EFFECTS OF DISCOVERY LEARNING ON PARTICIPATION OF LEARNERS' IN EARLY CHILDHOOD SCIENCE CLASSROOMS IN STAREHE DISTRICT

BY

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other college or university.

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DEDICATION

This thesis is dedicated to my parents, Mr. Calvins Ariko and Mrs Margaret Ariko, my husband Ezekiel Walala, my children Charles Oluoch, Annet Anyango, June Achieng and Derick Omondi from whose support and encouragement, I get a pillar of strength.

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ABSTRACT

Science is a process of finding our knowledge about ourselves and the world, through exploration and use of senses which help to develop and use scientific skills. It is a unique subject that enhances positive attitudes in the face of reliable evidence, through thinking in a clear logical way, formulating concepts, identifying problems and solving problems. In this view, there has been a lot of emphasis for an instructional shift from authoritarian, strict, pre-ordained knowledge approaches of science, to those that allow numerous and endless opportunities for practical exploration of the environment, through self selected activities for instance experimentation, observation, prediction, self discovery and exploration. Such opportunities have been echoed in teaching of the modem science as they help in transforming the minds thoughts, feelings, desires, wishes and aspirations making up the life of a learner in a preschool classroom enjoyable and meaningful. Based on this realization and also that approaches of traditional education are too irrelevant in delivering science skills and are not enough in satisfying learners' natural curiosity, discovery learning (DL) has been identified as one reliable approach for learners' of the twenty first century. DL provides opportunities for meaningful construction of knowledge, recognizes learners' needs and helps develop life long science skills. Surprisingly, a great number of preschool children are still predominantly instructed using expository approaches; work with inadequate learning resources within poorly organized classroom environment in which learners' differences and styles are uncared for. This has been established to inhibit their participation in science activities. It is against this background, that the study sought to establish the extent to which choice of DL as an approach to science learning, affects learner participation (LP) in science in early childhood classrooms. Guided by five objectives and five research questions, the study adopted a descriptive survey research design due to its ability to elicit diverse information and wide responses. Data collection items were constructed, pilot tested in three preschools targeting, heads of schools and teachers. This preceded administration of tools and a reconnaissance visit to seek rapport with respondents. Thereafter, with the use of two tools, a questionnaire and an observation checklist, data collection went on for about three months where inferences were made without manipulating variables, after coding and thematically grouping coherent information. From a population of 15 preschools, 15 head teachers and 33 teachers were randomly sampled to respond to the study. All respondents were found to be having requisite basic education and training where 90% had certificate and diploma qualification in Early Childhood Development and Education (ECDE). However, massive numbers of teachers were found to possess poor perception as far as DSL activities are concerned. This was identified as a limitation on their choice of learning activities because of inadequate skills, knowledge and low opinion of this approach for good science classroom management. On the other hand, learners who were handled by diploma holders were well taken care of in terms of choice of learning approaches, provision of learning resources and appropriate learning environment. Poor choice of instructions was found to be attributed to lack of adequate skills, knowledge and creativity in resource management among others. In a bid to improve LP in science activities in ECE classrooms, the study recommended that Ministry of Education and KESI to empower preschool teachers and give comprehensive guidance on prioritizing science learning through Discovery Science Learning (DSL) activities. Expansion of resource allocation to enhance capacities of preschool teachers as well as employing more skilled QASOs to monitor science learning was also suggested to be some of the government priorities.

LIST OF ABBREVIATIONS AND ACRONYMS

CBECD	:	Community Based Early Childhood Development.
CBO	:	Community Based Organization
CCF	:	Christian Children's Fund
DEO	:	District Education Officer
DICECE	:	District Centre for Early Childhood Education
DL	:	Discovering Learning
DLA	:	Discovery Learning Activities
DSA	:	Discovery Science Activities
DSL	:	Discovery Science Learning
ECDE	:	Early Childhood Development and Education
ECESC	:	Early Childhood Education Science Classroom
GoK	:	Government of Kenya
KESI	:	Kenya Education Staff Institute
KIE	:	Kenya Institute of Education
KU	:	Kenyatta University
LCIM	:	Learner Centered Instructional Methods
MoE	:	Ministry of Education
MoEST	:	Ministry of Education Science & Technology
MoH	:	Ministry of Health
NACECE	:	National Centre for Early Childhood Education
NGO	:	Non Governmental Organization
PSS	:	Pre School Services
QASOs	:	Quality Assurance and Standards Officers
SMASSE	:	Strengthening Science and Mathematics in Secondary Schools Education
TCIM	:	Teacher Centered Instructional Methods
UNESCO	:	United Nations Educational Scientific and Cultural Organization
UNICEF	:	United Nations Education Science and Cultural Organization.

INTRODUCTION

1.0 Introduction

This chapter begins with background to the study, statement of the problem, purpose of the study, research objectives and research questions. This is then followed by significance, assumptions and limitations of the study. It concludes with study organization and definition of operational terms.

1.1 Background to the Study

Access to Early Childhood Education (ECE) promotes early active participation in preschool science that engages the learners' five sensory experiences such as sight, smell, touch, taste and hearing (Miller, 2000). Such sensory experiences promote social, intellectual, physical. emotional, moral growth and as well enhancing learners' development of keen interest in science, which is a process of combining self directed, thoughtful reflections with guided thinking skills (Hammersly, 1986). Discovering Learning (DL) approaches empower learners to construct own knowledge, encourages learners to make interpretation of their play activities, construct own realities and interpret information based on individual perceptions and experiences. Learning science through discovery activities has been confirmed by studies (Patricia, 2001 and Miller, 2000) to improve LP, achieve relevant quality knowledge and skills to effectively manipulate their immediate environment.

The focus on an ideal instructional strategy that ensures improvement of learners' participation and guarantees success as well as high achievement of learners in science subjects has been the center of debates in many parts of the world. In 1taly after World War II for instance, parents of the villages around Reggio Emilia felt that early years of development of learners is the formation of an individual (Cadwell, 1997). This led to creation of a program based on the interests of the learners, through self-guided learning activity and curriculum which greatly improved acquisition of skills in science. This community felt that learning in preschool should be guided by respect and responsibility, through exploration and discovery in a supportive and enriched environment. They believed that in such an environment, learners take control over direction of learning and learn through experiences by touching, moving, listening, seeing, experimenting, communicating and hearing which enhances acquisition of science based skills (Cadwell, 1997). Similar sentiments also arose in America in 1983, which culminated into a declaration of "A Nation at Risk" program. This emphasized on serious problems of science learning right from preschools in the twenty first century (Cadwell, 1997). Besides, the program advocated for science learning that prepares learners for life participation in future science subjects. This necessitated an instructional shift from transmitting body of expected knowledge which was largely memorized, to discovery activities that was largely process oriented (Cadwell, 1997).

In Kenya, science learning has become increasingly a matter of concern with the No Child Left Behind program', which emphasizes the need of strengthening DL from preschool level (Republic of Kenya, 2005). Specifically, the project's purpose has been to enhance young Kenyans capability in practical learning and to develop creative activities from formative years through hands on participation. Views on this conceptual change, has seen progress made in identifying science learning that promotes acquisition of knowledge through experimenting and defending ideas. Wiser and Amin (2002) further supported the use of DL activities coupled with interaction within the immediate environment in which the teacher promotes scaffolding of ideas in accordance with Vygotsky's (1978) theory of learning to ensure that observation, experimentation and hypothesizing among other science concepts are promoted to help learners think clearly and logically in solving scientific problems.

According to a study by Santrock (2004), preschoolers are natural participants who engage in learning through play activities relevant in promoting acquisition of science concepts and skills. Therefore, introducing preschool children to DL activities and skills that involve practical hands on and minds on, provide them with adequate freedom to explore and construct their world (Republic of Kenya. 2005). This as well enhances learners' acquisition of knowledge, skills and attitudes through mutual interaction with learning environment. Bruner (1969) further identified benefits of DL as a means of supporting active engagement in acquiring abstract concepts hence fostering curiosity and motivation to enabling development of life science learning skills. DL gravitates around active involvement in the learning process and setting own science learning goals. This balanced adoption of hands on activities in DL, helps learners to become better scientists, by being observant, allowing them to formulate hypotheses and provide judgments and conclusions regarding science processes. Goals associated with DL and development of science knowledge and skills facilitate development of knowledge about science concepts right from preschool (Cadwell, 1997). .

Discovery Science Activities (DSA) promote relationship among learners when working with material items permitting them to explore and have endless opportunities of expressing their own interests (Patricia, 2001). The implication for this is that learners should be encouraged to acquire concepts on their own in science through DL which is anchored on practical activities such as nature adventures, project work and experimentation, observation, practical work, predictions, field trips. Additionally, real-life problem-solving among peers, blended with numerous opportunities for practical and exploration, provide a window for learners to engage in a variety of self-selected activities in a classroom such as sorting, grouping, matching, pairing and exploration. Such approaches boost acquisition of science concepts and application of such skills in daily life (Patricia, 2001).

Learners are known to get keen interest and full concentration while participating in activities discovered individually. DL focuses on active learning, asking questions and formulating hypotheses through experiments in science corners of interests and laboratories. Such skills are critical for future scientists (Kaplan, 1986). DL which revolves around practical groupings, experimenting, project work, making predictions and observation among other activities, have been documented to earn full LP in science learning (Tolman, 2002). Learners are reported to have enjoyed such activities by getting displaying keen interest. This has been found to enable them gain new knowledge and skills to the fullest. Learning science through DL activities improves participation, achieves relevant quality knowledge and skills. Besides, DL activities motivate learners and ascertain maximum participation in acquiring new science concepts gradually from known to unknown (Miller, 2000).

Constructivist theorists such as Bruner (1961) and Piaget (1962), underscored that learners radically think in different ways from adults and participate on interesting natural environment using own experiences. DL Activities (DLA) enables learners to acquire concepts and provide essential skills to practically solve own problems in the immediate world through play (Miller 2000). This indicates that early stimulating experiences in DL enhance ability of learners to apply gained prior knowledge in real classroom situation and sustains lifelong learning of science (Santrock 2004). DL requires learners to observe, draw, measure and practically manipulate resources in line with life experiences. Such activities promote acquisition of new experiences that equip learners with skills to experiment and internalize immediate knowledge from the environment. Similarly, DL activities develop learners' aspects of growth and enables learners to profit from education as well as from constructivist inductive instructional style. This boosts participation in science based learning (Fuchs, Powell, Scethaler, Cirino, & Fletcher, 2008).

However, in variety of practical instances, this has never been adopted and has since contributed into weak learning achievement and poor participation of learners in science based activities at all tier of the school system including ECE. This practice has hardly stimulated learners' interest in science classrooms. It is in this context that teachers in preschool have been encouraged to adopt DL activities as they motivate and challenge learners to remain on task.

However, this has been a daunting task and has probably been one of the most frustrating events in teaching process as it requires knowing learners styles, appropriate mix of approaches to maximize participation, right facilities and resources as well as positive teacher attitudes, skills and expertise. Studies Combs, (2001) and Payne,(2002) have documented that, a number of teachers have avoided including learners during planning and instructions making such learners to be poor participants. Separate studies, Payne (2002) and Combs (2001) have also noted that a number of teachers in preschool are unqualified yet, qualified teachers are perceived to understand better children's underlying concepts (Payne, 2002). Additionally, a number of preschools have been found to operate with inappropriate facilities yet learners' positive perceptions of learning environment and interpersonal relationships are factors associated with enhanced participation (Combs, 2001).

Eshiwani (1993), stressed that teachers should focus on DL as a strategy for teaching science activities that result from common interests. On the other hand Johnson (2002), pointed t DL as an instructional method whereby learning is centered on the child, motivating the active mind of the learner. This Johnson believes is naturally developed and manifest long before learners join formal learning environment. Bruner, (1961) and Piaget, (1962) argued that a young learner is a living thing whose thoughts and believes, hopes and choices, feelings and wishes and support relies on how the teacher perceives the class before introducing a concept. Positive perceptions of teachers' are likely to promote classroom participation in science learning in preschool (Dewey, 1938). In such instances, DL would not be the concepts or the subject matter chosen by the teacher, which the learners would be persuaded to learn or memorize, but rather focuses on engaging the mind of learners through experiences. This help to transform the thoughts, feelings, desires, wishes and aspirations which make up the life of the learner in preschool classroom.

Despite the many benefits that have been documented regarding DL approaches (Fuch 2008, Fletcher, 2008 and Johnson, 2002), learners in ECESCs are still exposed to explicit, didactic form of instruction that discourages DL. Based on this, ECESCs have not only been found unattractive for science learning but also attitudes of teachers towards organization of science learning environment has been wanting. This has for long accrued science deficits on children from preschool resulting in low achievement and failure of learners to profit from programs that produce understanding of the structure, meaning and operational requirements of science. In view of this background, the study focused on establishing the effects of DL on participation of learners in ECESCs in Starehe District.

1.2 Statement of the Problem

Learning science through discovery emphasizes on adoption of stimulating activities that boost individual learner's imagination and participation within appropriately mixed instructions .This has been confirmed to result into meaningful and coherent application of knowledge (Amollo, 2005). Studies have explored the significance of proper identification, selection and arrangement of relevant learning resources in encouraging learners' manipulation as well as development of concepts and skills within a well organized classroom environment. On the other hand, absence of DL initiatives during science lessons creates boredom, withdrawal from the learning process and lowers learners' participation in science activities (Amollo, 2005). Similarly, studies have underscored the fact that mismatch of DL activities like demonstration and question and answer limits learners' involvement, promotes passivity and inappropriate mastery of science concepts. Non structured, haphazardly arranged learning environment has also been confirmed to dissuade learners from effectively participating in science learning (Amollo, 2005).

Extensive studies (RoK 2005, Amollo, 2005) have been done across countries to determine appropriate approaches ideal learning environment for science learning as well as on teachers' knowledge, skills and attitudes that influence or impede on learners' participation and achievement in science particularly in secondary schools. Studies by Eshiwani (1992) and Amollo (2005) have particularly pointed a finger on weak infrastructural development, irregular in-service of teachers on choice of methods, ways of caring for learners' individual needs, to have resulted into failure to influence learners' participation and achievement in science. Little has however been documented on the effects of DL approaches on ECE science learning yet, there has been low participation of preschoolers in science as well as weak acquisition and interpretation of basic science processes and concepts. Based on this, the study sought to determine the effects of DL on participation of learners in ECESCs in Starehe District, Nairobi, Kenya.

1.3 Purpose of the Study

The study established the effect of DL on learners' participation in ECESCs in Starehe District, Nairobi province.

1.4 Research Objectives.

The general objective of the study was to determine whether DL had effects on participation of learners in science activities. Specifically, the study sought to:

i) Identify the effects of learners' participation in DL in early childhood Science classrooms in Starehe District.

ii) Establish the relationship between learners 'participation in DL activities and learning styles within ECE science cl assrooms in Starehe District.

iii) Determine teachers' perception on use of DL and how this affect learners' participation in science in ECESCs in Starehe District.

iv) Identify DL materials that affect participation of learners' in ECESCs in Starehe District.

v) Examine the effect of classroom organization on DL and LP in science in ECE in Starehe District.

1.5 Research Questions

The expected outcomes of this study was realized through endeavors to find out solutions to the following research questions

i) What effect do discovery science learning activities have on learners' participation in Early Childhood Education Classrooms in Starehe District?

ii) What relationship is there between learning styles and learners' participation in discovery science learning activities in E C E Classrooms in Starehe District?

iii) How do teachers' perceptions, skills, knowledge and qualifications affect learners' participation in discovery science learning activities in ECE classrooms Starehe District?

iv) To what extent do instructional resources used in discovery science teaching and learning affect learners' participation in ECE classrooms in Starehe District?

v) How does the ECE classroom organization influence on learner's participation in discovery science activities in Starehe District?

1.6 Significance of the Study

This study would benefit a number of people, organizations as well as processes of policy formulation, ECE curriculum implementation, monitoring and evaluation. It would be useful for policy formulation by the government and to the preschool teachers in improving participation rate in preschool science activities. Besides, the study would provide insight to Quality Assurance and Standards Officers (QUASOs) and KESI in inducting teachers and other preschool stakeholders in providing necessary support for effective delivery and evaluation of science activities in ECE classrooms. Young learners would also benefit from stimulating activities that fulfill their natural curiosity in the drive to acquire scientific skills.

1.7 Limitations of the study

This study experienced difficulties that arose as a result of beaucratic procedures and commitments of respondents most of whom perceived the process as a fault finding activity and were not free in providing requisite information. Secondly, the focus on only 15 preschools giving a sample of 30 teachers among 261 teachers provided quite a small sample for generalization even though it was still important that the study be brought to economic minimum. Additionally, the use of a questionnaire a key instrument was limiting since some important information may not have been captured and other key instruments would have added some interesting input.

1.8 Delimitations of the study

The study was delimited to ECE science learning in Starehe District. It was controlled by variables which included teachers' perceptions, instructional approaches, learning styles, physical facilities and resources and classroom organization. The key focus was on the effect of the above variables on participation of learners in ECESCs.

1.9 Basic Assumptions

The study was conducted under the assumption that ECE teachers in Starehe District are trained and competent in preschool teaching. Therefore they were able to adopt a variety of strategies that take cognizance of learners preferred styles for quality science learning and participation in classroom activities. Assumed also was that respondents were going to provide truthful, accurate and honest information helpful in establishing the gaps between approaches used, relationship between such approaches and learners styles, teachers' perceptions of discovery science learning that influence learners participation as well as how such perceptions affect acquisition and application of knowledge of science in preschool.

1.10 Definition of Operational Terms

Discovery Learning : Method of acquiring knowledge in science which emphasize on active and reflective nature of participation by doing, answering questions and responding towards the process (participatory acquisition of knowledge by the learner facilitated by the instruction).

