TEACHER RELATED FACTORS IN THE IMPLEMENTATION OF SCIENCE ACTIVITIES IN PRESCHOOLS IN NAIROBI COUNTY

BY

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DECLARATION

This research project is my original work and has not been presented for an award of degree or diploma in any other university.

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Brigid N. Kangori

This research project has been submitted for examination with my approval as university supervisor.

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DEDICATION

First and foremost my sincere and special dedication goes to the Almighty God for giving me this opportunity to go this far in my academic ladder.

Secondly, my dedication goes to my family (Husband, Dickson Reche and my children Michael, Mercy, Timothy, Esther and Curtis).

Thirdly my dedication goes to my loving mum Esther.

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Special thank goes to my husband Dickson Reche and my dear children. Thirdly I would also like to acknowledge the help I got from the D.E.O's offices in Nairobi County and my school head teacher. Special thanks also go to all head teachers, deputy head teachers, preschool teachers and other members of staff of the schools I visited for being kind and helpful.

To the Master of Education (ECE) comrades in the University of Nairobi, I salute you for your moral and educational support throughout our study period who we kept encouraging one another with the assurance everything will be possible.

ABSTRACT

The purpose of this study was to investigate teacher related factors in the implementation of science activities in pre-schools in Nairobi County. A descriptive research design was used to conduct the study. The study sought to investigate how teacher's related factors such as professional and academic qualification, teaching strategies and teacher's attitude influence implementation of science activity curriculum in Early Childhood Education Centres in Nairobi County. Descriptive survey method using stratified and random sampling was used to sample respondents. Respondents were preschool teachers. The study targeted twelve public and twenty eight private pre-schools. The researcher used the questionnaire which was divided into three sections to obtain information. Data collected was converted into quantitative data and analyzed using cross tabulation and summarized in-form of frequency, percentage and mean. The results were presented in tables and figures. The research study was guided by research questions, which conformed to the objectives of the study. Literature review of the study covered the implementation of science activities and teacher related factors which are teachers' academic and professional qualification, teaching strategies and teachers' attitude towards science activity and their influence on implementation science activity in preschools and lastly their effects on the implementation of science activities. Based on the analysis of the study data, the following were the findings on of the study: that there existed a significant relationship between teachers' academic qualification and preschool children achievement in science activity, that teachers professional qualification impacted positively on the achievement of preschoolers in science activity, that teachers' teaching strategies did influence preschool children achievement in science activity and teachers' attitude towards science activities did seem to influence preschool children's achievement in science activities hence leading to the implementation of science activities. Based on the strengths of these findings, the following recommendations were critical: That there is need for the government and other educational stake holders to promote continuous teacher development through in-service and pre-service training programs. These trainings and seminars will assist teachers in coming up with modern teaching methods. Further research should be carried out on the following areas: Factors influencing implementation of science activity in a larger population of Nairobi County, influence of other stakeholders, factors hindering in-service courses, seminars and effectiveness of teaching methods in implementation of science activity.

TABLE OF CONTENTS

Content **Page**

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATION AND ACRONYMS

DICECE	District Centre for Early Childhood Education
ECD	Early Childhood Development
ECDE	Early Childhood Development and Education
ECE	Early Childhood Education
KIE	Kenya Institute of Education
MOE	Ministry of Education
MOEST	Ministry of Education, Science and Technology
NACECE	National Centre for Early Childhood Education

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter presents the background to the study, the statement of the problem, the purpose of the study, research objectives, research hypotheses and significance of the study. Definition of significant terms and organization of the study are also described.

1.2 Background of the Study

Around the world there are many similarities and differences among teachers in the way teachers are trained and certified as professionals to teach in a preschool. In almost all countries teachers are educated in a university or college. Shiundu (1992) notes that teachers without proper academic and professional qualification fail to do justice to the subject. He further adds that an adequate qualification of the teacher instills self confidence in the teacher and serves as an inspiration to the pupils. Preschool science provide an exceptional method for teachers to challenge a child's mind because they encourage children's curiosity, wonder, interest in their surroundings and offer children the opportunity to build theories (Witt & Kimple,2008). An experienced teacher has skills, values and positive attitude to make the learner be curious, aroused and interested in learning. Therefore the researcher intends to investigate the relationship between teacher related factors that includes teacher's attitude, teaching strategies, professional and academic qualification in the implementation of science activities in preschool.

Margolin (1982) observes that a preschool teacher occupies an important place in the total educational growth of a child. One problem facing science education today is the fact that elementary teachers have negative attitudes towards science (Koballa & Crawley, as cited in Eshach, 2003). Some teachers' negative attitudes stem from a belief

that they do not have strong enough content knowledge in science to teach the subject effectively. These attitudes can influence their students. Because their attitudes impact their students, we need to help early childhood teachers change their attitudes towards science instruction (Yoo, 2009). Regardless of whether or not teachers' belief systems can be changed, their belief systems impact how they teach science, which also affects how their students learn. In this study the teachers' beliefs and their role in curriculum implementation will be investigated.

Research has identified that structural factors, such as group size, staff-child ratios and staff qualifications, are important factors influencing the quality of care that children receive in early childhood programs (Phillips, Mekos, Scarr, McCartney, & Abbott-Shim, 2001). In particular, the level of education of early childhood teachers, obtained through pre-service or in-service teacher education programs is a significant predictor of the quality of care provided (Darling-Hammond, 2000). Barnett (2003) proposed that better-educated early childhood teachers have more knowledge and skills and are more likely to create richer learning activities that are appropriate to the learning needs of the children and that these teachers are also better equipped to solve problems when they encounter challenges in the classroom. Yet, just how the nature of the educational experience for early childhood teachers mediates their actions in their professional work has not been explored. Over the last decade or so, research related to epistemological beliefs has offered insight into how to promote effective teaching and learning across educational settings (Hofer, 1994; Schommer, 1993a). However, there has been no research, apart from pilot work carried out by the authors that investigates the relationships between personal epistemological beliefs and early childhood practice

specifically. Thus, the study intends investigate the influence of academic qualification on the implementation of science activities in preschools.

