Agree	Disagree	Strongly disagree	
7.3.	All learners should actively participate in outdoor activities	Strongly agree	Agree	Disagree	Strongly disagree	

THANK YOU FOR YOUR COOPERATION

**APPENDIX III: OBSERVATION CHECKLIST ON EXPERIMENTAL GROUPS
USING OUTDOOR COUNTING DURING A PRE TEST**

The researcher will observe whether the learners are able to acquire counting skills during various outdoor activities.

Pre test items	Very good	Good	Better	Poor
<p>Skipping rope</p> <ul style="list-style-type: none"> • Fluency • Counting on • Writing numbers • Positioning • Number values • Identification of numbers • Sequencing 				
<p>Ball bouncing</p> <ul style="list-style-type: none"> • Fluency • Counting on • Writing numbers • Positioning • Number values • Identification of numbers • Sequencing 				

How to be observed	Very good	Good	Better	Poor
Tube Tyres Activities <ul style="list-style-type: none"> • Fluency • Counting on • Writing numbers • Positioning • Number values • Identification of numbers • Sequencing 				
Racing Activities <ul style="list-style-type: none"> • Fluency • Counting on • Writing numbers • Positioning • Number values • Identification of numbers • Sequencing 				
Sea Saw Activities <ul style="list-style-type: none"> • Fluency • Counting on • Writing numbers • Positioning • Number values • Identification of numbers • Sequencing 				

**APPENDIX IV: OBSERVATION CHECKLIST ON EXPERIMENTAL GROUPS
USING OUTDOOR COUNTING AFTER A POST TEST**

The researcher will observe whether the learners are able to acquire counting skills during various outdoor activities.

Pre test items	Very good	Good	Better	Poor
<p>Skipping rope</p> <ul style="list-style-type: none"> • Fluency • Counting on • Writing numbers • Positioning • Number values • Identification of numbers • Sequencing 				
<p>Ball bouncing</p> <ul style="list-style-type: none"> • Fluency • Counting on • Writing numbers • Positioning • Number values • Identification of numbers • Sequencing 				

How to be observed	Very good	Good	Better	Poor
Tube Tyres Activities <ul style="list-style-type: none"> • Fluency • Counting on • Writing numbers • Positioning • Number values • Identification of numbers • Sequencing 				
Racing Activities <ul style="list-style-type: none"> • Fluency • Counting on • Writing numbers • Positioning • Number values • Identification of numbers • Sequencing 				
Sea Saw Activities <ul style="list-style-type: none"> • Fluency • Counting on • Writing numbers • Positioning • Number values • Identification of numbers • Sequencing 				

**APPENDIX V: OBSERVATION CHECKLIST ON CONTROL GROUPS USING
ROTE COUNTING DURING A PRE TEST**

Pre Test items	Very Good	Good	Better	Poor
Fluency				
Counting on				
Writing Numbers				
Positioning				
Number Values				
Identification of numbers				
Sequencing				

**APPENDIX VI: OBSERVATION CHECKLIST ON CONTROL GROUPS USING
ROTE COUNTING DURING A POST TEST**

Pre Test items	Very Good	Good	Better	Poor
Fluency				
Counting on				
Writing Numbers				
Positioning				
Number Values				
Identification of numbers				
Sequencing				

Piaget, J (1930), *The Child's Conception of Physical Causality*. London Trench.

APPENDIX VII: RESEARCH PERMISSION FROM THE UNIVERSITY



**UNIVERSITY OF NAIROBI
COLLEGE OF EDUCATION AND EXTERNAL STUDIES
SCHOOL OF CONTINUING AND DISTANCE EDUCATION**

Our Ref.: UON/CEES/KSM/1/16

University Of Nairobi Plaza
Oginga Odinga Street
P.O. Box 825,
KISUMU Kenya

Telephone: Kisumu 057-2021534

30th May, 2016

TO WHOM IT MAY CONCERN

RE: ACHIENG GRACE AYODO - REG NO: E57/73669/2014

This is to inform you that the above named **Grace Achieng** is a student in the University of Nairobi, College of Education and External Studies, School of Education pursuing **Masters** Degree in **Early childhood Education**.