Learning Setting : An environment where all learners have access to resources and participate in learning equitably, comfortably and through genuine class control.

ECE Science Classroom: A standardized structure that meets the diverse needs of young learners and to accommodate both different styles and rates of learning. (8x8) squared meters for 30 pupils with (30-50 of space)

Discovery Science Learning: This involves hands on activities that encourage learners to manipulate and explore their immediate environment by fully participating on practical activities.

Participation in Science Classroom: Learners' involvement in classroom science activities for the purpose of acquiring knowledge, skills and attitude

1.11 Organization of the Study

The study was organized into five chapters. Chapter one provided details about background of the study, statement of the problem, objectives of the study, research questions, basic assumptions, limitations, delimitations and definition of terms as used in the study. Chapter two includes relevant literature review to provide a framework within which the data obtained were conceptualized. Chapter three, covers research design that was applied, target population, data collection instruments, process of data collection and data analysis. Chapter four contained data analysis, presentation and interpretation discussed under thematic areas defined by the study objectives. Finally, chapter five contains summary, conclusions, recommendations for policy and programs, contribution to the knowledge and suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This section explored theoretical and empirical literature touching on effects of discovery instructional methods in science participation in early childhood classroom. It established the foundation for the proposed study and identified a framework within which primary data was contextualized and interpreted.

2.1 Exploring Discovery Learning and Learner Participation in Science

DL is a constructivist, comprehensive instructional approach for engaging learners in sustained, cooperative investigations (Santrock, 2004). Within DL framework, learners collaborate, working together to make sense of what is going on, emphasizing on own artifact construction to represent conclusion of learning concepts. Blumenfeld (1991), underlined the fact that introducing learners to observation, experimentation, sorting and grouping and other manipulative activities in ECE classrooms, improves mastery of science concepts. Friedler, Nachmias, and Linn (1990) on the same note, described DL processes as a problem, a hypothesis, an experiment, as learners observe, collect, analyse, and interpret learning and apply results to make predictions in problem solving.

During the 1940's, Bruner (1960), focused on the impact of learner's needs, motivations and expectations which he called "mental sets" to influence perception. He further underscored the role of instructional process of learning and presented the point of view that, learners are active problem solvers and are capable of exploring abstract science concepts. This was widely divergent from the dominant views in education at the time, but this view found an audience. Brumer (1960), additionally determined the role of structure (relationships among factual elements and technique) in learning and how it could be made central in teaching. In his discussion, he introduced the idea of readiness for learning and spiral science activities which he reiterated should be taught right from childhood to fit the child's cognitive abilities to maximize learners' participation (Brumer 1960).

In shaping practical application of learning through DL activities, Dewey (1938) proposed that learners should be viewed as active learners rather than passive participations in science learning. He similarly underscored that, earners learn best by doing and that classroom learning need to focus on the whole child and emphasize the learners' adaptation to the environment. Learning through activities like lecturing , question and answer and reciting to Dewey (1938) , need to be avoided but rather adapt learning instructions which motivate learners to move, manipulate and solve own problems such as experimentation, observation, inference, discussion and the like. This is an indication that active problem solving and engagement in DL, is the most effective way to acquire science concepts Dewey (1938).

Due to the complexity of teaching and individual learners' differences in a classroom, only a highly effective instruction strategy can encourage learners' exploration in terms of how they get involved in learning using available resources. Teachers with good mastery of science concepts possess the ability to provide variety of practical facilitation, and flexible in teaching approaches that encourage individual choice of learning. This requires professional knowledge, skills, commitment and motivation. Further, learners should be encouraged to explore immediate world, discover knowledge, reflect and think critically (Santrock, 2004). Increasingly, the trend in DL is to facilitate from constructivist perspective including collaboration among learners, giving opportunities to meaningfully construct knowledge and gain the concepts.

In a practical situation, DL stands in contrast to direct instruction which encourages learners to wholly receive information as directed by teachers, but rather to figure out concepts for themselves, getting the root of the knowledge delivered. Dewey (1933), and cognitive psychologist Bruner (1966), promoted the concept of DL by encouraging teachers to give learners more opportunities to control own learning. The two theorists underlined that this approach encourages learners to think for themselves and discover science knowledge constructed to acquire new concepts, feed learners natural curiosity.

2.2 Rationale for Discovery Learning and Learner Participation in ECESC

According to Dewey (1938), the authoritarian, strict, pre-ordained knowledge approaches of modern traditional education are irrelevant in delivering knowledge and are not enough in understanding learners' actual experiences in science. To him, innovative DL that recognizes learners' different learning needs inevitably influences class participation in pre school science activities. Similarly, Jungs (1971), in his theory of personality types indicated that conscious mental activity could be subsumed in forms of psychic activity, which remains the same under varying learning conditions. Additionally, Dewey (1938) underscored the fact that thought processes tend to be influenced by attention directed towards objectives and learning in the environment. In a preschool classroom, for instance it is likely to find extroverted learners who actively process learning by doing in the external world or those whose attention is directed towards the inner world of ideas and concepts, (the introverted learners). To introverted learners, they process learning through sensing, intuitively as well relying on memorization as a learning instruction. Hence, they require activities which involve learners to gain new knowledge such as sorting and grouping, experimenting, observation so as to promote their mastery and participation in science activities.

Similarly, McCarthy (2005) defines hands on, minds on instruction as perceptive activities which classify science concepts into sensing and intuitive activities. He argues that in the absence of visual perception of objects, activities or events, little or no learning is likely to take place among learners while sequential learners to him can absorb information and acquire learning in small connected chunk. On the other hand he indicated that global learners are those who can master details of a subject needed in gaining concepts being presented in relation to prior knowledge and experience. Hence DL activities should be adopted in every preschool class to take care of the diverse learner needs. Jungs (1971) theory further supported this argument by dividing judgment activities which are the ways through which learners mark or come to conclusions about what they have perceived into thinking and feeling models of learning. This implies that choice of instruction for learning should cater for each individual learner. DL therefore proves the best instructional method for science in preschool since each learner get an opportunity to explore their own world at their own rate developing from prior knowledge (Jungs 1971).

Thinking is a learning strategy that links ideas together by making logical and sequential connections between various science learning concepts (McCarthy, 2005). On the other hand, feeling is the art of making decisions by weighing and relating science knowledge being discovered practically in preschool classrooms. It then follows that, learners learn better through changing from one learning style to another depending on circumstances or preferences for knowledge being delivered in science (Felder, 1996). It can then be concluded that effective science learning would only be realized if appropriate choice of learning instructions is matched with the learners' learning styles to affect learners' rate of science participation. The interplay between learning styles and other variables would most likely facilitate acquisition of skills and at the same time enrich science learning.

In order to capture learners' interest within science classrooms, teachers need to extensively highlight the relevance of new topics to arouse interest and to promote participation of learners based on known to unknown concept delivery (Mayer, 2004). Similarly, procedures to be followed when introducing concepts should be sequential in a way that all learners' attention is captured using activities that involve the instructors and learners to all feel part of the lesson (Santrock, 2004).

Basing learning on prior experiences, developing lessons from known to unknown with one step leading to the other concept has been established to involve learners in science participation. This reduces the gap between individuals with various learning needs, enables learners to discover knowledge learnt anticipatorily. There is therefore evidence that guided instructions would be ideal when learners share experiences, as the pre school teacher guides the instruction process by choosing on DL science activities such as observing, experimenting, classifying, measuring, communication, inferring and hypothesizing which promotes LP.

Participating in DL should form a daily practice amongst preschool learners, as it enables them to internalize information in details and improves science knowledge acquisition (Weinstein, 1997). The role of pre school teacher during instruction therefore revolves around giving guidance, delivering required materials and offering situations that prompt learners to build on own knowledge which links learners their information obtained from own world to tackle problems that arise in classroom science settings (Ferry, 1995).

2.3 Discovery Learning, Effective Learner Participation in ECESC

DL promotes learner construction of ideas, enhances understanding of own learning in a science classroom. According to Bruner (1966), DL creates relevant situations to learners and gives opportunity to fully participate in learning concepts on own, rather than to providing prepackaged science concepts to learners. According to Strike (1975), DL involves inquiry processes in which learners apply learning experiences and thinking to consider and solve matters in the learning environment. Learners also seek answers to provided questions during science inference activities in a preschool classroom. Besides DL permits learners to experiment and solve own problems through active participation.

In the same vein, Dean and Kuhn, (2006) underscored the fact that DL meshes with the ideas of Piaget (1965), arguing that every time teachers should direct learning that allows learners to participate in solving problems. Piaget (1965) similarly underlined that DL if developed in an organized learning setting is able to encourage individual LP. Dean and Kuhn, (2006) concurred with this view commenting that learners should always be encouraged to learn through own active involvement with concepts and principles, be allowed opportunities to experience and conduct experiments that permit them to discover science learning individually. Additionally, Slavin (2002) defined DL as a way of arousing learners curiosity and motivating them to remain on science tasks until they find out solutions to problems. Sharing the same sentiments is Santrock (2004) who indicated that DL is able to teach learners to solve problems individually, manipulate information rather than to simply absorb science facts.

Teachers can facilitate DL by providing learners with stimulating activities that activate their curiosity to observe, hypothesize, infer, classify, sort and group, experiment and manipulate resources to acquire science knowledge. Santrock (2004), specifically, identified that DL is crucial in preschool science classes where activities are more practical oriented and requires active participation. All kinds of instructions for children in these formative years needs to be evaluated to enhance enjoyment and excitement for science learning, need to minimize embarrassment and humiliation of learners who may be impulsive in the learning environment. Santrock (2004) he similarly indicated that an effective DL is an intervention for young learners who are naturally active to learn, who require free interaction through exploring and manipulation of objects and because they always wrestle with questions and controversies in everyday life experiences. There is no doubt therefore that, DL engages each learner individually. Based on the arguments above, pre schools become the best place for introducing science through DL activities in order to sustain life long science participation in learners.

Sharing the same sentiments with Amollo (2005), who holds the view that manipulative learning activities such as observation, hypothesizing, inferring, classifying, sorting and grouping, experimenting and manipulation, entails adequate classroom organization and abundant provision of learning resources in variety. He indicated in his argument that DL is one of the constructivists learning activities that encourage learners to take more active role in the learning process. It's not only by answering a series of questions, but also solving a series of problems designed to introduce a general concept that has to be learnt (Mayer, 2004). DL is based on the notion that learning takes place through classification and schema formation (Gellenstien, 2004). It is equally believed that DL increases retention of knowledge because through it, learners organize new information and integrate it with prior experiences which eventually increase their participation in science (Dean and Khun, 2006).

Facilitating DL therefore remains a daunting task to educational practitioners. It requires stimulating activities that activate learners' curiosity to observe hypothesize experiment and manipulate resources in order to acquire science knowledge and skills. (Bernet, 2003) Guiding learners through such tasks is highly recommended as this encourages their participation in science lessons. It is through active involvement in learning activities that concepts are internalized. Besides it enhances learners' growth and development in all aspects and spheres of life. DL to Bernet, (2003) is found to be one critical heuristic approach to science learning which provides learners with opportunities to participate in discussion, observation, experimentation and description as the preferred ways that promote learners participation and internalization of concepts.

2.3.1 Sorting, Grouping Activities and Learner Participation in ECESC

Sorting and grouping is based on the constructivist learning theory. The proponent of this approach to instruction McCarthy (2005) holds that learning always build upon knowledge that a learner already knows and that all learning is filtered through pre-existing input. Therefore there is no doubt that such a strategy enables a learner to build on what pre-existing knowledge in terms of features of what children have to sort and group. Constructivists similarly underscore the fact that learning is more effective when learners are actively engaged in the learning process, as they sort and group subjects rather than attempting to receive knowledge passively without manipulation (McCarthy 2005). Hence preschoolers DL activities rely on forms of guided discovery, where the teacher avoids direct instruction but leads learners through questions to discover, discuss, appreciate and practice new science knowledge, using prior knowledge where learners are able to sense concepts according to current conceptions (McCarthy 2005).

Preschool learners are noted to learn best when they are allowed to actively participate in own learning by making personal understanding based on ongoing classroom activities and by reflecting on learnt experiences. (Mayer 2004). One of the primary goals of using DL activities which involves sorting and grouping is that it permits hands on and minds on adventure for learners to participate in real activities and initiate own learning experiences. As indicated by Mayer (2004), a key characteristic of hands on sorting and grouping is the encouragement it allows to learners to fully be involved in the environment democratically while interacting with resources to promote science concept acquisition (McCarthy 2005).

Teachers should therefore facilitate processes of science learning by encouraging responsibility and autonomy In support of this argument is Jonassen (2004), who recommended teachers to make learning goals which are engaging and relevant but not overly structured. Sorting and grouping is driven in classroom by the problem to be solved with emphasis on discovery and hands on investigation. Practically, the strategy involves using body and mind. Likewise it is an educational process that enables learners to investigate immediate learning environment while applying tools and concepts from science. Such processes allows building of own scientific knowledge, understanding and interpretation of new knowledge in the context of prior experiences (Mc Carthy, 2005).

2.3.2 Self Discovery and LP in ECESCs

Self discovery involves finding an appropriate way to attain a goal in science by learners in a classroom through own problem solving. Mayer (2000) indicated that before a problem is solved, DL is needed to be done through adequate exploration and refinement so as to narrow the problem down to a point of generating specific solutions. Besides, DL allows learners to participate in gaining own solutions to problems by encouraging self discovery, exploration of alternatives in science as well as generating activity for learners. Similarly self discovery provides learners with opportunity to locate refine and solve problems through discovering. It permits active participation and motivates learners to frame meaningful problems and to define science concepts (Santrock, 2004).

According to McCarthy (2005), self discovery gives rise to doubt and uncertainty that requires building careful planning strategies and systems in which the teacher puts skills of learners in mind when designing learning experiences. Implicit within self discovery, is the concept which gives the idea that totality of science activities that learners carry out in science classrooms should be planned to produce desirable traits and disciplines that generate participation in science learning among learners (Santrock, 2004).

In concurrence with this sentiment is Orlich (2007), who added that self discovery contains elements of constructive model, as it involves learners in an inquiry based process and promotes seeking answers to questions hence it is relevant to preschool science instruction. Learning theorists defines DL as a task which permits learners to recognize a problem; figure out what a solution would look like, search for relevant information, develop a solution strategy and execute the chosen instructional method (Borthick and Jones, 2000).

2.3.3 Observation, Experimentation and Learner Participation in ECESC

Observing and experimenting in science classroom emphasizes constructivist ideas of learning; that knowledge is built in a step-wise condition by supporting individuals to generalize concepts in immediate world. For the success of this strategy, the teacher begins by taking learners to nature walk, pose questions and encourage seeing into details (Reed, 2000). This allows preschool learners to search for science information and learn on own with the teacher's guidance in a classroom. Learning is therefore restructured towards experimenting to acquire knowledge-building organizations, in which learners and teachers participate in the construction of collective knowledge through experimenting in solving knowledge problems.

According to Chip (1997), the concept to be studied, methods used to answer questions determines the need for learners to practically get involved in experimenting and not the teacher, provided learners are given all relevant resources in an organized classroom. This motivates individual LP. DL is supported heavily by skills of observing and experimenting. Observation is a skill that encourages learners to observe selected events, processes, objects and construct particular patterns of concepts or relationships based on learning experiments (Chip, 1997). During such processes, the teacher asks learners to infer concepts, generalize pattern of relationship from a set of data or events they have prior knowledge about (Reed, 2000). Observing and experimenting are also underscored by Tamar (1991), to promote practical, increases the rate of learning, and encourages teachers to allow learners to discover the specific patterns before generalization. Observing and experimenting is argued to involve own learning, guide learners to generalize own experiences in science and make conclusion inferred through participation in learning (Reed, 2000).

These two strategies observation and experimentation, permits active participation where learning progress fully, involves individual participation and assessment of how well learners develop experimental and analytical skills. The quality of knowledge that learners possess form the strategies support and encourages learners needs to observe, make inferences, classify, formulate hypothesize and experiments are all reinforced when the strategies are adopted. Bruner (1965) further noted that specific processes that are involved in observational learning include attention, retention, production and motivation. However, he noted that bare reinforcing and direct guidance fail to build learners thrive to participation. He noted that learners' participation depends on the teacher's organization, perception and way teachers' take care of learners' learning styles through provision of instructional materials (Barts, 2005). Observation and experimenting therefore provides the class with enough time to participate through interaction between learners and with resources in a classroom environment, for improved learning out comes (Barts, 2005).

2.4 Learning Styles, Discovery Learning and Learner Participation in ECESC

Learning styles are ways through which learners learn, think and gain knowledge and skills (Sanrock, 2004). Learning styles vary as the number of learners in the classroom. Teachers are also known to vary in their styles of learning and thinking. Most common styles and approaches to learning is impulsive, reflective and surface, according to Jungs, (1971). Impulsive types of learners are those who act quickly answer questions and reflective types are learners are those who take time to respond and reflect on the accuracy of an answer. Kagan, (1965) further identified impulsive learners to be those who often make more mistakes than reflective learners. Similarly, he identified reflective learners as those who do well at remembering structured information, reading comprehension and interpreting facts as well good in problem solving and decision making.

Reflective learners are more likely than impulsive to set their own learning goals, construct on relevant information and set higher standard of performance. Such knowledge enables the teacher to keep in mind that although most learners learn better when reflecting, each child need to be integrated using right instruction that is able to bring learners together, share and learn to accommodate one another. However, teachers' reaction towards impulsive learners is a bad method of teaching which discourage such learners to concentrate on solving and understanding science concepts.