According to the National Research Council (2001), children actively build their knowledge by integrating new information into their current understanding about the world around them. Science activities in preschool classrooms that underscore complex phenomena and language promote children's intellectual and linguistic development (French, 2004). Such activities provide children with opportunities to describe and explain scientific processes to others.

Science can be taught in various ways or methods which the teacher can vary when teaching science activities to nurture the learners' natural sense of adventure and curiosity. Brunner (1965), argued that discovery method also known to keep the learners motivated and aroused because it helps the learner to apply different skills during science activities like observing, describing, comparing, questioning and predicting.

Farrant (1980) notes that there are other teaching methods of science activities like instructional methods. The teacher uses this method to arouse the learner to follow instructions up to the end to get the results. Some preschool science activities involve the use of science tools like magnifying glasses, rulers and balance scales. Once the learner becomes familiar with using the tools, they keep them available throughout the day, not just during preschool activities (Gelman & Brenneman, 2004). By doing that the teacher will be making science tools part of the everyday life as a way of science activities implementation in preschool. Thus the researcher intends to determine the influence of teaching strategies in implementation of science activities.

Children have an innate curiosity, but they require assistance in understanding their observations and how to relate the new information to their existing knowledge (Lehr, 2005). When adults encourage children to question, predict, explain, and explore in a safe environment, they offer children the support that is essential for becoming successful science students and thinkers.

Children cannot learn much by sitting and listening to the teacher. Therefore, the teacher should allow and encourage the children to explore, investigate, discuss, play, model and practice activities (Karaka, Nyangasi & Githii, 2004). The teacher should always realize that science is doing not just being told and therefore children should be actively involved in learning (Nyoroh, Sayles & Munguti, 2003). Children need real experiences because they are unable to think through ideas. Hence there is need for the researcher to investigate the influence of teacher related factors in the implementation of science activity in preschool.

Shiundu and Omulando (1992) argue that to most teachers, implementation is their legitimate role in curriculum development. Their reference to the teacher and curriculum is that after a consensus is reached as to what will go into the curriculum of the educational system the next important step is to avail this curriculum package to the educational system, a process that is known as curriculum implementation. Various personnel are involved, but perhaps the one whose role is most important in seeing that programmes are successfully implemented is the teacher, who organizes the learning environment for the benefit of the pupils who must experience curriculum.

The teacher can be regarded as an indispensable catalyst to any educational change or innovation. The teacher plays a crucial role in the care and development of children in

preschools. Bishop (1985) contends that specialists and experts may select the objectives and plan the general advance, but it is the teachers in the classroom who are the assault troops. Shiundu and Omulando (1992) came up with a contemporary adage that no education is better than its teachers.

Children at the pre-school stage almost entirely depend on their teachers to guide and scaffold them in their learning activities. Apart from the difference in their power structures in determining which science activities are undertaken, teachers are left to interpret and to implement the science curriculum. ECD in Kenya seeks to develop the child holistically. The growth and development processes include all aspects of growth, that is, physical, mental, social, emotional, moral and spiritual and aesthetic dimensions. Hence it demands that teachers should have a sound knowledge of how children grow, develop and learn (KIE-ECD Guideline, 2001, p. v). Hawes (1979) contends that implementation of curriculum change depends on the knowledge, skills and attitudes fostered during initial training. Indeed, training of teachers and curriculum development must be close and constant.

Training is acknowledged as important in preparing teachers for their work since it equips them with necessary knowledge, skills and attitudes for them to perform their duties competently. The Ministry of Education, Kenya, in its quality framework, notes that among the factors that shape teacher quality are: the formal educational attainment, the teacher training attainment, the experiences gathered by the teacher, the subject mastery and the availability of the teacher (MOEST, 2003).

The Ominde Commission (RoK, 1964) observed that the provision of an all educated and competent teaching force is by far the most important contribution that the

government of Kenya can make to preschools. It further observed that while the main problems in Kenya were those of quality and quantity, improvement in both was a necessary prerequisite in improvement of education. Teacher training is indeed one of the nerve centres of an educational system. The World Bank (2008), in a staff appraisal report, notes that pedagogical and practical skills in Early Childhood Development are important for the effectiveness of ECD teachers and their capacity to deliver a quality ECD programme.

Khatete (1995) argues that science teacher is the most important person who plays a crucial role in bringing about positive learning of science in children. Good science teachers will enable children modify and/or replace their naïve science and construct knowledge and ideas acceptable to scientists. This is a great challenge for preschool teachers; they have the task of beginning the process of molding children into scientists. It is also here where the new generation of future scientists must ultimately be formed. Hence Kenya preschool teachers must do their best to enable preschool children develop into individuals with a scientific outlook. They must possess a deep conviction that the science experiences that they avail to their pupils are vital and will be functional in the contemporary and later life. Therefore it is important to find out the attitude and beliefs of preschool teachers towards implementation of science activity.

According to Greenwald (1999), teacher factors like academic and professional qualification, teaching experience and attitude do have an influence on how a teacher is able to instruct the preschool children in achieving the implementation of science activities. This can be displayed by the learners' completion of activities, neatness of the class work and the participation during the science activity. When these activities are repeated it becomes a part of their data base of knowledge and understanding.

Since science education has been made compulsory in primary and secondary schools, there is needed to lay foundation in science at the early childhood education level. This fact has been supported by the introduction of science in early childhood education in Kenya (Republic of Kenya, 1999).