Grace has completed her course work and examinations successfully and is now undertaking her Research project which is a pre-requisite for the course. The Research is entitled **"Effect of Outdoor Activities on Number Counting Among Early Childhood Education Learners in Nyando Sub-county, Kisumu County"**. The purpose of this letter therefore is to request you to allow the student to access the data or information he may need for purpose of this study. The data is required for his academic purposes only and not for any other reasons.

We would appreciate any assistance that may be given to enable him carry out the study.

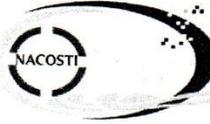
Yours faithfully,


Dr. RAPHAEL O. NYONJE, PhD
RESIDENT LECTURER
KISUMU CAMPUS



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NAIROBI-KENYA

Ref. No. **NACOSTI/P/16/47548/12471**

Date:
15th November, 2016

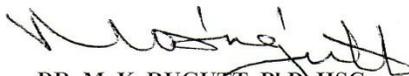
Grace Achieng Ayodo
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*Effect of outdoor activities on number counting among early childhood education learners in Nyando Sub-County Kisumu County,*" I am pleased to inform you that you have been authorized to undertake research in **Kisumu County** for the period ending **28th October, 2017.**

You are advised to report to **the County Commissioner and the County Director of Education, Kisumu County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.


DR. M. K. RUGUTT, PhD, HSC.
DIRECTOR-GENERAL/CBO

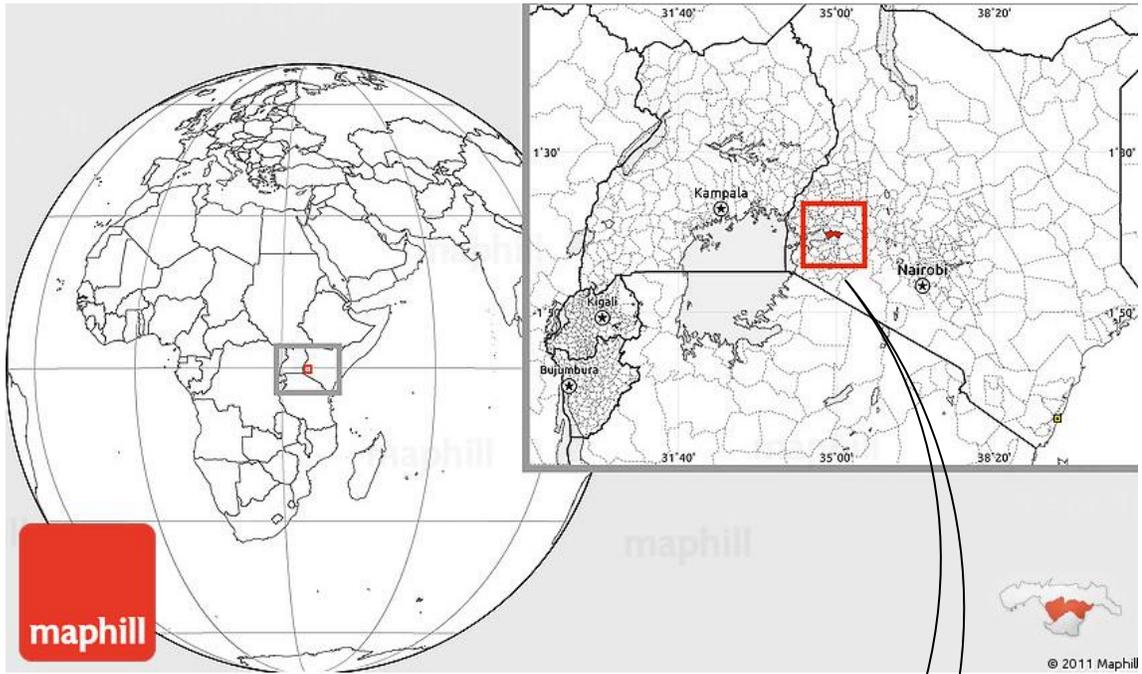
Copy to:

The County Commissioner
Kisumu County.

The County Director of Education
Kisumu County.

National Commission for Science, Technology and Innovation is ISO 9001:2008 Certified

APPENDIX VIII: SITE MAP



MAP OF NYANDO SUB – COUNTY