It is a common practice in classrooms that some reflective learners might ruminate forever about a problem and present difficulty getting closer. So, choosing DL can encourage such learners to retain their reflective orientation at more but arrive at more timely solution. Sharts, (1997) supports this argument asserting that activities that help all learners to see other learners' perspectives can improve learning behaviors and relations. DL is such a strategy that allows learners interact with each other in DL in accordance with their experiences and as a result improves feelings of anxiety and apprehension in science.

The deep or surface learning indicates the extent to which learners approach learning materials in a way to understand the meaning of materials (deep style) while simply what needs to be learnt (surface learners), are those learners whose approach to learning fail to tie what is learnt into a larger concept. Such learners perceive and often rotely memorize information. Deep learners on the other hand are likely to construct concepts and give meaning to what they need to remember. They take constructive approach to learning and are self motivated to learn while surface learners are motivated to learn because of external pressures or positive feed back from the teacher (Jackson, 1996).

DL in this regard provides learners with intellectual and copied skills to use own experiences, struggles and visions of many activities. This raises their self esteem, reduces prejudice and promotes more equal science learning activities. Learners as well develop tolerance towards each individual child and multiple perspectives within classroom. When such a strategy is involved in exchange for the teachers' commitment to DL in science, learners are offered opportunities that encourage classroom participation, completion and long range problem solving and decision making. It leads to development of activities that support concrete acquisition of science concepts.

2.5 Teachers' Perceptions, DL and Learner Participation in ECESC

According to Ndegwa (2005), a teacher's attitude is concerned with the value, appreciation and activities that build responsive relationships in choice of science teaching methods. Teachers' views towards learners and instructions influence classroom participation in a way that, learners are guided to develop skills. Providing learning resources goes hand in hand with teachers' attitudes and is documented to encourage learner's competence, consequently leading to mastery of knowledge of science. Witt (2002) separately argued that instructional methods are influenced by a teacher's attitude, consequently this influences own competence and choice of relevant learner's activities that revolve around such strategies defined within DL framework such as classification, experimentation and observation.

Studies (Ndegwa 2005, Witt 2002) documented this conscious choice of science content and instructions relating or matching it with learners learning styles requires professional preparation and cultivation of positive attitude paramount to effective science learning and participation (Munyeki, 1987 and Ndegwa, 2005). It thus follows that teachers' experiences and knowledge improves knowledge on relevance of DL in science learning processes. Additionally, Aila (2005) supports this view that the use of teaching materials by a teacher in a science learning environment increases LP, generates learners' positive interest, improves teaching styles, encourages each learner to experiment, demonstrate and solve own problems for long term mastery of science concepts. He added further that this contributes to positive classroom organization which motivates learners to take an influential move in science learning (Aila, 2005).

DL revolves around exercising flexibility with regards to the individual learner capabilities and placing class needs and interest at the centre of learning process and learners as active recipients in classroom learning (MoE, 2002). All knowledge and experience about the development of learners can best take place in a class where learners are given freedom to learn from one another. (Santrock, 2004) He further argued that encouraging classroom environment where learners support one another during science activities, according to individual abilities and strengths encourages learners' participation. Choice of instruction is about teacher perception, viewing classroom differences as opportunities for science learning.

According to MoE (2002), the choice for quality classroom participation is concerned with the need to ensure that learning opportunities contribute to effective learning as an individual and as groups of learners to a wider fabric of society. McCarthy (2005), similarly indicated that quality of practical learning can only be enhanced by the diversity of learners' participating in own learning. So, teachers' attitude and tolerance is the vehicle for the construction of learners' participation in science classroom environment. According to a survey by UNESCO (2002), quality of teaching is assessed by the percentage of high participation among learners' activities that is presented during and after learning. UNESCO indicated that quality of instruction implies quality of knowledge provided by the preschool teacher and that quality of learning offered by preschool teacher is assessed by the type of overt behavior (both in physical and emotional). In contrast though, the facts are generally associated with very minimal preschool centers where not all learners receive all the benefits required for improved LP. Such benefits include learning resources, a welcoming teacher attitude and well arranged classroom for free movements as learners practically work on their own (Elkind, 2004).

Classroom management and effective instructions are found to depend on the preschool teachers' preparation before class presentation in terms of teaching documents and learning resources (UNESCO, 2008). Studies conducted by UNESCO (2008), confirm that use of practical skills, proper classroom arrangement and discipline as learners work on their own are the complex and demanding challenges facing preschool teachers. Such challenges contribute immensely to learners' physical participation in science activities. Preschool teacher's success may be more feasible if implemented in specific, current required practices involving hands on minds on, in cooperative group work and assessment within preschool science learning.

2.6: Discovery Learning/Teaching Resources and Participation in ECESC

Learners have experiences of learning concepts when they push and pull or throw objects playing and observing and this is all through DL experiences, learners build up ideas and expectations relating to the way objects feel and move (Driver, 1994). Learners also develop interest towards natural science learning through individual sensory experiences by using senses of, smell, touch and taste. Discovery also includes perceiving knowledge through mental schemes as a result of interaction with resource provides in a classroom environment for learners to manipulate and relate to learning science concepts. Teaching science with reference to learners' experiences has been linked to the demystification of science and removal of barriers created by science terminologies (Townend, 1991). It argues to contribute to effective choice of instructional materials, maximizes learners and improves in thinking into the best ways to manage own problems (Emme and Wosham, 2003).

In a classroom situation, DL builds on previous experiences and knowledge, language and concepts, as learners relate learning experiences to everyday life. In this general approach lies arguments by Ausebel's (1968), who indicated that meaningful learning take place only if new knowledge can be purposefully linked with provision of relevant resources (Driver, 1994). As indicated by UNESCO (2008), learning at preschool should be about relating ideas, discovering new activities and linking ideas to relevant local resources for the benefit of learners and immediate environment.

According to the Kenya Primary Syllabus (KIE, 1992), the main objective of science teaching in school is to encourage learners to apply prior experiences, solve science problem through investigations. Learners therefore develop and use appropriate skills and technologies, collect resources, interpret and communicate scientific and technical information to develop flexibility and adaptability by discovering concepts. DL conducted in presence of variety of learning resources from locally available environment encourages learners to participate in own problem solving (Bently and Watts 1989). Science teachers are therefore urged to develop practical teaching methods by providing resources to be observed like charts, pictures, clay, measuring tools, objects and models. As learners participate in sorting in terms of features, manipulate to discover varied concepts and solve problems, teachers need to care for the diversity of learners' personal experiences and differences of individual learners' in early childhood preschool classrooms.

2.7 Classroom Organization, DL and Learner Participation in ECESC

Adequate classroom space influences choice of DL effective for learner's participation in the way learners explore learning environment. In a free space, learners are free to move to organized learning centers relevant so as to satisfy their own needs. (Santrock, 2004) Resources, space and proper classroom organization is a basic factor in catering for each learners' learning style as these encourage individual LP. From arguments of Weinstein and Migano (1997), classroom space influences classroom learning a great deal. Organized movement with secured and safe pathways together with health encourages learners' involvement in classroom activities enabling learners to gain confidence in participating in activities provided (Pickoff and Walling, 1969).

Additionally Mc Combs, (2001), shared a belief that learners at very young age to have abundant energy, very mobile in a classroom trying to reach immediate world. Based on this, therefore, indoor space is required to consider classroom participation of learners with varied learning styles. Creating a desired science classroom space for learners is required to develop the trust learners expect in order to manipulate provided learning resources. DL is relevant in instructing learners to be initiative and be self-reliant in own learning (Johnson, 2002). Similarly learners work more effectively in well organized classrooms rather than one that is in a clutter, which reduces movement and hinders them from reaching various learning corners (Johnson, 2002).

A well organized classroom encourages free movement, natural participation and is a motivation to learners to make own learning progress. However, inadequate learners' movement discourages consistency with DL. According to MoE (2005), creating desired science classroom space for specific instructions, encourages individual participation in learning activities. Consequently, Njoka (1995) recommended a minimum area of 8mx8m for the accommodation of a maximum of 30 learners and about 30-50 feet learning space. Contrary to this argument regarding an ideal and desired classroom size, Glassy and Smith (1978) mentioned that a big space is not always desirable for science learning in that, as classroom size increases, participation decreases hence leading to poor classroom participation.

Classroom organization is believed to influence choice of DLA and allows caring for learners' learning styles. Since a number of learners' need to be considered before planning for the content and structure relevant for level (Republic of Kenya, 2002). Learners' safety is also noted to improve through maintenance of holistic health during science activities that promote participation. Therefore, enough ventilation, light and proper arrangement of objects should be maintained for use in appropriate shelves for safety assurance in science learning environment (RoK, 2002).

It is in this context that Santrock (2004), reminds teachers that learners' process of interaction with science is a continuous discovery process of interaction between different learners and materials in the environment. Preschool teachers' have thus a responsibility to customize class materials, assignments, and assessments to diverse learners in each classroom. This indeed would raise LP as required for adequate science learning (MoE, 2005). Choice of DL is the official task of this multi-faceted customization done by the teacher. It is about being flexible in material collection and resourceful enough to adapt and customize methods and activities. This influences learners' products, and learning experiences to the needs of both individual learners and the teachers (Eshiwani, 2003).

2.8 Learner Perception, Discovery Learning and Participation in ECESC

Bidswell (1980), established that learner perception translate in science learning gains in a classroom. Learner perception is effective when utilized in the process of instruction. Learners should be involved in planning, collection of materials and acquisition of learning for DLA. Bidswell et al, (1980), further observed that DL experiences and nature of classroom organization in science process correlates with learner's participation in science activities. Heyman (1981) also supports that there is a relationship between discovering teaching and learners participating in preliminary years. He argued that involving use of inadequate facilities and inconsistent choice of activities lowers learner's perception resulting to learners' poor participation in science activities (Heyman 1981). The argument imply that adequate learning resources in a well organized environment promote individual learner participation in science classroom, therefore encouraging discovery learning atmosphere.

From a study by Acholar (1991), who tried to establish the difference between learners participation in relevance to teacher traits, perception and learning related behavior in Asego, Nyanza. , there exists a positive correlation between science learning attainment and DL activities. Ngecu, (1989), from this study noted that professionally trained teachers contribute more positively to effective learners' attitude in science than untrained teachers.

Consistent to this argument is Saha (1983), who found out that improved classroom environment, adequate provision of learning resources and active hands on learning activities lead to positive science learning outcomes. Similarly, Odhiambo (2000), noted that the root cause of poor LP in DL activities is that science teachers are poorly prepared to handle learners needs for improved LP. Most science teachers in preschools are noted to lack quality instructional skills that are able to adequately care for individual learners hence lowering LP. On a similar note Eshwani (1992), also underscored that inadequate teacher training in college level is a contributing factor to failure in choice of DL that caters for learners needs. The training was found to apply heuristic approaches as it places too much emphasis on preschool teachers at the expense of preschool content. This has been noted to hamper acquisition of science in preschool as teachers tend to teach the way they are taught.

As indicated in the Gachathi (1976), Report of National Committee on Educational Objectives and Policies, quality teachers training is relevant to DL as it influences learners' participation in science activities. Similarly, a report from Kenya Institute of Education (1989), on methods of science learning further elaborated the role of preschool teachers in selecting activities that encourage hands on experiences. This report emphasized on teachers crucial roles and responsibility to adapt to choice of activities that enable learners to experience learning activities which best suit individual learner difference for quality participation in all learning activities (KIE, 1989). This is an implication that putting learners' interest at hand during preparation motivates learner participation in science classroom. The teacher therefore needs to put in place clear measures that enable each learner to have full control in science classroom to discover activities at hand.

2.9 Expository Instruction, Discovery Learning and Participation in ECESC

In the face of education reform, preschool science classroom should present participatory a class environment which incorporates practical tasks for mastery of science concepts. The structure of learning environment must continue to address the question of how to modify and adapt classroom based environment to best serve the learner (Santrock, 2004). The ideological dichotomy created by both teachers and psychologists, suggested that science learning is a matter of discovering demonstrated by active participation in science classroom. On the other hand, traditional instruction, as the name implies, focuses on teacher's choice of activities and teachers full control of learning activities (Mills, 2002). Discovery learning activities therefore is the best choice for learners, motivating the natural active involvement that learners posses to support science learning and to acquire concepts from simple to complex.

According to Mayer (2003), expository teacher-centered approach explores various methods of imparting knowledge from the teacher to the learners. DL, on the contrary, promotes a preschool based learning in which the teacher takes on the non-traditional role of teaching leaving the learners to discover science solutions for themselves (Santock, 2004). DL is more well known among the two, to come to the mind of learners when reflecting on own learning experiences. Use of expository methods is characterized and demonstrated by consistency in teacher directing learning (Hake, 1997). In comparative studies, the idea of the "passive-learner" was introduced through identical connotation of learning activities defined as, lecture and questioning method (Sungur & Tekkaya, 2006). Expository instructions is reminiscent of the popular perception of school in which science learning concepts is instructed by the teacher and information provided by the teacher. This lowers acquisition of science learning as indicated by studies. (Hake, 1997 and Tekkaya, 2006)

To Domin, (1999), knowledge from DL is that knowledge acquired in a free practical atmosphere and is able to be applied in other learning areas. This implies that, a learner needs to experience learning activity rather than being dictated and lectured. According to Domin, (1999), a discovery classroom is one which the teacher is no longer the focal point of the classroom. Instead, the teacher is seen as a "facilitator, mentor, coach, or consultant". Additionally, the role and expectations of the learner are transformed. In such a situation classrooms favor exploratory science learning, use of inductive thinking to construct, or "derive a general principle" based on learners experience.

2.10 Quality Science Learning Instruction and Participation in ECESC

Quality of learning and teaching instruction influences quality of learner's participation (Mayer, 2004). The role of a teaching environment at preschool level is found to develop a child's social, mental, physical, moral and cultural aspects of growth and development (UNESCO, 2008). Watt (1989), argues that choice of instructions that accommodates learners' individual needs increase the contribution towards science achievement through active learning activities. To Watt (1989) DL activities expand and provide adequate learning resources and increased provision of practical learning exercises. DL involves learners in minds on hands on activities which necessitates development of learners' capacities, by creating suitable free and structured learning environment (Watt, 1989).

A KIE (1999) survey recommended that all learners in preschool need quality learning activities to be equipped with opportunities to acquire not only skills, knowledge relevant to science learning, but also to participate in a dynamic and flexible in manner a classroom setting. This is based on the premise that, without DLA that expose learners to activate learning, it would be too difficult to promote science acquisition which is relevant for learning other activities including science, social and number work. Studies done by UNESCO (2005), indicated that DL improves experiences, increases learners participation and development of positive attitude towards own learning.

Similarly, Bartz (2005) indicated that DL enables learners to organize learning environment, choose materials needed to solve own problems and to participate in practical learning activities. This encourages learners to get involved in developing rich and stimulating classroom learning atmosphere for learners to interact. Learners are noted to develop positive attitudes towards science learning in an environment which is positively supportive through excellent and appropriate skills in mobilization and manipulation of learning activities (Santrock, 2004). It is therefore important to note that with the guidance of the teacher, learners owe a bigger role in collection of resources, organization and manipulation for adequate involvement in science discovery learning.

Learners are known to be active participants in own learning with already acquired experiences from immediate world. Osino (2004), highlighted organized instructional processes, well adopted for science teaching as the best exercise for encouraging active learning activities promoting acquisition of ideas, concepts and skills in science learning. This implies that the ability to participate, explain ideas and show interrelationship between concepts is better developed through DL activities. Further noted by Bennet (2003), DL provides learners with activities for acquisition of knowledge and skills on immediate features as animals, human and plants they meet around and effective ways of applying known concepts to learn the unfamiliar behaviors and makes.

Essentially, learners need attractive science learning atmosphere with diverse materials, organized to help teachers deal with critical and sensitive features of science concepts in lifetime (Eshiwani, 1993). The teachers' role therefore, is to guide the process, choose heuristic approaches to science learning that allows learners with opportunities for discussing, observing, experimenting and describing facts hence active participation in science learning.

2.11 Theoretical Framework of the Study

According to Bruner's (1966) theory, DL makes learning environment constructive, made in manner not only to discover regularities and relatedness, but rather to avoid drafting the facts, to keep account of the uses of available resources to acquire science concepts. Brunner advocated for active LP in preschool science learning. Similarly this view is shared by Curson (1990), who underscored that acquisition of knowledge is an active process and its effectiveness depends on the learner relating incoming information to previously acquired frames of science references. Bruner's theoretical framework is based on the theme that preschool learners construct new ideas in science concepts based upon existing knowledge. To Bruner (1966), learning is an active process that includes selection and transformation of information, decision making, generating hypotheses, and making meaning from information and experiences by learners.

According to Bruner (1966), classroom learning is meaningful to learners if developed to enable learners discover learnt exploration motivated by curiosity shown by learners. Tuovinen, and Sweller (1999) also supported this view that DL is in essence a matter of rearranging or transforming science learning in such away that a learner is enabled to go beyond the evidence provided in a classroom and reassembled for additional new insights. In this instructional method, learning is based on the importance of understanding the structure of science concepts. The need for DL is a base for understanding the value of inductive learners reasoning in science learning and how learners react to activities provided to affect positive LP (Woorfork, 1995).

Bruner (1966) also indicated that DL is not restricted to the art of directed science learning but rather includes all forms of obtaining skills and knowledge from known to unknown. The aim of teachers would be to give learners affirm grasp to promote rate of science learning. Science learning therefore involves figuring how to include learners in own learning, to encourage individual LP and to enrich prior experiences to improve learners' perception in science. This is in agreement with Okere (1996), who pointed out that one of the objectives of preschool science learning is to discover knowledge and analyze situations using an experimental approach in science technique.