Due to poor performance of Science subject in secondary schools in Kenya, the MOEST started SMASSE project (strengthening mathematics and science in secondary school education). This in service course was done in most districts country wide and Nairobi County was one of the targeted districts due to poor performance in Science and Mathematics (Njoroge, 2003). Though the MOEST came to the realization that Science and Mathematics are not being performed well in secondary schools, it has not initiated a similar programme for strengthening Science at the primary and pre-school level which is the root foundation for better performance in higher levels.

An analysis of K.C.P.E. results (MOE, 2012), show that performance of science in Nairobi County is fair. According to K.C.P.E results analysis 2011, the following are the mean scores of the examinable subjects English 59.45, Kiswahili 57.27, Mathematics 53.01, Science 52.24, Social studies 57.27. Science subject was position four out of five. Therefore the K.C.P.E results mean scores for the last five years in Nairobi County is shown in Table 1.

Table 1: K.C.P.E Subjects and Mean Score Analysis in Nairobi County

Year	2008	Position	2009	Position	2010	Position	2011	Position	2012	Position
Eng	**66.08**	**1**	**63.89**	**1**	**69.1**	**1**	**59.45**	**1**	**58.87**	**1**
Kiswa	**60.9**	**2**	**56.77**	**3**	**55.71**	**3**	**57.27**	**2**	**55.91**	**2**
Math	**54.94**	**5**	**54.77**	**4**	**53.60**	**4**	**53.01**	**4**	**53.28**	**5**
Sci	**56.04**	**4**	**53.38**	**5**	**53.14**	**5**	**52.24**	**5**	**53.91**	**4**
S/S	**58.60**	**3**	**57.65**	**2**	**57.18**	**2**	**57.27**	**2**	**55.12**	**3**

Source: Education Office, Nairobi County, 2012.

From Table 1, it can be seen that science subject attained a mean score of above 50% but throughout the five years, it has not improved beyond position four out of five. This suggests that science is poorly performed. Further analysis also indicates that science curriculum is not well performed in country wide. The mean scores have always been below 50% as shown in table 2.

Table 2: K.C.P.E Science Mean Score Analysis Country wide

Year	**mean score**
2007	29.72
2008	27.62
2009	29.96
2010	29.82
2011	33.63
2012	33.63

Source: The year 2011 and 2012 KCPE Examination Report by Kenya National Examination Council

From the table above the year 2011 KCPE science performance was the highest compared to the last four years (2010, 2009, 2008 and,2007), but dropped in the year 2012. Teachers should strive to bridge this gap by using approaches that motivate pupils towards science at early stage in learning. The gap should be adequately addressed so that it is not transferred to the next level in learning.

According to Kenya certificate of secondary education (K.C.S.E.) results announcement, the Minister for education Professor Sam Ongeri highlighted that though K.C.S.E. performance has improved, there is a general drop in candidates' performance in science, "albeit various interventions by government is worrying". There was a remarkable drop in Mathematics, Biology, Physics and Chemistry. (Orengo,"K.C.S.E. Results" 2010). Therefore there is a need to research on teacher related factors that includes teacher academic qualification, professional qualification, teaching strategies, and teaching attitudes and beliefs in the implementation of science activities in preschools in Nairobi County.

1.3 Statement of the Problem

Science has been recognized as an important area of learning for the economic and technological transformation of the society (Whydah, 1990). Ndirangu (2006) argued that science and technology is essential in many developing countries. Science curriculum is important in seeing preschooler's education accomplished because it is a stepping stone to tackle other levels of education. In Kenya science is a compulsory area of learning in preschools, primary schools and secondary schools (Republic of Kenya, 1999).

Science is not only compulsory but also important subject in the Kenyan primary school curriculum and its crucial role in the realization of Kenya Vision 2030 cannot be

underestimated (Government of Kenya, 2007). In line with this, the Kenya government in collaboration with donor agencies has consistently implemented teacher-based educational interventions aimed at improving pupils' achievement in science in primary schools. These interventions include; Strengthening Primary Education (SPRED) programme, School-based Teacher Development (SbTD) programme and recently, the Strengthening of Mathematics and Science Education (SMASE) programme (Republic of Kenya, 2008: CEMASTEA, 2010, SMASE-WECSA Association, 2010).

Despite implementation of these teacher-based interventions, pupils' achievement in Science in primary schools in majority of Nairobi County has remained far below stakeholders' expectations. Table 1 presents mean scores for KCPE subject analysis in Nairobi County for the last five years. From Table 1, it can be seen that science subject attained a mean score of above 50% but throughout the five years, it has not improved beyond position four out of five. This suggests that science is poorly performed. Poor performance of primary schools in Nairobi County undermines pupils' chances of joining highly performing secondary schools and this subsequently jeopardizes their future employment opportunities, participation in the national economic development and poverty alleviation. Therefore the implementation of science curriculum could be having contributing factors that are rooted in early childhood education. Lack of empirical studies in this area leaves a gap in knowledge that needs to be filled. This study sought to find out the influence of teacher academic qualification, professional qualification, teaching strategies and teachers attitude in implementation of science activities in preschool in Nairobi County.

1.4 Purpose of the Study

The purpose of this study was to find out the influence of teacher related factors on implementation of science activities in preschool in Nairobi County.

1.5 Research Objectives

This research was guided by the following objectives:

i. To determine the relationship between teachers' academic qualification and the implementation of science activities in preschools in Nairobi County.
ii. To find out the relationship between teachers professional qualification and the implementation of science activities in preschools in Nairobi County.
iii. To establish the relationship between teaching strategies and the implementation of science activities in preschools in Nairobi County.
iv. To investigate the relationship between teachers attitude towards science and the implementation of science activities in preschools in Nairobi County.