DL is believed to be the best for learners to discover facts and relationships for themselves by getting involved in own learning. He further argued that practice in discovering for oneself, which forms the basis of DL, teaches preschool learner to acquire information in a way that makes that information more readily viable in problem solving. The relevance of this philosophical argument suggests that in discovering science knowledge, learners should 'learn science by doing'.

2.12 Conceptual Framework of the Study

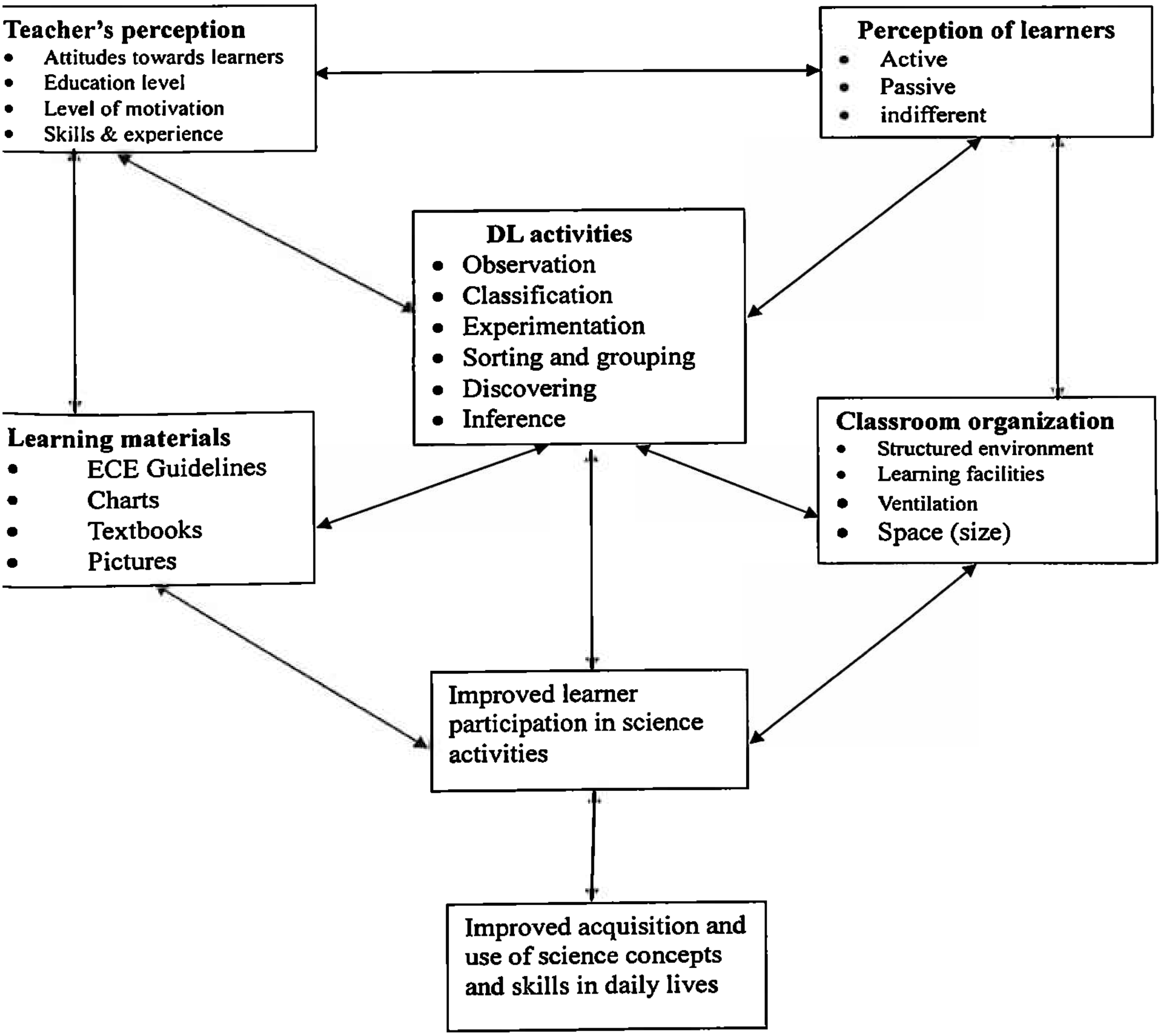
Quoting Reichel and Ramey (1987) in Kombo and Tromp (2006), conceptual framework is a set of broad ideas and principles taken from relevant field of inquiry and used to structure subsequent presentations. It involves forming ideas about relationships between variables in a study and showing relationships graphically or diagrammatically (Mugenda and Mugenda, 2003).

Effective and consistent use of DL in science learning is capable of ensuring that learners' participation is maintained in the whole learning process in a classroom. Further, effective science teaching through DLA produces learners who are science oriented, ctive, and motivated and have the ability to apply learnt knowledge in other activity reas. This relies on effective use of DL activities, caring for learners learning styles, hange in teacher perception, and provision of learning materials and organization of lassroom setting environment that allows activities.

Conceptual framework of this study was based on the idea that, a highly effective nd efficient organization of discovery learning involves use of activities that include bservation, classification, experimentation, discovering, inferring sorting and grouping. uch activities support learner perception as expressed through active involvement in their wn learning, building knowledge, skills and attitude from simple to complex. To effect he active learner participation, teacher perception need to be positively encouraged by roviding opportunities to improve on their educational level, skills and experience. Such xperiences encourage teachers to improve their perception towards learner individual lifference, striving to improve their level of motivation acquiring skills to motivate active earner participation for discovery learning in ECESC.

Adequate discovery learning in ECESC relies on adequate, relevant and varied earning materials that include ECE guideline, use of charts, reading materials and pictures within a well organized classroom with adequate learning facilities, ventilation and space in a structured environment. Establishing and maintaining teacher perception, collection of learning materials, appropriate classroom organization and effective choice of discovery learning activities for active learning improve learner participation that leads to improved acquisition and use of science concepts and skills in daily lives.

Figure 1: Perceived Linkage between DL and Participation of Learners in Science Activities



CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents description of research design, target population, sampling size and procedures, the types of data, and research instruments for data collection. It also involves the research process, reliability and validity of the research instruments as well as data processing and analysis.

3.1 Research Design

The study applied both quantitative and qualitative approaches. The descriptive survey design and use of observation for qualitative approach, was identified for the study because of its tendency to denote the scores from few indices of situations or statistics. It also gives a wide range of baseline information concerning the variables of the study. Use of survey helped to gather facts and figures through direct observation on nature of learning environment rather than manipulation of variables, deals with variables as they occur and how they are interrelated (Orodho, 2005).The study applied questionnaires to obtain detailed qualitative information about effective use of discovery instructional methods at pre-school by teachers. This design was chosen because of its ability to elicit information on good use of discovery instructional method and how it affects learners' participation in science activities.

3.2 Target Population

The study was conducted in Starehe District, Nairobi Province, targeting preschools, ECE Head teachers; Teachers and Learners and learning environment (infrastructural materials), a total of eighty one (81) preschools, twenty seven (27) public and fifty four (54) private preschools. The total number of preschool teachers during the same year 2010 was 261 which are 6 male and 255 female teachers.

Table 1 Registered Preschools, Teachers and Head teachers

Zones	Preschools		Pupils	Teachers		Head teachers
	Public	Private		Male	Female	
Central zone	20	15	385	1	136	35
Juja zone	7	39	721	5	179	46
Total	**27**	**54**	**1106**	**6**	**255**	**81**

Source: Survey Data, 2011

Preschool was the main focus of the study as children in these settings are within their formative years where learners gain from active involvement due to their curious nature to develop lifelong concepts in science.

3.3 Sampling Design and Procedures

Quoting Koul (1984) in Mugenda (1999), sampling is a process by which a relatively small number of individuals, objects or events are selected and analyzed in order to find out something from the entire population from which they are selected. A sample is thus a small proportion of population selected using some predetermined procedure. For this study, purposive sampling was used to identify preschools within the population that met specific criteria. The criteria for selection included: formally registered, private and public preschools.

From this population identified, a cluster sampling technique was applied for representation where 5 public preschools and 15 privately owned preschools in Starehe district were used. The publicly owned preschools were purposively picked for representative ness and generalization. However, a simple random sampling technique was a applied to pick 15 private preschools from specific cohort of private institution giving a total of 20 preschools used for the study. Since the number of teachers, learners and head teachers from preschools were quite varied, the study applied a combination of simple random and purposive sampling procedures to select different samples. A sample of 30 teachers was selected using simple random techniques from specific cohorts of teachers. In this regard, the number of learners in each preschool was obtained from the administrators and random numbers assigned to them, then selected.

Simple random techniques were also applied to select teachers from preschools, city hall. 30 teachers were desired, handling either private or public preschools. This gave public and private preschool teachers equal chances of selection into intended samples (Mugenda and Mugenda 1999). However, 15 preschool head teachers were purposively selected as they were most appropriate to inform the study on issues regarding teachers' qualifications, resources and facilities that would influence participation in science activities in preschools.

3.4 Data Sources

The study utilized quantitative and qualitative data from primary and secondary sources. However, the study heavily borrowed from primary data because such information is original, unaltered and is a direct description of occurrence by an individual and (Mugenda and Mugenda 1999) sourced through administered questionnaires and personal observation by investigator from sampled populations. Secondary data was received from official documents from the MoEST, City Education Department, Reports and Media on statistical information, scholarly journals, dissertations and reports concerning science instructions in preschools.

3.5 Research Instruments

Data was collected using two sets of questionnaires, one for the head teachers' and another for preschool teachers. The head teachers' questionnaire was divided into two sections: A and B. Section A solicited data for demographic information. Section B collected information on instructional methods preferred teachers attitudes, facilities and resources for teaching learners and their role towards effective LP in Science. The teachers' questionnaire was also divided into two sections. Section: A focused on the respondents' demographic information and Section B addressed their preferred styles, learning methods, resources and their role in influencing effective LP in science. Questions were constructed in both closed and open ended structures for in-depth understanding of the study.

Observation check list was designed to collect information concerning class organizations, resources, facilities, learning materials and instructional methods prepared during science instructions. It informed the study on class organization practices, opinions and attitudes of teachers. It was also used to document adequacy, relevancy of DL, in this formative years. It enabled the researcher to get additional information that could not have easily been captured by questionnaires.

3.6 Pilot Testing

Nachmias and Nachmias (1996), indicate that pilot testing reveals fake questions and unclear instructions. The aim of this was to find out the effectiveness and the ease of understanding of the instruments. This helps in enhancing the reliability of instruments as consistent measures of the concept being studied. Based on this realization, pilot random sampling was performed to ensure that the pilot sample represented key attributes of the bigger sampling frame. For this case a convenient sample of three pre schools was considered adequate to reveal inherent weaknesses in the research instruments. The result from the pretest which revealed blank spaces, inaccurate sentences, inconsistencies and other weaknesses detected in items were reviewed for corrections, analyzed and appropriate amendments were made. Based on the outcomes, the instruments were reviewed further in readiness for data collection.

3.6.1 Validity of Instruments

Validity is a subject concerning what can be measured. Quoting Otieno (2003) in Mugenda and Mugenda (1999), an instrument is validated by proving that its items are representative of skills and characteristics that it is purported to measure. For this study, instruments validity ensured that content items were representative through a pilot survey. This preceded questionnaire administration which was also meant to create good rapport with respondents and to reveal ambiguities, inconsistencies, bringing into light any weakness of questions (Borg and Gall, 1989). Data and experience gained from pilot survey within two preschools was analyzed and used to fine tune and improve on questionnaire items.

3.6.2 Reliability of Instruments

The reliability of research instruments was measured using the re- test technique, to test reliability of instruments before they were administered to sample respondents to assess clarity. This was done by administering the items to samples within the identified institutions for a pilot survey and then data was collected. After a time lapse of one week, the same instruments were administered to the same group of respondents. The results of the initial responses were then compared with the latter to determine reliability of results (Saunders, 2006).

Consequently, the processing and analysis was done using SPSS to test the reliability and validity. This software package was relevant for the pre-test as it involved generating comparisons between the dependent and the independent variables. The SPSS was found best suited for the task given that it was able to generate appropriate comparative graphs that made it easy for the researcher its findings were used for appropriate corrections of the research items.

3.7 Data Collection Procedures

3.7.1 Preparation

The investigator sought an introductory letter from the University which was used to get a permit from National Council for Science and Technology (NSCT). This was presented to Provincial Director of Education's Office and District Education Office to authorize the study. The researcher reported to the preschool head teachers, giving the briefs on the intended study, using this chance to create rapport. Dates were scheduled to administer questionnaire and to fill the observation checklist concurrently. This chance was also used to iron out queries from the target population regarding the essence of the study.

3.7.2 Data collection

Wisemen (1980) quoted in Ouko (2007), stressed that steps to increase response rate in research is key and his suggestions were adopted. The respondents were encouraged to fill in the questionnaires as the researcher waited, where possible, and further arrangements were made to collect remaining tools within a week to reduce mishandling or misplacement of the questionnaires. Instruments misplacement, were replaced by giving new tools to be filled while waiting. Observation schedule were done by the investigator as teachers filled the questionnaires. Collected and returned instruments were examined for completeness, consistency and reliability.

3.8 Data Processing and Analysis

According to Bryman and Cramer (2007), data analysis seeks to fulfill research objectives and provide answers to research questions. Quantitative and qualitative analysis was used to interpret the data. After data collection, open ended information within the questionnaires was edited. This was succeeded by coding the data, entry, analysis and interpretation. The Statistical Package for Social Sciences (SPSS) was used to run descriptive analysis to produce frequency distribution and percentages, while charts and tables were produced using Ms- Excel. The responses of all respondents in each category was put together to get the overall score. The score for each respondent was then converted to percentages and frequencies. Qualitative analysis considered the inferences that were made from views and opinions of respondents. This helped to reduce the volume of information, identify significant matter and construct framework for communicating the existence of what the data revealed. Data was summarized, organized according to research questions, arranged into themes and presented in narrative form, where it was possible, tabular forms indicating averages, percentages and frequencies was used to highlight meanings.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRATATION AND DISCUSSION

4.0 Introduction

This chapter presents interpretation, analysis, presentations and discussions of findings based on the following thematic areas; demographic characteristics of the respondents, choice of discovery methods and LP in science activities caring for individual teachers' perception, provision of learning materials and organization of learning environment on LP.

4.1 Demographic Characteristics of Respondents

This section highlights demographic characteristics of the target population who were preschool learners, ECE Teachers, and Preschool Head Teachers. This data helped in explaining characteristics of respondents that influence choice of DL. The demographic characteristics included educational qualifications, gender compositions and professional qualifications of the respondents. Also discussed here was enrolment of preschoolers as well as learner- teacher ratio.

4.1.1 Teacher Qualification and Learner Participation in Discovery Learning

The majority of teachers 18(75%) had certificate in ECE while only 5(20%) had diploma in ECE. Head female teachers who held certificate in ECE were 5(36%) with 2(14%) holding diploma. There was no male head teacher with ECE specialization. It was then concluded that preschool learning program in Starehe District is predominantly female run. The absence of male teachers seemingly hindered personality growth and development of the boy child and increased the burden of women.

Table 2: Distribution of Respondents by Qualification and Gender

Qualification	No. of Head teachers				No. of teachers			
	M	%	F	%	M	%	F	%
Certificate	0	0	5	13	0	0	18	47
Diploma	0	0	2	5	1	3	5	13
Degree	7	18	0	0	-	-	-	-
Total	**7**	**18**	**7**	**18**	**1**	**3**	**23**	**60**

Source: Survey Data, 2011

By comparison, from the 9 head teachers who were used in the study, there were only 2(14%) female head teachers who had Diploma in ECE. All the remaining male head teachers 7(18%) were not ECE specialists. Preschool teachers who had higher qualification were found to be well placed in terms of classroom management, care for individual learners' differences as they consistently chose learning activities that permitted learners' active participation in science learning. They also competently employed DL activities during science instructions. Hence, the children under their care were lively, active and competent in science skills as compared to their counterparts.

4.1.2: Discovery Learning across Gender in ECESC

To determine choice of DL and LP in preschool learning, the study considered gender composition to establish the contribution of this characteristic in effecting learners' participation. Again, a majority of preschool teachers 23(61%) as the head teachers were found to be female. This gender imbalance was found to inhibit personally growth and development of particularly the boy-child who lacked role models to emulate even as they learn, apply knowledge, skills and creativity in science. This is based on the fact that it is the teachers who interact with children on daily basis through classroom activities.

4.1.3: Distribution of Learners by Gender and Class

Examining the number of learners' enrolled in preschools and the rate at which this classroom organization, availability of resources and child teacher ratio was also a center of focus to the study as this influenced their participation in science DL activities. This was analyzed as indicated in table 3.

Table 3: Distribution of Learners per Class

No of learner	Boys	%	Girls	%	Total	Percentages
Baby class :	148	25	129	24	277	25
Nursery :	215	37	192	36	407	37
Pre - Unit :	210	37	212	40	422	38
Totals	**573**	**52**	**533**	**48**	**1106**	**100**

Source: Survey Data, 2011

From the findings, boys were 573(52%) and girls 533(48%). Enrolment of learners was noted to consistently increase with age as most of the learners' progressed to formal school. This was linked to MoEST's policy requirement for all learners' to have basic skills in preschool before transiting to class one. There was no doubt therefore that learners were denied opportunity to participate actively in learning activities and this promoted, discovering knowledge, skills and activities within a social environment.

4.1.4: Teachers Ratio and Learner Participation in Science Classroom

The analysis by a T- test, obtained the number of teachers handling learners as 1.67, with a standard deviation of 1.049. This is an indication that in every preschool class, there was only one teacher on average in science classroom. The number of teachers from the findings, influenced participation in ECE Science, based on the fact that one single teacher could not adopt instructions that could be able to meet each individual learner in science learning activities hence lowered the rate of learners' participation. Therefore, therefore it was true to conclude that this ratio of teacher per class without an extra assistant limited effective DL practices and lowered LP in science and knowledge acquisition.

4.2: Mode of Instruction and Learner Participation in ECESC

The appropriate choice of a DL strategy promotes learners participation rate in Science activities in preschool classrooms (Bennet, 2003). Indeed, learners come to school with acquired knowledge and skills from immediate environment and with prior knowledge gained that need to be put into practice and to be organized through use of discovery activities (Bruener, 1960). This when taken care of enables learners to scaffold and solve own problems from known to unknown. It is as a result of this, that this study sought to establish preferred instructional methods by ECE teachers to effect LP in science. Quantitative results were summarized as in table 4

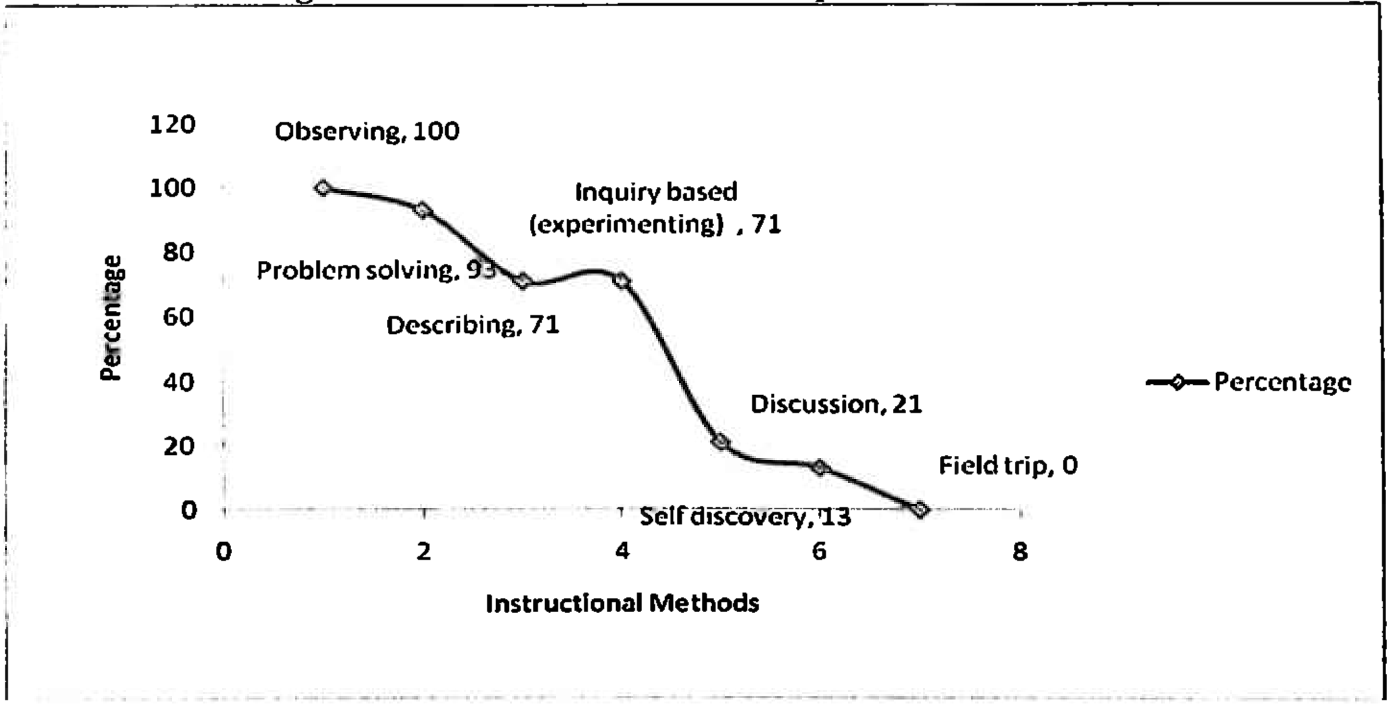
Table 4: Mode of Instructions Preferred and LP in Science

Instructional methods	Frequency	Percentages (%)
Lecturer	0	0
Demonstration	23	42
Recitation	15	27
Question and answers	17	31

Source: Survey Data, 2011

The study identified that teaching methods that limit individual LP were the most preferred when compared to learner centered instructional methods such as observation, experimentation, explanation, inferring and classification. Demonstration was the most preferred 23(42%) followed by question and answer indicated by 17(31%) and recitation represented by 15(27%). Such instructional methods are noted to exposed learners to a lot of passive learning, boredom and impeded effective knowledge and skill acquisition in science. Hence, the study tried established whether DL activities were in use within preschool and this was analyzed as shown in figure 2.

Figure 2: DL A and Learner Participation in ECESC



Source: Survey Data, 2011

Findings revealed that observation was the most preferred 15(100%) method for instruction in preschools with problem solving at 13(93%) while describing was preferred by 10 (71%). Inquiry based was also popular with 10(71%) while only 3(21%) of teachers liked discussion while 1(13%) mostly used DL activities. The findings implied science learning instructions were dominated by non-discovery methods, irrespective of the benefits that accrue learners when DL activities are chosen. This confirmed that teachers preferred, directing science learning activities, despite the widespread notion that there is low quality of LP with expository learning methods. This results in poor acquisition of science concepts therefore be blamed on learners exposure to non-stimulating activities make learners passive in science learning activities.

1. **4.2.2: Teachers' use of Discovery Learning Strategies in ECESC**

To establish whether DL instructional methods teachers were used in science activities so as to effect learners' participation rates in science learning, quantitative data was analyzed by establishing the frequently used DL activities. Results were presented in frequencies and percentages as shown in table 5.

Table 5: Preference of Instructional Methods on LP in science

Instructional activities	Frequency	Percentage
Question and Answer	8	53
Demonstration	10	67
Describing	12	80
Lecturing	7	47
Observing	3	20
Hypothesizing	1	7
Experimenting	2	13
Discussing	1	7

Survey data: 2011

Responses of 25 teachers indicated that, describing 12(80%) was the most used DL instructional method followed by question and answer 7(53%) and lecturing 6(47%). The study identified that in most cases in the preschools, teachers fully directed science learning. This is because the activities chosen by teachers did not give learners opportunity to learn and to participate in hands on activities. Further, the study indicated that in science learning, the learners were given opportunity to participate in observation, as noted by 3(20%) respondents, experimenting 2(13%), while hypothesizing and discussion were both indicated by 1(7%) respondents to be least adopted. This implied that preschool teachers did not expose learners to a variety of DL activities that would have created a great synergy in learning.

From the findings, the preschool teachers had no adequate knowledge on relevance of DL activities in solving learner's individual need. This encouraged internalization of disjointed information which diminished full concept acquisition. It was noted however that actively solving problems encouraged positive learning habits and development of learners' abstract reasoning. There was low attitude in developing DL and provision of adequate learning resources to effect participation. It was also established that even though DL activities was used in instructing science learning, few teachers were able to recognize its relevance to learners. Choice of DL was the only opportunity learners could be encouraged to individually participate. This notion supports Wilking (1974), who asserted that teachers presentation of contents using DL activities are crucial for understanding on the part of learners, since they get chance to understand concepts better while practically getting involved in hands on minds on activities.

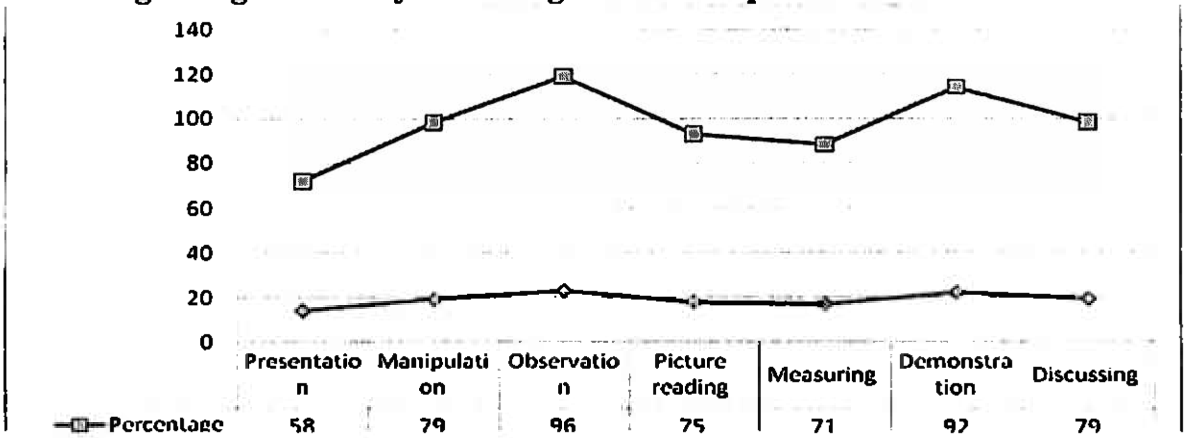
4.2.3: Integrating Discovery Learning and Participation in ECES

Learning condition that influence positive rate of participation from learners is described by how the teacher integrates instructional methods to accommodate individual learner differences during science activities (Achollas, 1990). Quantitative data was therefore analyzed to show the synergy and results presented as shown in table 3.

Findings in table 3 indicated that learners activities during science learning involved observing 22(92%), demonstration 22(92%), discussing 19(79%) and manipulation of resources 19(79%). Other activities indicated were presentation as pointed by 14(58%) respondents, picture reading 18(70%) and measuring 17(71%).

Further revelations cited that teachers with relatively high qualifications were very much aware of the discovery learning activities relevant for promoting high rate of learner participation. This was indicated by the kind of activities the teachers planned for their classes and the kind of learning materials available for science learning within ECESC

Figure 3: Integrating Discovery Learning and Participation in ECES



Source: Survey Data, 2011

The study therefore observed that processes undertaken by learners' in science instructions during presentation involved observing, demonstration and picture reading. These were however indicated to limit adequate active involvement in the learning process. The implication was that, appropriate integration of activities influenced learners' perception and participation in science learning activities. Also noted was that DL activities were promoted so was the amount of practical activities to be done by learners, improving rate of learners' participation as pointed out by Myers Briggs indicator (Myers, 1956).

Data analysis using Chi-square was therefore carried out to test best ways of merging DL activities with expository activities. This aimed at identifying the best ways of encouraging ECE teachers to find better discovery activities for their learners that encourage high rate of participation in science activities. Science activities tested were those that were highly used within different science classrooms during learning process.

Table 6: Affordability of Merging Teacher Centered Instructions and LP in Science

	Value	df	Asymp. Sig. (2-sided)
Self discovery*demonstration	24.000	1	.000
Self-discovery * Description	5.217	1	.02
Observation *Demonstration	11.478	1	.001

Source: Survey Data, 2011

The analysis obtained a Chi-square value of 24.000 with 1 degree of freedom and a significance of 0.000 for self discovery and demonstration. Use of self discovery and descriptions was shown to have a value of 5.217, with a degree of freedom of 1 and significance to be 0.2. In testing observation and demonstration, a value of 11.478 was noted with a degree of freedom of 1 and significance of 0.001. As the related activities were merged, so was the amount of LP in science learning. This was an indication that learners' participation increased when more than one activity was used in DL to cater for individual LP. Additionally, teachers were asked to indicate whether science learning was better acquired practically or orally based, and responses captured were analyzed as shown in table 7.

Table 7 – Learning Activities Preferred for practical Participation in ECE Science

Science Activities preferred	Frequency	Percentage
Observing	23	96
Colouring	20	83
Picture Reading	19	79
Classifying	18	75
Discussing	20	83
Drawing	21	88-

Source: Survey Data, 2011

Table 7 showed that science teaching required different practical instructional methods. It was noted that teachers identified various activities that promoted DL such as observing represented by 23(96%). This insured that children are keen observers within their learning environment, drawing indicated by 20(83%) which to the teachers was argued to promote small muscle coordination while reading was noted by 19(79%) teachers to cultivate a reading culture for future scientists. Coloring and discussion was indicated by 18(78%) teachers to sharpen analysis and logical thinking skills. Further, 19(79%) of the teachers indicated picture reading as the most used instructional method that invoked the sense of sight and interests learners. A majority of teachers 18(78%) were found to prefer classifying as a way involving what the minds and hands of learners. This implies that activities that involved observing, drawing, coloring discussing and classifying were not adequate in solving learners' needs in preschool settings. It then follows that more practical activities are required such as experimenting, hypothesizing, problem solving and hands on activities to adequately include learners in own learning.. This was in agreement with Psacharopoulos (1985), who cited factors such as limited materials and facilities and mismatch of teaching strategies to have a negative effect on learners' participation in science learning.

4.2.4: Impact of DL and Learners' Participation in Science

Choice of discovery instructional methods to address a science concept enables learners to acquire, apply skills and knowledge as well as in gaining new concepts in science. Based on this, teachers were asked to indicate reasons behind their choices of their most preferred instructional methods and the finding was summarized as indicated in table 8.

Table 8: Impact of Practical Discovery Learning and Learner Participation.

Effects of practical DL activities	Frequency	Percentage
Provides opportunity for Learning by Doing	7	29
Demand a lot of preparation	2	9
Need for qualified skills and services	1	4
Cater for varied skills	1	4
Knowledge gained applicable in daily experiences	10	41
Torched and seen materials	2	9
Demands for finance and time	1	4
Total	24	100

Source: Survey Data, 2011

From the findings above 10(41%) teachers believed that knowledge gained as learners practically perform science activities on own could be applicable in daily experiences. On the other hand, 1(4%) teachers indicated practical learning as a motivation as it catered for a variety of learner's styles and demanding interms of time and money. 7(29%) teachers indicated that DL activities learnt by doing promoted opportunity for practical hands on participation. On the other hand, 2(9%) teachers stated that science learning was quite demanding in terms of preparation, while only 2(9%) teachers indicated practical science activities as demanding in terms of learning resource collection to maintain adequacy and relevance to learners' participation hence resorted mostly to expository activities. There was an indication that, learners were able to recognize the relevance of practical learning activities in science learning. In contrast though, the same could not be encouraged in preschool classrooms as a result of inadequate qualifications of teacher to handle DL activities low opinion and inadequate resources to use in involving learners in practical learning.

4.2.5: Effect of Discovery Learning and Learner Participation in ECESC

Pearson correlation was done to determine the effect of DL activities and their relative importance in explaining learners' participation. The analysis yielded a correlation results between picture reading and demonstration having (0.7), classifying and drawing to be (0.655), classifying and drawing as (0.655) while drawing and demonstration as (0.619). From the analysis, it was noted that various instructional methods characterized by expository activities and those of DL could as well be well put together for instruction to give complete combination of DL that could be relevant in promoting high rate of learners' participation. This implies that use of more than one activity was able to take care of varied individual differences and increasing rate of learners' participation.

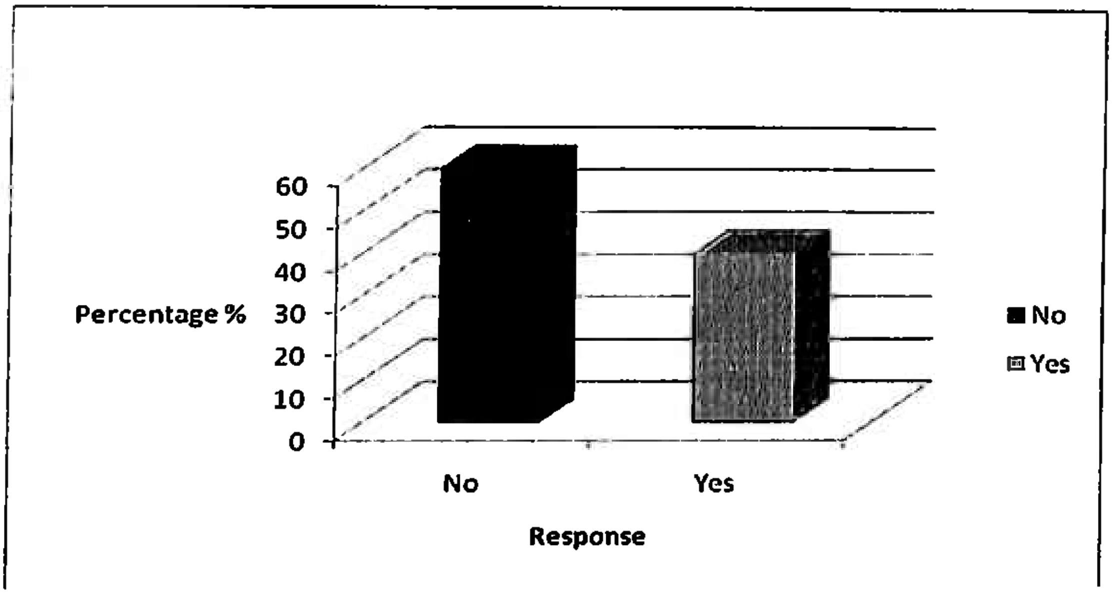
4.3: Caring for Individual Learning Style and LP in ECESC

Each learner in a preschool class comes with diverse means of acquiring knowledge which must be well taken care of in the way activities are chosen to effect their participation. Learners instructed entirely through discovery methods that are antithetical to learners learning style may be made too uncomfortable to learn science concepts effectively. Teachers should therefore expose learners to discovery methods that develop full range of learning skills and methods and those that ensure participation in science learning (Smith and Renzuli, 1984).