1.6 Research Questions

The study addressed the following research questions:

i. What is the relationship between academic qualification and the implementation of science activities in preschools in Nairobi County?
ii. What is the relationship between teacher professional qualification and the implementation of science activities in preschools in Nairobi County?
iii. What is the relationship between teaching strategies and the implementation of science activities in preschools in Nairobi County?
iv. What is the relationship between attitude of the teacher and the implementation of science activities in preschools in Nairobi County?

1.7 Significance of the Study

The study highlighted teacher related factors in the implementation of science activities in pre-schools in Nairobi County. The study provided a source of knowledge to the curriculum developers and implementers on factors influencing implementation of science activity curriculum in ECDE centres.

The research findings may benefit the policy makers by equipping them with knowledge of preschool teachers training, minimum qualification to qualify for training and how to modify the curriculum to suit pupils in preschools. Research methods, techniques and instrument established in the current study to be of relevant in the future studies targeting other curriculum areas of early childhood education.

Knowledge generated from the study would be used by the MOE, NACECE, DICECE's and Universities. These bodies will use the knowledge to formulate the revised early childhood education science curriculum, effective teachers training programs in preschool science, refresher courses/ science workshop and science learning kits.

1.8 Limitations of the Study

The limitation of this study was that implementation of science activities was affected by multiplicity of other factors which the researcher had no control over them (Mugenda & Mugenda 2003). Factors such as government policies, parental participation and student's attitude were some of the limitations the researcher encountered in the process of conducting this study. Teachers were reluctant in responding to some items in the questionnaire because they feared to be exposed on the specific weakness. However, the researcher assured respondents that confidentiality was to be ensured. The researcher limited herself on four factors teachers' academic qualification, teachers' professional

qualification, teaching strategies and teachers attitude relationship in the implementation of science activities in preschools in Nairobi County.

1.9 Delimitations of the Study

The study was carried out in selected public and private pre-schools in Nairobi County. Other areas in Nairobi were not included in the study. The researcher personally administered the questionnaires to 40 teachers in 40 preschools to investigate the teacher related factors in the implementation of science activities in preschools.

1.10 Research Assumptions

The study was based on the following assumptions:

i. The information given by the respondents was free from any external influence by the school management.
ii. The study also assumed that all the preschools had the necessary facilities that enhanced the implementation of science activities.

1.11 Definition of Significant Terms

This is the definition of significant terms that the researcher used in the study.

Achievement refers to the test scores in science activities of preschoolers in preschools in Nairobi County.

Attitude refers to internal state of a person that is focused on the object. Teachers as implementers of the curriculum, they like the work or don't like the work. In this case they like teaching science or don't like teaching science

Curriculum refers to the set of courses, and the content of science activities offered in preschools in Nairobi county.

Early childhood education refers to education of children from birth to age eight. This study focused only on four to five year old children who are educated and cared for in nursery and pre-schools in Nairobi County.

Teacher related factors refers to distinguishing features of Nairobi County teachers which are teachers academic qualification, professional qualification, teaching strategies and teacher's attitude in the implementation science activities.

Science activity refers to organized science knowledge obtained by observing and testing of facts about physical world, natural laws and society.

Professional refers to expert and specialized knowledge in the field of science which Nairobi County teachers are practicing.

Implementation refers to carrying out plans or activities involving science subject in preschools in Nairobi County.

1.12 Organization of the Study

The study was organized in five chapters. Chapter one is introduction which includes the background to the study, statement of the problem, purpose of the study, research objectives and questions, significance of the study, limitations and delimitations of the study, research assumptions and definition of key terms. Chapter two reviews literature on teacher related factors that influence the implementation of science activity in preschools. Chapter three describes research methodology; this includes research design, target population, sample and sampling procedure, research instruments, data collection, validity and reliability of instruments and analysis procedure. Chapter four deals with data analysis, presentation and interpretation and summary of findings. Chapter five is

on summary of findings, conclusions, recommendations on data collected during the study and suggestions for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviewed relevant literature on teacher related factors influencing the implementation of science activities in preschool. The section also discussed the theoretical and conceptual framework.

2.2 Teacher Academic qualification in the implementation of Science Activities

Teacher quality is of important concern to parents and policy makers (Wilson, 2001). Teacher qualification refers to credentials and knowledge that teachers bring with them when they enter the classroom. These include coursework, grades, subject matter, certification and evidence of participation in continued learning such as supplemental training and professional development. Teacher qualifications help in the regulation of entry into classroom when there are no performance and outcome data for the case of new teachers (Ferguson and Hellen, 1996). To some extent, teacher qualifications are effective at identifying teachers who improve the achievement of children (Ferguson, 1996). Some teacher qualifications are consistently associated with increased student achievement in particular subject areas. A study conducted by (Allinder 1995) to find out whether students verbal and science self-concepts are affected by the teaching looked at the teacher's knowledge and experience in implementing the science subjects, though there are other factors that influence this particular implementation. The concentration was also in secondary schools not in primary and preschools. Thus in this study certification and degree of the teacher will be assessed to determine its influence on implementation of science activity.

Other attributes that have been investigated in the past include subject matter, test scores, training institution, advanced degrees, certification, induction and mentoring, professional development, experience and content based pedagogical knowledge (Hanushek, 1997; Jacob, 2007, and Jacob, 2011). Subject matter knowledge has been found to have varied effects on the students' achievement. It is strongly related to achievement in higher grades. Studies have established that there exist a stronger correlation between the achievement of secondary school students and their teacher's subject area expertise than exist between the success of younger students and their teacher's subject knowledge (Raymond, Fletcher and Huque 2001). In particular, several studies indicate that teacher completion of an undergraduate or graduate major in science is associated with higher student achievement in high school and middle school. Given previous association of subject matter knowledge with increased achievement in higher grade classes, this study will not investigate this attribute. Methodology of the study used was not mentioned as well bringing the findings of the study in question.