4.3.1: DL, Individual Differences and Learners' Participation in Science

DL encourages learners to take part in own learning and to solve problems through hands on activities. It also encourages individual LP (Bernet, 2003). Qualitative data was analyzed and results presented as in figure 4, indicating teachers' responses on the relevance of caring for learners differences when effecting quality learner participation in science activities in ECE.

Figure 4: Teachers' Perception on Care for Learners' Styles

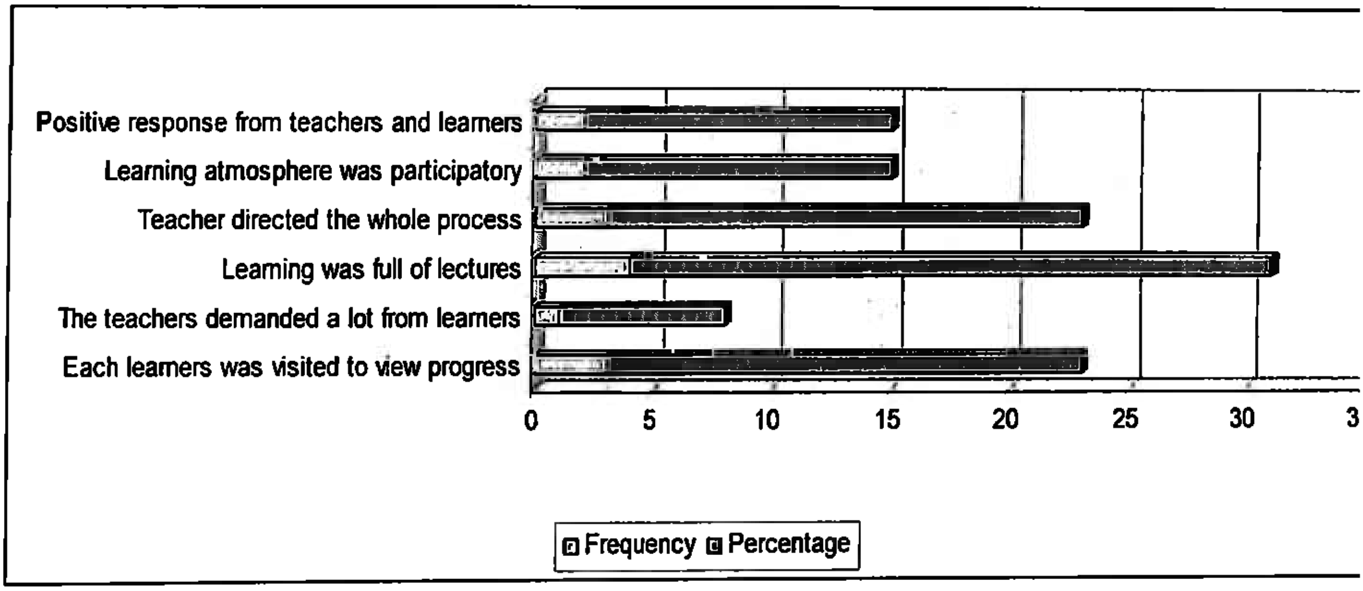


Source: Survey Data, 2011

Figure 4 shows that the bulk of teachers 16(60%) were not aware of relevance of learners care in effecting DL for effective LP. Only 8(40%) were of the view that DL activities are used to promote individual learner differences by actively involving them in science learning activities. Seemingly, this low opinion resulted into low participation as was recorded in most of the school science learning. From the results teachers' perception on LP was influenced by knowledge and skills in caring for learner differences during discovery activities. There was no doubt that increase in knowledge, skills and positive attitudes in caring for DL learner difference influenced choice of DL activities and this increased LP in science activities.

Further, the study tried to establish roles of teachers in ECE classrooms in ensuring that each learner participated actively during discovery science learning. Data collected outlined teachers' roles as shown in figure 5

Figure 5: Teachers in Care for Learner Differences IN ECESC



Source: Survey Data, 2011

The findings in figure 5 indicated that 4(27%) teachers did not take control of learners needs during science instructions as they major in lecturing children to acquire concepts. Also 3(20%) teachers who used direct instruction failed to respond to children's needs. On the other hand 2(13%) teachers provided motivating learning activities to effect participation and this promoted positive responses from learners. It was therefore surprising, to note that a majority 4(27%) of preschool teachers directed science learning activities despite the emphasis given with regards to participatory learning in formative years. A minority, 2(13%) teachers were the only teachers able to take care of individual learners' styles. Findings confirmed that preschool teachers were having inadequate knowledge on learners learning styles and its relevance in implementing DL activities. This further revealed that expository learning activities that provided much opportunity for teacher participation resulted to limited learner participation, in adequate practical learning and minimal acquisition of science knowledge and skills.

4.3:2: Teachers' Role in Discovery Learning and Learner Participation ECESC

Caring for individual learners' learning styles has been identified as a major determinant of motivating high rate of participation in science learning. In order to get comprehensive information on teachers' roles in promoting learners' participation, the study analyzed findings were as cited in table 9.

Table 9: Teacher's Role, Caring for Individual Learners' Participation ECESC

Teachers role in care for differences	Frequency	Percentage
Motivate and take scare of learners interests	1	7
Encourage exploration and discovery	6	43
Involve participatory activities	5	36
Provide age appropriate materials and activities	2	14
Total	15	100

Survey data: 2011

Table 9 shows the varied ways in which teachers cared for learners differences. It was indicated by 5(36%), teaches that they involved learners in participatory activities while 6(43%) teachers noted that it encouraged exploration and DL. On the other hand caring for learners by providing appropriate materials was pointed by 2 (14%). The study established that only a few of the teachers were aware of expected activities that take care of learner differences for effective participation in science activities. It was also noted that only in rare cases were learners taken care of. This implied that science concepts acquisition was limited given the fact that high rates of participation require maximum care for learners needs

4.4: Effect of Teachers' Perception on DL and Participation in Science

Establishing teachers' perception towards science DL activities was necessary to determine their motivation in creating conducive environment for DL tasks as well as motivating learners through appropriate choice of activities that enhance learners participation in ECE classroom in Starehe District, qualitative data from the tools were analyzed and results presented in frequency and percentages as summarized in table 10

Table 10: Teachers' Activities in a DL Classroom and LP

Teachers' roles in DL classrooms	Frequency	Percentage
Visiting learners to view progress	3	20
Demanding a lot from learners through questions	1	7
Learning was full of lectures	4	27
Directing the whole learning process	3	20
Providing participatory learning atmosphere	2	13
Giving positive guidance and responses to learners	2	13
Total	**15**	**100**

Source: Survey Data, 2011

From the findings in Table 10 most classrooms were dominated by lectures as cited by 4(27%) teachers, with only 2(13%) teachers indicating that classrooms were participatory. However, 3(20%) teachers indicated that they occasionally visited learners to view progress but still had a lot of demands from learners. Such approaches to instructions were quite meaningless as they did not permit thinking by learners in logical way about scientific processes.

4.4.1: Teachers Skills and Knowledge in Effecting DL and participation in Science

Basically, preschool teachers need to be hired on the basis of specialization and teaching experience (Eshiwani, 1993). However the criteria to determine the right teachers in handling preschool science learning are quite varied. Hence the study sought to determine skills and knowledge of preschool teachers that affect DL activities. Data was harnessed to affirm or refute the claim that high qualification in teaching influenced choice of DL which eventually results in high participation of learners in science activities.

Table 11 shows that in ECESC, only 5(22%) teachers were able to effect learning using variety of discovery instructional methods, a 3(14%) had clean and maintained charts, while 3(14%) involved use of immediate environment to mobilize resources for teaching and to effect LP. Such features allowed learners to fully enjoy science processes and determined the causes of events. This allowed learners to view the environment as a rich resource base and sharpened their observation skills as they interacted in their surrounding

Table 11: Teachers Skills, Discovery Learning and Participation in ECESC

Teachers' skills and techniques	Frequency	Percentages
Use varied instructional methods	5	22
Provide varied instructional materials in class	4	18
Have clean and maintained charts	3	14
Use of immediate environment	2	10
Only color and modeling clay available	1	4
Recycle materials for learning	4	18
No effect in terms of resource allocation	3	14
Total	**22**	**100**

Source: Survey Data, 2011

On the other hand, 1(4%) indicated use of colors and modeling clay or to stimulate interest in science activities while 4(18 %) recycled the old used materials to save on cost of material production. and to provide varied instructional resource 3(14%) had nothing to use for instructing learners during science learning activities. On the other hand only2 (10%) were aware of the relevance of the immediate learning enrolment to boost active discovery learning. This left children quite bored. In a practical classroom situation, DL can be accomplished by relating activities to everyday, understandable world of pupils, building on previous experiences knowledge, skills and concepts. The result concurs with Ausebel's (1968), who noted that, meaningful learning take place only if new knowledge can be purposefully linked with provision of relevant resources which already exist in learner's cognitive structure.

4.4.2: Effects of Planning for DL Activities and participation in Science

Effective teacher preparation enhances positive learning atmosphere, encourages efficient teaching, effective collection and use of resources, within an organized learning environment for DL activities that is able to motivate high rate of participation (Brown, 2004). Quantitative data was analyzed and result by frequency and percentages presented as summarized in table 12.

Table 12: Teachers Preparation for DL and Learners' Participation in Science

Content of schemes of work	A little		Adequate	
	Freq	%	freq	%
Cared for learners needs, interest, skills and experience	2	13	10	67
Realistic lesson content to learners	3	20	7	47
Majorly learner centered	5	33	4	27
Appropriate and adequate learning resources	7	47	2	13
Introduction according to learners experience	4	27	5	33
Relevant choice of instructional methods	8	53	0	0
Took care of learners learning styles.	6	40	4	27

Source: Survey Data, 2011

Table 12 indicates that 10(67%) teachers were able to prepare for learning that took care of learners needs interest and prior experience, 7(47%) had appropriate and adequate learning resources, while only 3(20%) had realistic lesson contents. The study however noted that only 8(53%) teachers chose activities relevant to learners' experiences and 5(33%) had choice based on active practical learning. On the other hand, 4(27%) had adequate and varied discovery activities, 2(13%) had appropriate and adequate materials collected, 7(47%) introduced learning according to learners experiences. Further, the study noted that 5(33%) teachers introduced learning in the context of learners needs while 4(27%) instructed learning from the introduction process. To other teachers, 8(53%) teachers were able to choose relevant activities that matched learners individual needs in order to raise participation in science learning.

The study established that teachers' choice of instructions were dependant on preparation influencing presentation level for effective DL activities. This is an indication that knowledge of teachers in relation to learners needs influenced choice of DL activities, classroom organization, and collection of relevant instructional materials and caring for learners needs, and influencing LP.

4.5: Classroom Organization for DL and Learners' Participation in Science

According to Bernet (2003), quality good classroom organization is determined by the availability, adequacy and quality of facilities and resources for science learning. The study endeavored to establish classroom structure as stipulated against learners' involvement in DL activities. Factors put into consideration here included quality of furniture, adequacy of space for movement and availability of resources.

4.5.1: Influence of Classroom Organization for DL and Learners' Participation in Science

Advancement on how classroom organization effect classroom learning correlates with learners achievement in science, a social environment, sharing ideas and improvement on individual participation in own learning, Adequate space for movement encourages learners to move around and reach relevant corners created in the classroom (Carlson, 1998). Classroom organization is a basic factor in influencing active participation. This study sought to examine the effect of classroom organization on LP in science classrooms as shown in Table 13.

Table 13 indicates that out of 24 teachers, 11(46%) classrooms encouraged free movement during DL, enabling learners to participate in activities, 5(21%) classes encouraged collaborative learning, while 4(17%) were organized to improve comfort.

Further, 3(13%) classes were able to solve learners needs in terms of reaching learning corners only 1(4%) indicated that positive teacher perception towards learners encourage sharing of knowledge among learners in a discovery science classroom. The study indicated wide range of teachers view on classroom organization to enhance professional skills and to implement quality classroom atmosphere in preschools.

Table 13: Teacher's Perception on Class Organization and Learners' Participation in Science

Learners' Activities	Frequency	Percentage
Sharing of materials and resources	5	21
For organized movement	11	46
Sharing of knowledge among learners	1	4
Children comfort during activities	4	17
Learners needs are able to be solved	3	13
Total	**24**	**100**

Source: Survey Data, 2011

This implies that classroom organization is influenced by teacher's knowledge, perception and skills which vary from one teacher to another in determining stimulating classroom setting for learner active participation. The study further noted that there was higher correlation between adequately ventilated and a free structured classroom organization and effective DL.

4.5.2: Factors Hindering Proper Classroom Organization for DL and Learners' Participation in Science

As a result of relevance of teachers' perception towards choice of instructional methods, the study determined to obtain vital information on the factors perceived by teachers to influence DL activities and how this affected learners' participation in science activities. Respondents were asked to give reasons for failure to effect adequate classroom organization in most ECE classrooms. The results were summarized as in table 14.

Table: 14 Illustrated Factors that Hinder Proper Classroom Organization for DL Activities

Factors	Frequency	Percentage
Inadequate materials in variety	2	13
Inadequate space for proper organization	3	19
Inadequate Provision of interesting materials	3	19
Inadequate learning facilities	8	50
Total	16	100

Source: Survey Data, 2011

Findings in table 14 showed that 8(50%) a great number of participants attributed teacher perception to inadequate provision of learning facilities to influence choice of DL activities while 3(19%) cited inadequate provision of interesting materials, on the other hand, 3(19%) blamed lack of space for proper organization as a factor. However only 2(13%) teachers had organized adequate space, well equipped with enough learning materials learners could manipulate during science learning. The main contributor to inadequate classroom organization was inadequate provision of learning facilities influencing choice of DL activities, as was indicated by 8(50%). This implies that as a result of teacher perception and inadequate learning resources very few classrooms were adequately organized for effective discovery science learning in preschool classrooms.

4.5.3: Teacher's Choice of Science Instructions and LP

Factors guiding teachers choice of instructions and science learning in preschools was found to be a matter of concern in effecting choice of DL. Head teachers were asked to state guidelines used for promoting science learning from pre-school classes and they gave responses as presented in table 15.

Table 15 Determinants for Teacher's Choice of DL Activities

Influence	Frequency	Percentage
School guidelines	11	70
Syllabus	13	93
Learning styles	6	43
Parental choice	1	7

Source: Survey Data, 2011

From table 15, the study noted that majority 13(93%) of preschool activities were determined by the syllabus. School guidelines were stated by 11 teachers (70%) to influence their choice of DL activity, while 6(43%) stated learner needs styles and interest to influence their choice. Only 1(7%) stated parental choice as guide in choice of instructions. Study observed that processes undertaken by preschool teachers in ensuring learners participation were mostly triggered by both the school and the government regulations. The findings implies that for effective DL practices, the teacher has to apply acquired knowledge and experiences they have in science to influence active science learning as demanded by the school and guided by the syllabus.

4.5.4: Head Teachers' Role in DL and Learners' Participation in Science

Head teachers are managers of preschool, involved in decision making, this study sought to establish Head teachers' role in motivating teachers' in science teaching.

Table 16: Head Teachers' Roles in Effecting DL in Schools

Head Teachers' Roles	Frequency	Percentage
Organizing in service /short courses	20	83
Threats	3	13
Provision of learning materials / resources	20	83
Peer teaching	17	71
Providing hand outs	9	38
Funding school staff trips	17	71
Total	**86**	**100**

Source: Survey Data, 2011

Table 16, shows that 20(83%) of the head teachers motivated preschool teachers by taking them for short courses in science teaching. This reminded them of their roles and obligations. 20(83%) provided adequate learning resources for teachers required to effect discovery instructions, 17(71%) encouraged peer teaching among teachers to learn from one another as well as taking them for trips as a way of motivation. More still 9(38%) provided handouts as a means of providing motivation while 3(13%) used threats as way of ensuring teachers worked hard to achieve active learning. The findings implied that the role of head teachers was paramount in effecting active learning and choice of activities in preschools. It was further noted that in preschools where teachers had good relationship with the administration teachers worked hard, were very positive and promoted DL through participation.

The study further established the effect of motivation and teacher's perception towards organization of DL activities. This is based on the realization that a highly motivated teacher is an important factor in teaching process. Such characteristics like kindness, helpfulness, patience, self control, positive emotional stability are virtues that have been identified to create good relationships between teachers and learners (Naccino Brown et all, 1982). The stated responses were as indicated in table 17.

Table 17: Relationship between Teachers' Motivation, DL and LP in Science

Effects of Motivation	Frequency	Percentage
Able to share knowledge and concepts	2	11
Improve teaching attitude	2	11
Acquire skills for quality service	3	17
Learn to cater for varied needs	5	28
Acquire more ideas	4	21
Motivates learners' involvement	2	11
Total	**18**	**100**

Source: Survey Data, 2011

Table 17 indicates that due to motivation level given to teachers, 2(11%) were able to share knowledge and apply the same during science activities increasing classroom rate of participation, 2(11%) had improvement on teaching perception in science while 3(17%) were encouraged to acquire skills for taking care of varied individual learner differences. Further, 4(21%) teachers got better opportunities to acquire more ideas in better choices of science instructions and how to make learners participate actively from one another. This is an indication that increase in teacher motivation increased teacher perception, sharing of knowledge, acquisition of skills to effect choice of DL activities, improved care of individual learner difference, gaining of science knowledge and motivation of learners to participate in activities involving hands on minds on. This implies that teacher motivation is relevant to DL activities, enabling learners active participation in solving own problems, based on own past experiences.

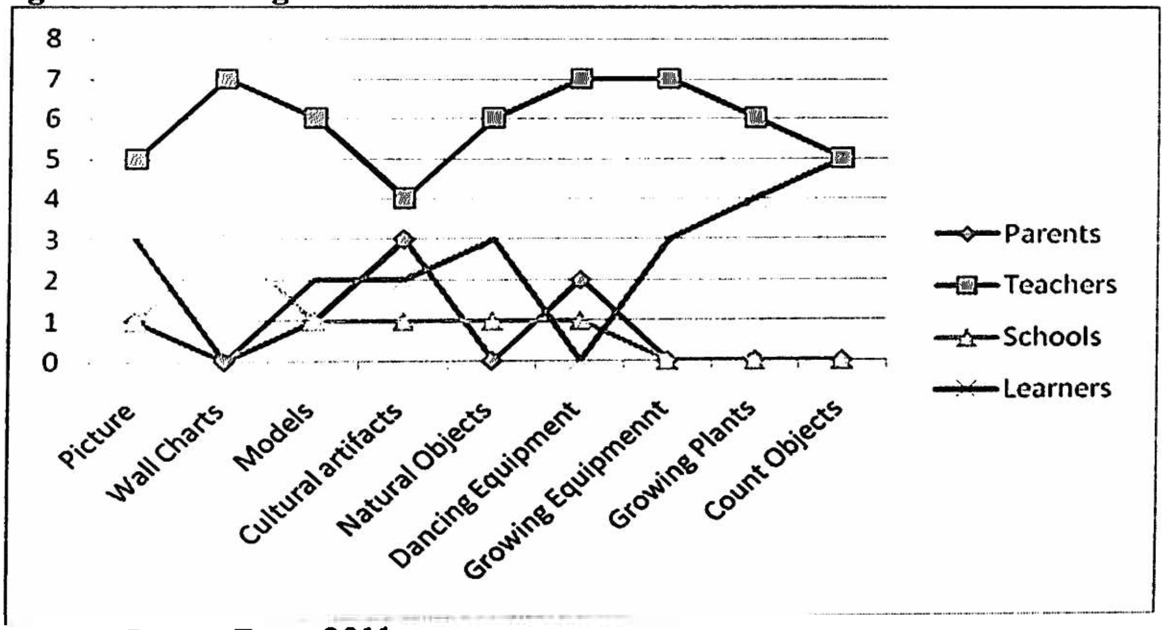
4.6: Development of Instructional Materials and Facilities for DL and LP in Science

Quality classroom science learning in preschool is determined by the availability of learning resources, of good quality. This is based on the argument that presence of basic facilities and provision of relevant media increases learner involvement in own learning facilitated by teacher in applying all senses to learn new concepts.

4.6.1: Instructional Materials for DL and LP in Science

Availability of instructional materials such as textbooks, reading materials, laboratory equipments, materials for practical subjects leads to higher participation. Such aids enhance achievements of learners, helps teachers communicate effectively and meaningfully in order to achieve learning objectives. Instructional materials that promote learners' participation include concrete materials arranged in various learning corners based on themes (Ferry, 1995). According to Good, and Brophy (1994), the way learning materials are displayed in a classroom as pinned on walls, hanged on ropes, cut out in boxes, and others placed on tables well arranged attract learner's participation. Teachers were asked to state types of instructional materials used in science teaching and responses were captured as shown in figure 6.

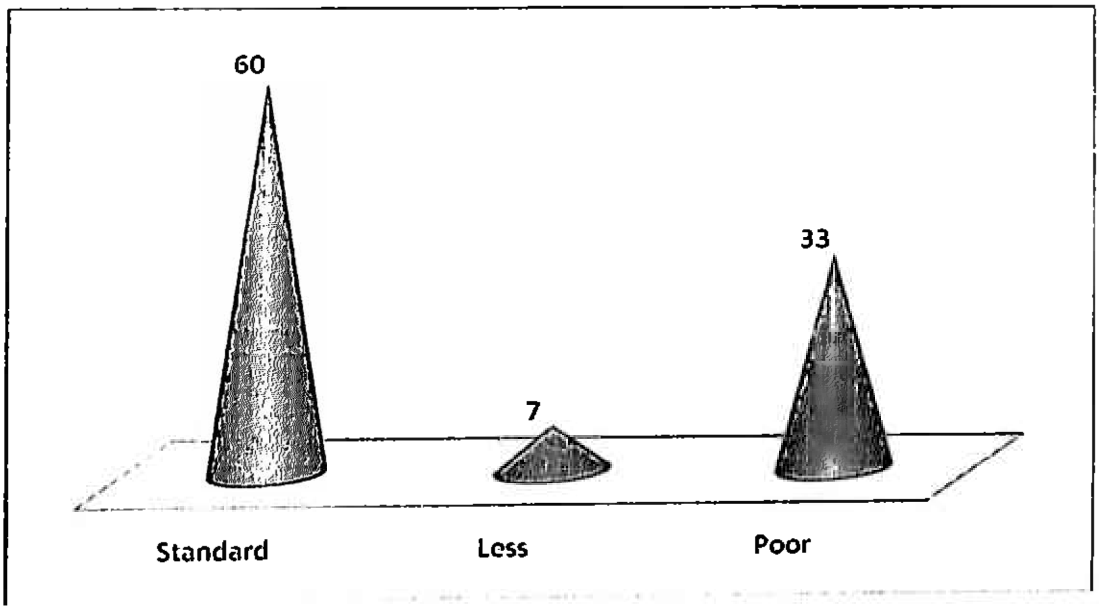
Figure 6: Learning Materials on LP



Source: Survey Data, 2011

Figure 6 shows that teachers were the most providers of the learning resources used for effecting science learning followed by learners own collection, of locally available resources. Parents support was in very low quantity in terms of support and resource collection compared to that of teachers, learners and the school. The study further noted that the work done by the schools in provision of resources was also not adequate. Following the ranking of factors in figure 11, the findings were worked as follows: (1) Teachers, (2) learners (3) School (4) Parents. From the findings, teachers were the major providers of science learning resources required for effecting DL activities in preschool science classrooms. Hence teachers' creativity and knowledge in science activities influence effective choice of instructional resources, arrangement of resources and maintenance of classroom environment. Further observation was done to asses types of instructional materials teachers used during science instructions.

Figure 7: Instructional Resources used to Effect LP



Source: Survey Data, 2011

The study shows that resources for science learning were not only inadequate but also inaccessible by learners. Out of the 15 preschools observed, 8(51%) had pictures, while 5 (34%) had colors with only 2(8%) having growing plants, and only 1(7%) of the preschools having charts for learners to use during science learning. Evidently, lack of learning resources within preschools was a serious hindrance to choice of DL activities and a serious impediment to learners' participation in science activities.

4.6.2: Effects of Lack of Instructional Materials for DL and LP in Science

Several factors influence teacher activity in collection of instructional materials that affect science learning and LP. This includes finances, teachers' creativity and skills as well as support from the community. Based on this argument, teachers were asked to give responses on various challenges towards collection of resources for science learning. Respondents' responses were summarized as shown in table 18.

Table 18: Reason for Lack of Instructional Materials for DL and Learners' Participation in Science

Reasons	Frequency	Percentage
In adequate support by government	7	29
Inadequate finance in school	4	17
Lack of support from the parents	6	25
A lot demanded from the teacher	3	13
Inadequate skills and creativity	4	17
Total	**24**	**100**

Source: Survey Data, 2011

Out of 24 teachers 7(29%) cited inadequate support by the government as a major factor, 4(17%) stated in adequate financial status of the preschools, 6(25%) stated lack of support from parents in collection of materials, 3(13%) indicated teachers burdened with a lot of activities to handle in preschool to ensure learners participated actively in own learning in science through discovery activities, 4(17%) cited poor skills and lack of own creativity in collection and organization of materials for science instructions as major effects of DL activities. Therefore, these results echoed earlier findings by UNESCO (2002) which pointed that quality of teaching is assessed by the percentage of participation among learners' activities that are presented during and after learning science. Quality of instruction implies quality of knowledge provided by the preschool teacher and that quality of learning offered by preschool teacher is assessed by the type of over behavior of learners.

4.6.3: Classroom Facilities for DL and Learners' Participation in Science

Facilities such as desks, benches, shelves, chairs that learners use in pre school classroom have a lot of influence in learners' comfort and motivation to participate in learning activities. What learners sit on determines how comfortable they are and to feel part of learning activities. Additionally, a well ventilated and lit learning atmosphere enable learners to feel comfortable and moving freely (Hopkins, 2002).

Table 19: Facilities for DL and Learners' Participation in Science

Facilities	Less comfortable	Comfortable	Grounded
Chairs	-	7	2
Mats	3	4	-
Desks	1	2	2
Tables	2	7	2
Benches	1	-	1
Total	**7**	**20**	**7**

Source: Survey Data, 2011

Table 19 shows that preschool facilities were not only inadequate but also inappropriate for young learners. Chairs and tables were the most used furniture in preschools as was noted in 7(47%) pre schools. Use of desks was mostly preferred in private pre schools where learners were squeezed in smaller rooms, reducing learner's rate of participation in a classroom. Use of charts limited learners from involving in hands on experiences, relevant for DL activities. In 2(13%) classes, benches were used. This indicated the kind of discomfort learners had during instructions since the desks were insecure in terms of stability, size and ease required for young learners. In inadequate choice of sitting conditions was a serious problem in preschools affecting choice of discovery instructions lowering rate of learners' participation in terms of access to instructional materials and choice of DL activities.

4.6.4: Effects of DL Classroom Conditions and LP in Science

Classroom infrastructure positively influences instructional participation and acquisition of concepts. Use of varied instructional methods is closely linked to instructional infrastructure which strongly influences learner's movement and reaching outside world (Mayer, 2003). Of the classes observed, figure 13 indicated conditions of classes within Starehe District preschools.

Table 20: DL Classroom Conditions on Learners' Participation in Science

Classroom conditions	Frequency	Percentage
Standard	9	60
Moderate	1	7
Poor	5	33
Total	15	100

Source: Survey Data, 2011

Table 20 shows that 9(60%) classrooms had standard ventilation that enabled learners to have free atmosphere for healthy air movement. 1(7%) classroom had moderate space and ventilation. Worse off were 5(33%) classrooms which had inadequate space left for windows and air circulation making classes very stuffy. This showed inadequacy of learning conditions and ventilation in preschools. Our space exposes children to attack by frequent infections. This reduced participation of children as a result of reduced volume of oxygen in the rooms. Additionally, highly squeezed rooms with little space in between unmovable desks made learners uncomfortable and unsecured. The study realized that generally private preschools were inadequate in terms of facilities required for preschool learning as compared to public preschools.

4.7: Activities of Encouraging Use of DL and Learners Participation in Science

DL involves seeking information that seeks knowledge settle and attend to content uncovered through genuine interest and stimulating activities. DL enables learners to use multiple senses to uncover knowledge leading to a feeling of elation. It is an eye widener which leads to a feeling of "I have found it" which excites and motivates a child to look again and discover more. For a practical learning process, varied activities are relevant in effecting a rich DL atmosphere (Carlson, 1998). Table 21 indicates important activities for effecting DL processes.

Table 21: Activities for Encouraging DL Activities and LP

Activities encouraging DL	Frequency	Percentage
Lack of models for children to copy	1	4
Negative attitudes of learners	1	4
Abstract concepts in science	2	8
Lack of basic skills in the teachers	3	13
Inadequate time for preparation	1	4
Poor instructional approaches	2	8
Lack of reference materials	6	25
Poor teacher perceptions and attitudes	3	13
Language deficiency in the learners	1	4
Limited provisions of resources and facilities	4	17
Total	**24**	**100**

Source: Survey Data, 2011

Table 21 indicates different factors proposed by teachers to effect active participation in science in pre school classrooms. Out of 24 teacher, 4(17%) proposed need for providing enough resources for learners to manipulate. 4(17%) cited involving learners in all the activities going on in the class, 3(13%) were for the need to organize class environment according to learners needs. Further, 2(8%) echoed need for motivating teachers to influence positive perception while 1(4%) stated need to choose activities that encourage learners to manipulate and to promote practical learning. This implies that addressing each of the concern would influence choice of DL activities to effect LP in science learning.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, RECOMMENDATIONS AND AREAS FOR FURTHER INVESTIGATIONS

5.0. Introduction

This chapter presents summary of the findings, conclusions recommendations, and suggestions for further study.

5.1: Summary of Findings

It was apparent that preschool teachers had low level of qualifications (certificate). However public preschools were found to strictly employ teachers of better grades (Diploma) compared to private preschools. There was a strong correlation between teacher's knowledge and skills and choice of DL activities consequently increased LP in science. This is because quality of knowledge is influential in the way teachers presented learning activities, the way they chose learning resources and classroom organization. On the other hand, study noted gender imbalance with majority 23(96%) of teachers being female, this reinforced stereotyping the preschool learning as a feminine duty regarded for motherly care assuming the role of learning performance. This was attributed to lack of awareness on need for both gender (male and female) to provide competitive creativity in choice of instructions to effecting quality DL activities at preschool level. Besides, the dire need to put on board men in preschool issues is critical for personality growth and development of the boy-child.

Private preschools were mostly headed by unqualified non ECE specialists, thus this affected provision of learning resources and choice of activities as a majority of such teachers did not understand that formative years acquired instructions through stimulating activities. Lack of knowledge on preschool activities among head teachers created loophole in provision of learning resources and facilities, evaluation and monitoring activities relevant for DL in science. Private preschools had a high turn over rate of teachers due to regular movement for greener pastures. Lack of job security was noted to affect proper planning for life long DL, and follow up of science activities. Inadequate assessment of preschools by the administration on teachers' preparation, collection, presentation and evaluation processes affected instructional pattern and commitment in maintaining DL as a reality, thereby compromising science learning outcomes (performance).

Teachers' choice of instructions included activities that encouraged rote learning and expository activities, such as demonstration, questions, answers, lecturing with the preferred being, lecture followed by question and answer. The choice of discovery method was perceived to be more easily applicable for science teaching irrespective of poor response from learners. The study also established that learners were involved in learning activities through observation, picture reading and question and answer resulting to neglect of care of individual learner differences. Hence, failure in learning by doing and manipulating the materials, leading to poor individual LP in science activities and weak acquisition of science concepts

Caring for leaner differences is established to be of very great importance for effective LP to be achieved. This was noted to be contrary in pre school classes in Starehe District where science learning was characterized by expository activities such as demonstration, question and answer and story telling. In most of the science sessions, activities were either directed by the teacher through demonstration, lecturing or full of question and answers. The findings noted very few, 3(20%) teachers that encouraged exploration, involved learners in participatory activities such as hypothesizing, discussion, experimenting observation, inference and classification.

In terms of preparation for science learning, only 3(20%) teachers had adequate lesson preparation while only 2(13%) were able to take care of learners in tasks of science learning. This was in terms of adequacy and variety of learning instructions and resources and classroom arrangement appropriate for active learner's participation in DL activities. The study noted that choice of resources and caring for learners individual needs were influenced by nature of preschools, support provided to teachers by the administration and knowledge, skills and attitudes teachers possessed in science that influenced their choice of science activities (experience and qualifications).

There was also high relationship between teacher's organization and choice of DL activities in effecting learners' participation. Similarly, the study found that in most of the pre schools, classrooms could not match the standards required for science learning. Only 4(13.7%) classes had adequate provision for learning activities, the rest 11(86.3%) lacked adequate space for arranging variety of instructional materials that could motivate learners participation. This left the classroom walls bare, non-stimulating and boring. Based on the effect of learning resources and facilities and learner's participation, the study established that well organized preschools with relevant learning resources were able to effectively realize high rate of participation during science instructions as learners practically got involved in organized classrooms to reach provided corners and manipulating resources during science learning.

Collection and provision of learning resources was noted to be a challenge to many teachers utilized the same learning resources for many lessons without creating a variety in preschool classrooms to effect learner's participation. The study identified that teachers were the frequent providers of learning resources used in preschool science classrooms. There was an indication that learners and preschool administrator's role was minimal in provision of relevant resources for science learning. Involving learners in collection was noted to be the most efficient in provision of variety of science learning resources.

Provision of relevant sitting facilities was found to be inappropriate. Desks and benches were squeezed in smaller classrooms, and this denied learners opportunity to feel comfortable during classroom activities. Classrooms with adequate resources and comfortable sitting facilities relevant for learner's age and needs were noted to encourage active movement within the classrooms raising participation rate. DL activities in science was found to be only possible when learners are encouraged to actively get involved in own leaning. Therefore, DL would be efficiently utilized if teachers were retrained in ECE instruction through short courses and seminars.

5.2 Conclusion

Factors resulting into failure in the choice of learning activities through DL included; low teacher qualification, gender disparity in preschool teaching inadequate care of learners learning styles and inadequate facilities and resources.

The choice of DL was found to have direct bearing on the rate of LP in science activities. The neglect of choice of DL activities in science teaching by teachers was based on the premise that activities were quite involving, demanding a lot of time for collection of required resources and time for preparation and presentation. Hence teachers preferred expository instructions such as, demonstration and question and answer and lecture.

Based on learners' learning styles and LP, the study identified that caring for learners learning styles could be taken care of when DL was put into practice. Neglect on learners needs by introducing learners to activities that do not promote practical participation, poor relationship between teacher and learners as well as poor choice of instructional materials lowered rate of LP in science learning.

Teacher's knowledge, skills and attitude in science learning affected choice of DL in science and the higher the teachers motivation the better the learners' participation. Most of the school administrators were however noted to ignore this; they never motivated teachers' through seminars, trips or rewards. Teachers' motivation is relevant in preschool learning and only a few preschool administrators took the initiative so as to encourage learners' participation through motivation preschool teachers.

Effective classroom organization promotes LP. Most 11(86%) preschools visited had very limited chairs and tables comfortable for learners. A Majority 11(86%) was conducted in very minimal classroom spaces, and this limited learners' movement which resulted to poor rate of participation.