The effects associated with teacher's possession of an advanced degree are strikingly counter intuitive; especially given the salary incentives offered to encourage teachers pursue graduate degrees (Rowan, 2002). Recent studies as in Woolfolk and Wayne (1990) have not established any benefits for students of teachers with advanced degrees. Moreover, these studies indicate that teachers with master's degrees and beyond may negatively influence their student's achievement.

Other studies however, find marginal benefits for middle school science achievement when teachers hold masters degrees, but this effect is not practically significant. Xu, Jane and Colin (2011) reported that there is no association between teachers holding masters degrees and fourth through eighth grade students' science test score gains. Thus

the relationship between learners achievement and teacher test scores will also be investigated in this study

Teacher's certification as a signal of teacher quality has been investigated at various levels. Jacob (2007) established that full certification is either unrelated or positively related to student achievement. On other hand, Ballou (2000) established that emergency certification is generally unrelated or negatively related to student achievement. Teacher's subject area of certification or authorization is one of the teacher qualification most consistently and strongly associated with improved student achievement. Thus in this study, teacher science certification or authorization and its impact on science activities implementation in preschool will be investigated.

2.3 Teacher Professional Skills

A profession is a type of a job that needs high level of education and training. Teacher trainees in colleges and universities are equipped with skills (the art or pedagogy) of teaching. This implies that after undergoing training one becomes an authority in his or her field of operation. Even with the highest professional qualification possible, teachers should always strive to improve their skills and knowledge. Bell (1978) asserts that one should ever remain a student which is supported by Farrant (1980) who observed that teachers of today have greater responsibilities. These studies not only provide insight into the characteristics of good teachers, they reveal how this contributes to learners learning and closing achievement gap. Hence professional qualification of preschool teachers in the implementation of science activities will be investigated in this study.

Darling –Hammond, (2001) shows that certain types of professional development contribute to teacher quality and student achievement. Sustained professional development that is aligned with curriculum and focused on instruction has shown to

positively influence school level achievement in mathematics and science at both elementary and high school. However other studies dispute this view. Studies done by Sanders and Rivers (1996) looked for changes in learners test scores according to the teacher they were assigned to. A highly effective teacher therefore is one whose students show the most gains from one year to the next.

Advocates for early childhood are increasingly insistent that teachers of children between the ages of three-and-four-years-old should have at least a Bachelor's degree as well as a major in early childhood education or state certification that enables them to teach this age group (Barnett, 2004; Barnett, Carolan, Fitzgerald, & Squires, 2011). According to the National Institute for Early Education Research (NIEER; Barnett et al., 2011), 24 of the 39 states that fund prekindergarten programs require that all lead teachers have a Bachelor's degree. This shows that the importance for qualified teacher is no secret especially for those in charge of hiring and training. Key teacher quality provision of No Child Left Behind Act (NCLB) underscores this importance. The 2004 estimates put number of teachers who have not yet met the qualified standard at 20% in elementary secondary schools (U.S Department of Education 2004). Since most of effective teacher studies focuses on elementary secondary schools, there is need to investigate teacher quality in early childhood education.

The child care literature seems to support this assertion for prekindergarten teachers to hold a Bachelor's degree in early childhood education. In a study of 553 infant, toddler and preschool classrooms Burchinal, Cryer, Clifford, and Howes (2002) found that teachers with the highest level of formal education (i.e., Bachelor's degree) or those who attended workshops (at the center, in their community, or professional meetings)

had higher ratings of observed classroom quality on a global scale, even after controlling for the adult-child ratio, state-related differences, and classroom types.

Results such as these have led to conclusions that higher-quality early childhood education programs are those where the lead teachers have Bachelor's degrees, specifically in majors of child development or similar areas (Whitebook & Ryan, 2011). However, some research demonstrates that teacher education or certification is not consistently related to higher quality classrooms or better pre-academic skills for children. The Tennessee studies revealed that Africa America students were almost twice likely to be taught by the least effective teacher (Sanders and Rivers 1996). The distribution of teachers with these qualities has grown more inequitable, in recent. In addition some states efforts to reduce class size- and in so doing creating a need to the hiring of more unqualified and untrained teachers, thus minimizing the possible benefits of lower class sizes but retaining high quality of education.

In a study that examined teacher's level of education and classroom quality in six state-funded pre kindergartens, Early et al. (2006) found that teachers who had more than a Bachelor's degree received higher scores on the Teaching and Interaction subscales of the Early Childhood Environment Rating Scale (ECERS) than those teachers who had an Associate's degree. The children in these classrooms had significant gains in math skills, but not in other areas. An analysis of seven longitudinal data sets found similar results (Early et al., 2007). Yet, these authors stress that these findings should be interpreted cautiously due to limitations within these studies.

While there is little research that addresses the competencies in early childhood educators in terms of math and science, it is known that many consider these areas

difficult to teach (Copley & Padron, 1998). In study that conducted focus group interviews with Head Start teachers, Greenfield et al. (2009) found that two main themes emerged when teachers discussed their concerns: (1) low self-efficacy with respect to teaching science and (2) though science-related materials were provided in the classroom, many teachers indicated that they did not feel comfortable using them. Hence there is need to investigate the relationship between the professional qualification of the teacher and learners achievement in the implementation of science activities.

Research conducted by Karuga (1996) in Kenya revealed that only 80% of science teachers were qualified that is professionally trained he says that problem of teachers can be improved by advancing in education. He says a well-trained teacher feels motivated to teach. The teachers who are not motivated always feel that the syllabus is wide and difficult to finish in time.