5.3: Recommendations

Based on the findings, the study makes the following recommendations

Improve on Rewarding Teachers Effort:

Teachers need to be taken for science in-service training causes to better their qualifications in terms of knowledge and skills. This willo promote participation in science learning from preschool level. In-service and seminars would place teachers in a better position and to attract and retain teachers to improve learners perception towards science learning, link content with instructional methods for possible alternative teaching methods. This would benefit young learners with relevant learning resources and adequate provisions that stimulate DL. Rewarding, encouragement and support to pre school teachers should be used to motivate them in organizing and planning quality instructions that enable active participation of learners in preschool science.

Promoting choice of DL in all science classrooms:

Perceived provision of science learning activities using discovering activities depends on learners individual differences on the way they receive concepts, react to information provided and how they respond to learning resources provided in a classroom environment. Considering these factors will ensure choice of science instructions that are aimed at caring for each learner's needs.

Develop a planning system to Strengthen Preschool learning:

The government should make preschool learning compulsory and provide relevant facilities and resources so as to attract more qualified teaching personnel for quality and competitive science learning which involves discovery activities for preschool instructions. There is need for an effective system to verify preschool learning science instructions in terms of teachers' qualification, teachers' motivation, preschool facilities, provision of learning resources, and choice of instructions as precondition for effective LP. This would ensure that science activities are instructed according to learners' individual needs by teachers who possess relevant skills, knowledge and attitudes to effect the learners' participation in ECE science.

Partnerships and Collaboration with Parents in Preschool Science Learning:

Access to adequate provision of learning facilities and learning resources are skewed in favor of public preschools hence, most publicly owned preschools have adequate facilities, rooms for science instructions and arrangement of learning corners with variety of learning resources. In this regard, programs aimed at educating parents on relevance of getting involved in provision of learning resources for learners, and the involvement of other institutions as churches, community based NGO's in support of Pre-School should be designed and implemented.

5.4: Contribution to Body of Knowledge

Objectives	Contribution
Instructional methods used in science learning and the effect on instruction participation	Teacher centered instructional methods (TCIM) like demonstration and question and answer can be applicable in use to effect DL with learner centered methods like picture reading, observing and classifying for rich learning environment and to motivate learners to participate higher. Choice of a TCIM reduces LP in science learning
Effect of relationship between instructional methods and learning styles on classroom participation	Adequate preparation of resources and activities is able to accommodate learners' needs and individual differences, motivating active participation and acquisition of concepts in the learning process. Inadequate knowledge of learners learning styles lead to improper choice of instructional methods turning learners to passive thinkers.
Teachers perception on choice of instructions and effects of learners' perception	Past experiences affect behavior, if positively reinforced by spelling out expected behavior at the end of an activity, shapes a habit. Opening opportunities for more experiences like taking teachers to refresher courses and rewarding learning effort affects preschooler's innovativeness and what they give to classes.
Instructional materials used in teaching science and learners participation	Choice, arrangement and provision of resources depend on teacher's attitude. Improper use of resources leads to poor participation. Support from parents, school and government will promote aesthetic value, increasing involvement and concepts acquisition.
Classroom organizations and learners participation	When behaviors learnt under one set of conditions are applied to other situations or similar settings, those behaviors are generalized and never disappear in child's mind. Proper classroom organization is recommendable for learners to retain leant science concepts for along learning period. Classroom organization involves provision of adequate, relevant, safe and aesthetic learning resources well arranged to encourage learners' movement in a free structured learning environment.

5.5 Suggestions for Further Research

The research focused on only five variables that had direct effect on the learners' participation. This does not mean that the five are the only predictors of effective DL. Further research can be carried out to establish other possible effects and to determine the extent of such contribution on learners' participation in science in ECE classrooms.

1. There is need for further research that will focus on the effectiveness of the learning involving learners through hands on activities in science and other tiers of learning. This is because this study assumed that the methods (DL) apply across all the learning systems.
2. There is need to investigate effectiveness of instructional resources on LP.
3. Investigate links between proficiency in science and other learning activities.

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APPENDIX I: LETTER OF TRANSMITTAL

Jackline Akinyi Walala
University of Nairobi, Kikuyu Campus
Department of Education, Communication and Technology
Box 30497, Nairobi.
Email: jackywalala@yahoo.com
Cellphone +254722279528
August, 2010.

Dear Sir/Madam,

RE: EFFECTS OF DL ON PARTICIPATION OF LEARNERS' IN EARLY CHILDHOOD SCIENCE CLASSROOMS IN STAREHE DISTRICT, KENYA

I am a Masters of Education (Early Childhood Education) student at the University of Nairobi carrying out research on the above topic. It is my humble request that you assist me by filling in the questionnaire and responding to the interview questions as correctly and honestly as possible. Be assured that your identity and responses will be treated with UTMOST CONFIDENTIALITY and for this reason DO NOT WRITE YOUR NAME OR INSTITUTION on any tool.

I take this opportunity to thank you in advance for your willingness to participate in this important exercise.

Yours faithfully,

Jacky Akinyi Walala
Reg: E57/72517/08

APPENDIX II: HEAD TEACHERS QUESTIONNAIRE

Dear respondent,

The study seeks to investigate the effect of learner centered instructional methods on preschooler's participation in science in early childhood classroom Starehe District. The study is based on the fact that classroom participation in a science lesson in pre schools has been falling or not convincing. This is in spite of the fact that the country highlights the goals of every learning area in both the lives of young learners and the country as a nation on their achievement and participation. Given the significance of the topic enhancing participation of pre scholars within science classroom, I consider you to be an important part of the study. In this regard, I would be very grateful if you could spare your time to provide information relating to the questions that follow.

Your responses will be treated in confidence. Thank you in advance.

Background Information

Zone	Qualification
Gender of teacher	Type of pre school
No of teachers: M F	Post in the school
NO of classes	Qualification in ECE
Number of preschoolers [a] girls______[b]boys________	

Classify your pre school classes into the following categories.

Class Size	Baby class	nursery	Pre unit
Girls			
Boys			
Total			

1. Indicate what you consider as appropriate instructional methods for use in instructional methods teaching science to preschoolers

	Yes	No		Yes	No
Demonstration			Lecture		
Recitation,			Description		
Question and answer			Self discovery		
Drawing			Observation		
Singing			Poem		
Dramatization			Problem solving		
Experimenting			Inquiry based		

Give the reason for choice of such instructional methods...

2. Identify activities relevant for preschooler's during science lessons

	Yes	No		Yes	No
Presentations			story telling		
Manipulation			Note taking		
Observation			Discussing		
Discriminating sounds			Meditating		
Picture reading			describing the process		
Manipulating			Inferring		
Demonstrating			Giving facts		

Give reasons for the choice of such activities...

3. Are you comfortable with the instructional activities teachers prefer in teaching science in the preschool?

Yes [ ] No [ ]

Explain your answer ....

4. Identify the learners' participation during science lessons?

Adequate [ ] Fair [ ] Poor [ ]

5. Indicate what influences your teachers' choice of instructions for science learning?

	Yes	no
Syllabus		
School guidelines		
Teacher's preference		
Learner's styles		
Parent's choice		

Give how such factors influences learners participation...

6. Highlight ways of motivating teachers' choice of instructional methods to influence learners' active participation in science activities

	Yes	no
Termly token		
Short courses		
Provision of instructional materials		
Encouraging teachers' own organization		
School trips		

Indicate the role of such activities..

7. Effect of the leeway of government's policy of including preschools under the provision of education and procurement of resources on preschoolers' participation in science

Weak [ ] good [ ] excellent [ ]

8. Do you think the above statement affects choice of instructions and preschoolers participation in science? Yes [ ] No [ ]
Explain your answer ……………………………………………………………………

9. Does preschool teacher's current choice of instructional methods affect future learners' participation in science education syllabus? Yes [ ] No [ ]

10. What can be done by these stake holders to encourage learners' participation in science?
Government……………………………………………………………………
School……………………………………………………………………
Teachers……………………………………………………………………
Parents ……………………………………………………………………

11. Indicate the best source of instructional materials in teaching science to preschoolers?
Commercial [ ] locally collected [ ] both [ ].

12. Do you think science learning can be used to solve learners' needs? Yes [ ] No [ ]
If yes, Indicate what can be done to ensure learners' individual differences are catered for during science learning
……………………………………………………………………

13. What advice can you give to preschool teachers to effect learner's participation in science activities?
……………………………………………………………………

APPENDIX III: PRESCHOOL TEACHERS QUESTIONARE

Dear respondent.

The study seeks to investigate the effects of leaner centered instructional methods on the LP in early childhood classroom in Starehe District. The study is based on the fact that classroom participation within pre schools has been falling or not convincing. This is in spite of the fact that the country highlights levels mostly from ECE for its fundamental benefit on the achievement and participation of learners for effective teaching and learning. Given the significance of the topic enhancing participation of pre scholars within the classroom, I consider you to be an important part of the study. In this regard, I would be very grateful if you could spare your time to provide information relating to the questions that follow

Background Information

Zone	Qualification in ECE
Gender of teacher	Type of pre school
No of teachers in class	Post in the school
Duration in the school	Marital status
No of preschoolers in a class [a] girls______ [b]boys______	

Part 2: Perception of teachers

1. Indicate whether the following instructions are able to influence active participation in ECE class DL activities

	Yes	No		Yes	No
Lecture			Drawing		
Demonstration			Poem		
Recitation,			Description		
Self discovery			Observation		
Problem solving			Dramatization		
Singing			Inquiry based		
Experimenting			Question and answer		

State reasons for your preferred choices............ ....

2. Identify activities you involve your preschoolers in during DL science lesson

	Yes	No		Yes	No
			hypothesizing		
Presentation			field trip		
Manipulating			Discussing		
Observing			identifying		
Discriminating sounds			describing		
Picture reading			Inferring		
Measuring			participation		
Demonstrating					

Give reasons for the choice of such activities ....

3. Identify the effects of chosen activities on learners' competence.

....

4. Indicate whether science learning is practical oriented or oral based by choosing the following examples listed.

	Yes	No		Yes	No
Observing			Drawing		
Coloring			Answering questions		
Picture reading			Demonstrating		
Classifying			Discussing		

Give reasons to support your choices...

5. Indicate what you perceive as the most appropriate benefit of science learning

Teachers Attitude on science teaching	Strongl y agree	agree	disagree	Strongly disagree
essential in life				
A lot are practical activities				
Need for learner to learner cooperation				
useful in other learning areas				
It is a compulsory subject				
Involves new concepts				
Taxing in terms of preparations				

Give reasons for your support ....

6. Indicate your roles as a science pre school teacher

	Yes	*No*
Organizing classroom and arrangement		
Directing or teaching		
Collecting or developing materials		
Involving learners in lesson preparation		
Providing / choosing activities		

Guiding / giving support to learners

Any other (specify)

....

7. Identify how the selected roles influence learners' participation in science

....

Learning atmosphere	**Yes**	**No**
Relaxed/welcoming atmosphere		
Quit/ un groomed classroom		
Sharing ideas (discussion)		
Individual based activities		

Calling for teacher's guidance	
Simple experimenting	
Cramming facts	

8. Personal satisfactions towards choice of instructional methods
Too great [ ] to some extent [ ] Too involving [ ]

9. Indicate how you involve learners in your preparation for science learning in your ECE class?

	Yes	No
Organizing classroom		
Collecting learning resources		
Class arrangement		
Choosing activities		
Listening to instructions		

Any other, (specify) ....

10. Comment on the children's response when involved in science preparation, delivery and evaluation process. Active [ ] Passive [ ] Any other ....

11. Indicate instructional methods that influence LP in DL activities

Negative	Positive	Negative		Positive
Demonstration			Self discovery	
Lecture			Observation	
Recitation			Discussion	
Description			Dramatization	
Question and answer			Drawing	
Singing Problem solving			inquiry based	
Poem			Singing	

12. Identify the activities children prefer likely to influence your choice of instructional methods for teaching science

	Yes	No		Yes	No
Presentation			Sound discrimination		
Observing			Manipulating		
Demonstrating			Story telling		
Writing facts			Discussing		
Meditating			Describing		
Inferring					

13. List the effects of such chosen activities on learners' competence.
....
....

14. The role of the teacher during science instructions includes:

	Yes	No
Initiating the lesson activities		
Guiding learners during their participation		
Fostering group norms and completion		
Forming groups		
Providing instructional materials		
Organizing the classroom		
Direct learners activities		
Making assignments of homework or class activities		
Evaluating learners activities		

Indicate the reasons supporting your choice? ....

15. Give measures that can be put in place to promote teacher's choice of relevant instructional methods to learners

	Yes	No
In-service		
Threats from administrator		
Provision of adequate L/S		
Pear teaching		
Hand outs		

List the relevance of your choice ....

Classroom Organization and provision of learning resources

16. Does the class sitting arrangement need to be adjusted? Yes [ ] No [ ]

Explain your answer..
....

17. The choice of instructional methods is influenced by classroom organization.

Yes [ ] No [ ]

18. What is your opinion on use of classroom organization in science learning?
....

19. Improvisation of learning resources is done by.

Teachers [ ] learners [ ] School [ ] community [ ]

20. Indicate types of learning instructional materials available for teaching science in your preschool influencing learners' participation. Give the quantity for the mentioned materials

Commercial ....

Locally...

Collected..

Improvised ....

21. Is time allocation for teaching science is enough for learners' activities?

Yes [ ] No [ ]

In your view, does provision of instructional materials affect learners' participation in science?

Yes [ ] No [ ]

Indicate the reason for your choice...

22. Suggest ways of encouraging use of instructional methods that influence learners' positive participation in science activities..

23. Indicate whether you strongly Agee (SA) Agree (A) Neutral (N), Disagree (D) or Strongly Disagree (SD) by ticking against each statement;

	SA	A	N	D	SD
Highly qualified teachers use varied instructional methods than less qualified ones					
Experienced teachers care for learners needs better					
Recognizing teacher's role has greater influence on choice of instructions					
Learners participate actively when their needs are cared for					
Facilities in classroom determine choice of instruction					
Teachers past experience influences their attitude towards preschool learning and choice of instructions					
High teacher relationship in well organized classroom promote learners participation					
Class size determine choice of instructional methods					
Classroom organization depends on teachers perception and skills					
Availability of instructional materials influence choice of instructional method					
Choice of instructional method reflects learners participation and learning					

APPENDIX IV: OBSERVATION CHECK LIST

A) Background Information

Zone	Pre school
Class	Type of pre school
Subject	Topic
Gender of teacher	Time
Number of preschoolers [a] girls______[b]boys________	

1 a little, 2 adequate, 3 a great deal

B) Schemes of work

Plan		1	2	3
1	Took into account learners learning needs, interest skills and experience			
2	Appropriate and realistic in the light of lesson content and learners abilities			
3	Leaner centered instructional methods were used			
4	Appropriate adequate preparation of materials for learners use			
5	Introduction incorporates learners experience from known to unknown			
6	Stimulating introduction motivating learners participation			
7	Relevant Choice of instructional methods in each step			
8	Learners learning styles were well taken care of			
9	The classroom was well organized for the content learnt			
10	Teacher's participation towards learning			
11	Learners participation during learning activities			
12	Learning summary took care of learners needs			
13	Each learning resource was well put into use			

2. List Instructional methods used when teaching ....

3. Indicate the kind of teacher child relationship in the course of teaching
   Very good [4] Good [3] Poor [2] Very good [1]

4. Teacher's role towards learners during learning process.
   Very good [4] Good [3] Moderate [2] Poor [1]

5. Learner's attitude towards the methods used by the teachers while teaching preschoolers
   Excellent [4] Good [3] Moderate [2] Poor [1]

C) Learning Process

Activity, participation and implementation during teaching

Activity	a) Practical work was conducted b) Almost all learners were active c) Appropriate task for discussion d) Group oriented	No	yes	Remarks
Learners participation	a) Children were encouraged to use their prior experience to solve their problems b) Learners were encouraged to give their own hypothesis/predictions and helped to discuss how they differed in their reasoning c) Learners were encouraged to give their own observations/results in their practical work			
Experiment effectiveness	a) Learners were able to solve related problems b) They were able to verify their hypothesis c) Learners actively participated by choosing own material in terms of their problems			
Improvisation	Improvisation practiced in the classroom a) Simplified experiments were done b) Utilization of available resources in environment c) Teacher produced improvised materials interesting to learners			

D) Lesson Development

Lesson development	Yes	no	comment
Teachers creativity/ innovativeness			

E) Stimulation

Does alternative learning style used stimulate learners response?			
What are the reactions of learners in use of space and mode of presentation, conclusions/and evaluation.			
Do the teaching methods used capture the participation of learners?			
Relevance of learning resources and facilities			
General level of disciplines within the school e.g. during break, lunch, games during learning in a classroom.			
Use of available resources to facilitate participation during learning			

F) Teacher's perception

Roles of a pre school teacher in the class..

i. Teacher's use of learner centered methods?
   Too great [ ] To some extent [ ] Not at all [ ]
ii. Do you have set goals for your learners?
   Explain..
iii. Learners' involvement during learning? Yes [ ] No [ ]

G) Facilities in Classroom

Facilities in classroom	comfortable	less	crowded	Remarks
Chairs				
Mats.				
Benches				
Desks				
Desks				
Tables				

H) Charts and other teaching aids available

	No	source	condition	Labeled	Remarks
Pictures					
Wall charts					
Models					
Cultural Artifacts					
Natural objects					
Dancing equipments					
Growing equipment					
Growing plants					

I) Classroom condition

	Standard	Excess	Less	Poor	Remarks
Ventilation					
Cleanliness					
Water source					
Learning corners					
Play materials					
Others					

J) Reference books for preschool teaching and learning Yes [ ] No [ ]

Source of references...