The study carried out by Wanjala (2008), Takes a critical view and analysis of the challenges and issues faced in the current practice of teacher education for the science and technology disciplines in Africa. It is now evident, for example that most emphasis has been placed on theoretical aspects of science without providing the complimentary laboratory experiences due to the lack of facilities, materials and equipment. Teacher education for technology has been ignored or at least assumed to be a part of science education and yet this area demands, besides the theoretical aspects of knowledge, practical experiences that can only be achieved by hands-on practical lessons. He further explore some of the modern pedagogical applications used around the globe and suggests alternatives and options appropriate to Africa's education systems.

The Andrew reports identify the quality of science teacher trainings as one of the key factors hampering science education particularly in developing countries. Common wealth member countries were urged to stimulate training as one of the ways of contributing effectively to teacher development (1986 report of common wealth)

Kathuri (1986) indicated that a professionally trained teacher contribute more positively to effective learning than untrained one. It is for the same reason that teacher training exists as a major part of education systems throughout the world. Hence there is need for the researcher to investigate the influence of teacher professional qualification in the implementation of science activities in preschools.

2.4 Teaching Strategies

The U.S. National Science Education Standards recommends modeling how science should be taught (National Research Council, 1996) as an important aspect of professional development. Kalande's (2006, p. 69) study of new teachers in Malawi found the need for modeling at the Teacher Training College level. Almost all participants said "science teacher educators should teach using the same kinds of instructional methods that they would like their students to use in the primary schools."

According to Karaka, Nyangasi and Githii (2004) learning is a highly personal and individual process. The children must be actively involved i.e. carry out investigations, develop curiosity and powers of observation and inquiry, explore basic questions and suggests solutions. They must manipulate a variety of materials in search for patterns and relationships while looking for solutions to problems (Karaka et, al, 2004). The teacher must prepare appropriate materials for learning activities, motivate children, discuss and coordinate activities to achieve desired objectives. He or she should assess

the activities and suggest solutions to problems. The teacher must make an effort to teach children how to learn so that they can work as independently as possible.

According to Njenga and Kabiru (2005), children use their sense to explore the environment, manipulate objects and discover the nature of things, now they work and relate. They discover how things smell, taste, feel and how they look like. Children break things up and construct others to see what will happen. They experiment with different things making discoveries and this increases their knowledge and concepts. Children learn by doing. They learn by hands on experiences with real materials and meaningful activities. Learning is an active process which involves the whole child. Children learn through practice, observation, imitation, exploration and problem solving. When they explore and experiment, they discover new things and ways of doing things. As they engage in different activities they develop strategies or different ways of acquiring information and solving problems. This is referred to as learning how to learn.

Research studies with high school students (Court,1993; Palmer, 1999) and undergraduate students (Bulunuz, in press 2012, 2012; Jarrett & Burnley, 2010; Palmer, 2002) indicates that engagement with interesting hands-on science activities in a playful environment not only promotes students' learning science, but also helps them to recognize the value of ma-king science exploratory, fun, interesting and motivational.

A number of researchers indicate that play, playfulness, and fun are a part of scientific investigations of practicing scientists. Ganschow and Ganschow (1998) described the role of playfulness in research conducted by biologist; Kean (1998) identified fun and playfulness among chemists. Teachers can help children by suggesting ideas for their

play; providing props, time, and space for children to engage in play; assisting children to implement guidelines for their play, but then step back to allow children to interact with their peers so they have the opportunity to adopt the skills necessary for sustained play as well as develop cognitive skills (Copple & Bredekamp, 2009). For preschool teachers to facilitate learning science through play, understanding of both science and play are important. Resnick (2004) states that integration of play and learning creates self-motivation, responsibility, and great concentration. According to Resnick children are likely to learn the most and enjoy the most when they are engaged as active participants, not passive recipients. Playful learning environment can be serious, creative, and imaginative as well as being fun and playful. The researcher sought to relate teaching of science through play with the implementation of science in preschool

There is also evidence that students find practical work relatively useful and enjoyable as compared with other science teaching and learning activities. In survey responses of over 1,400 students (of a range of ages) (Cerini, Murray, & Reiss, 2003), 71% chose ‘doing an experiment in class’ as one of the three methods of teaching and learning science they found ‘most enjoyable’. A somewhat smaller proportion (38%) selected it as one of the three methods of teaching and learning science they found ‘most useful and effective’. In both cases, this placed it third in rank order. Learners learn best by carrying out activities related to what is being learnt. The above study carried out based on leaner’s opinion, not putting into consideration the implication it will have on the learner achievement. Hence this study will investigate the practical activity as a teaching strategy in relation to implementation of science activities.

According to developmentally appropriate practice (DAP), optimal development is more likely to occur in an environment that encourages children to form warm relationships with adults and their peers; provides planned, intentional guidance from adults; and creates environments that invite children to learn and explore objects (Copple & Bredekamp, 2009). The DAP also stresses that a central component to nurturing the learning and development of children is a teacher who provides guidance for children in their classroom by taking an active role in their thinking and attainment of skills and concepts (Copple & Bredekamp, 2009). Teachers promote children's engagement in challenging and intentional ways by the use of well-timed questions that encourage children to reflect and investigate, demonstrations of techniques using tools with which children are not familiar, and modeling procedures that children may not know how to carry out independently. Good teaching is found in environments where children are actively engaged, enjoy what they are learning in the classroom, participate in real-world experiences, and are asked to make connections to their own experiences (Harbeman, 1991) as well as in environments where children's sustained play is encouraged (Copple & Bredekamp, 2009).

The instructional use of cooperative learning through small groups allows children to work with their peers to enhance each other's learning (Johnson & Johnson, 1999). Research has shown that cooperative learning in small groups enhanced preschooler's mathematics problem-solving abilities (Tarim, 2009). In this approach, teachers guide children as they work together by providing materials and explaining when the children are in need of assistance.

According to Perkins (1993), theory needs to be applies in practi-ce. Also "Learning for understanding requires not just taking what you hear, it requires thinking in a number of

ways with what you heard practicing and debugging your thinking until you can make the right connections flexibly" (Perkins, 1993, p. 32). Perkins and Unger (1994) recommend that the instructor provide powerful representations that facilitate the learner's construction of understanding and that students be given time for thinking and reflecting.

Teaching approaches should therefore be participatory to ensure that children acquire science process skills, enjoy learning and apply what is learnt to everyday life. Retention of knowledge that is actively acquired through activities is much higher than that learnt passively. Science is learnt through different approaches. Participatory approaches suitable in science learning include demonstration, practical activities, guided discussion, projects and field trips. Demonstration – it is important to have clear objectives. Children should always be involved. Ensure that they are involved through questions, making observations, recording results and discussing conclusions (K.I.E, 1987).

Despite the widespread use of practical work as a teaching and learning strategy in school science, and the commonly expressed view that increasing its amount would improve science education, some science educators have raised questions about its effectiveness. Hodson (1991), for example, claims that: 'As practiced in many schools it [practical work] is ill-conceived, confused and unproductive. For many children, what goes on in the laboratory contributes little to their learning of science' (p. 176). From a similar viewpoint, Osborne (1993) proposes and discusses a range of alternatives to practical work. The teacher needs to prepare the practical in advance and if necessary try them out before the lesson (K.I.E, 1987). Learners should be given clear instructions before the lesson. The activities can be done individually or in groups or collectively as

a class. Wellington (1998) suggests that it is ‘time for a reappraisal’ (p. 3) of the role of practical work in the teaching and learning of science. This article presents findings from a study of the effectiveness of practical work as it is typically used in science classes for 11-year-old to 16-year-old students in maintained schools in England. The study finding was based on middle and high school learners, hence the study intends to investigate practical activity as a teaching strategy on preschool learners.

Theories of learning underscore the fact that children learn through doing (Nderitu, Kihara and Onguti, 2005). Projects and Long Term Practical Activities Project work stimulates and motivates the learner. It instills a sense of responsibility and commitment if proper guidance and supervision are provided. Field trips and excursions should be encouraged. The local environment should be considered to cut costs such as school compound and local neighborhood to study plants and animals. Also trips to weather stations and local market (Rai and Richardson, 2003). Since children learn and derive a lot of pleasure from visiting places of interest (K.I.E, 1987), the researcher sought to find out the relationship between field trip as a teaching strategy and implementation of science activities in preschools.

2.5 Teacher’s Attitude in the Implementation of Science Activities

Attitudes are mental superposition’s that express the connections between situations. As defined by Bell (1980) it is a mental and neural state of readiness organized through experience exerting a directive or dynamic influence upon the individual’s response to all objects and situations with which is related. Ryan and Cooper (1984) emphasize that there are four major types of the teacher’s attitudes that affect teaching behavior. They are attitudes towards self, attitude towards children, attitudes towards peer and parents

and attitudes towards the subject matter. The beliefs that teachers hold influence their behaviors in the classroom. It is for this reason that Pajares (1992) suggested that teacher beliefs should be the focus of educational inquiry in order to improve the professional preparation of teachers. Because research suggests that science should be taught through student-centered approaches, and yet most beginning teachers have been taught through teacher-centered approaches, it important to investigate teachers' attitude in the implementation of science activities

In (1967) Johnson noted that 'it is the attitudes which are built that are highly involved in the learning and retention of the attitude you (teacher) build that are basis of your rank as a successful teacher'. This indicates that if a teacher develops a positive attitude towards a given subject, then the chances of liking that subject and performing in it are increased. Aiken (1970) studied the relationship between attitude and performance and concluded that the relationship between attitude and performance is certainly the congruence of reciprocal influence in that, attitude affects achievements and in turn affects attitude. Mwangi (1986) had similar findings when he found out that teachers attitude was being reflected in the students' performance. Investigating the attitude of these teachers further would provide greater understanding of teachers' attitude towards science. Hence, the focus of this study will be to investigate teachers' attitude towards science in order to build a more in depth knowledge.

Pleasure in teaching and learning is the common ground necessary to sustain great teaching. If teachers like and value their subjects, this positive attitude will show through and will have a powerful influence on motivation of students. What the teacher values students begin to value and on to motivation will have taken root (Eble, 1988). If the teacher therefore feels little enthusiasm or interest, this too shows through and the students slows down. Positive attitude to the teacher towards the subject plays a positive role in causing the student to learn the subject effectively and thus achieve good grades

in the subject. The teacher's attitudes are believed to be an important factor in determining the teaching and the learning of science. Hence there is need to investigate the learners achievement in relation to teachers attitude.

A study was conducted by Ali and Awan (2013) to examine the relationship of attitude of secondary school students towards Science with the achievement in the subjects of Physics, Chemistry, Biology and Mathematics. TOSRA was used to measure students' attitude towards Science and data was collected from 1,885 students of 10th grade. Simple correlation (r), Multiple regression analyses (R) and standardized regression coefficients (β) were used to investigate the relationships between attitude towards Science and achievement in Science. The results of the study indicated that attitude towards Science had significantly positive relationship with the achievement of Science students at secondary level. The study focused on student attitude towards science whereas the teachers' attitude needs to be looked at. Owing to the fact that all these studies targeted the secondary students, it is worth to undertake the same research on the preschool learners to unearth the discrepancy since teacher's attitude towards science is an important factor in learning science activities.

An attitude is another important aspect of science education. Osborne (2003) describes attitudes toward science as "feelings, beliefs, and values held about an object that may be enterprise of science, school science, the impact of science on society or scientist themselves" (p.1053). According to Ajzen and Fishbein, (1980 cited in Osborne, 2003) attitudes are enduring and they predict people's behavior. Therefore, attitudes toward science and attitudes towards doing school science predict teachers' behavior about doing science in the classroom. It is important for teacher to have positive attitudes toward science and teaching science because the teacher variable-le is the most

significant factor in determining students' attitude toward science (Osborne, 2003). Therefore the study will focus on the teacher's attitude in relation to the implementation of science activities in preschools.

Research studies indicate that teachers with negative attitudes toward science spend less time teaching it and also use didactic approach rather than approaches that base on students active participation and explorations (Fulp, 2002; Goodrum, Hackling, and Rennie, 2001; Harlen & Holroyd 1997; Varelas, Plotnick, Wink, Fan, & Harris, 2008; Weiss, 1997). A study conducted in Kenya by SAMASSE baseline found out that teachers who had negative attitude towards teaching of science, they were reluctant to perform experiments. The study indicated that attitude had strong influence on student's attitude and that the student attitude towards science had bearing on the achievements SAMASSE (2003). The study was conducted in secondary schools and left out primary schools and preschools. This study intends to find out teachers attitude towards science in preschool.

2.6 Implementation of Science Activities

Contemporary instructional approaches described in science education literature draw heavily on the constructivist philosophy. Although there are many forms of constructivism, all of the instructional applications of constructivism view children as active agents in their personal construction of new knowledge (Fosnot, 1996; Gunstone, 2000). Further, these instructional approaches aim to promote active learning through the use hands-on activities with small groups and with sense-making discussions. A common expectation is that learners are more likely to construct an understanding of science content in this type of inquiry-based learning environment (Trundle, Atwood, Christopher, & Sackes, 2006).

However, minimally guided instructional approaches, which place a heavy burden on learners' cognitive processing, tend to not be effective with young children. A heavy cognitive burden leaves little capacity for the child to process novel information, thus hindering learning (Kirschner, Sweller & Clark, 2006; Mayer, 2004). As educators consider young children's limited cognitive processing capacities, inquiry-based instructional approaches, which are guided by the teacher, seem to offer the most effective way for young children to engage with and learn science concepts.

A guided inquiry-based approach allows for scaffolding of new scientific concepts with the learner's existing mental models (Trundle et al., 2007). In a guided inquiry approach, children are expected to be active agents in the learning activities, which strengthens children's sense of ownership in their work and enhances their motivation. With this approach, children usually work in small groups, which promote their collaboration skills and provide opportunities to scaffold their peers' understandings.

Meaningful science activities, which are relevant to children's daily lives, allow children to make connections between what they already know and what they are learning. Sense-making discussions promote children's awareness of the learning and concept development and facilitate the restructuring of alternative ideas into scientific mental models. As teachers work with children to develop their inquiry skills, the instructional strategies should move toward more open inquiry where children are posing their own questions and designing their own investigations (Banchi & Bell, 2008).

Traditional science instruction has unsuccessfully relied heavily on didactic textbook-based approaches. A growing body of literature suggests that traditional, text-based instruction is not effective for teaching science because children are usually involved in

limited ways as passive recipients of knowledge. However, nonfiction, expository text can be integrated effectively into inquiry-based instruction. Researchers suggest that the use of expository text should be accompanied with appropriate instructional strategies (Norris et al., 2008). Teachers should ask questions that activate students' prior knowledge, focus their attention, and invite them to make predictions, before, during, and after reading the expository text. These types of questions promote children's comprehension of the text and improve science learning (Kinniburgh, & Shaw, 2009).

The structure of the text can affect science learning. The main ideas in the text should be supported with several examples, and these examples serve as cognitive support for the children. Examples should be highly relevant to the main idea so that children can establish connections between the text content and their own personal experiences (Beishuizen et al., 2003). Diagrams also support science learning. Effective, clear diagrams that represent causal relationships in the text support children's comprehension of causal mechanisms (McCrudden, Schraw, & Lehman, 2009). Illustrations and images in textbooks can be effectively integrated into inquiry-based instruction. Learning by inquiry involves, among other skills, observation in nature over time. However, teachers are presented with several challenges when they try to teach science concepts through actual observations in nature. For example, some phenomena are not observable during school hours.

Weather conditions and tall buildings or trees can make the observations of the sky difficult and frustrating, especially for young children. Also, observations in nature can be time consuming for classroom teachers who want to teach science more effectively through an inquiry approach. Images can be used to allow children to make observations and inferences. Teachers also can have children compare observations in nature to

illustrations and images in books. While many science educators might argue that observing phenomena in nature is important, the use of illustrations and images in the classroom offers a practical and effective way to introduce and teach science concepts with young children (Trundle & Sackes, 2008).

2.7 Effects of Teacher Related factors on Implementation of Science Activities in Pre-School

Despite the importance of identifying observable factors that predict teacher success, researchers and educators have had difficulty in identifying specific teacher related factor to teacher effectiveness (Hanushek, 1986). The lack of agreement in findings has sometimes led to impassioned disagreements about interpreting research results (Krueger, 2003). Rivkin, Hanushek and Kain (2005) found that teachers in their first or second year of teaching are associated with lower student test scores in Texas, but teacher certification and education have no systematic relationship with achievement. This could probably imply that the only way implementation of science activities can be measured is through performance of the learner.

Pre-school teacher's activities guide (KIE, 2003) suggest that performance may be assessed through questioning, observing children during dramatization and play, listening to children as they discuss and play. The teacher can observe the children to see how well they participate and do in various activities. A teacher can also use oral test or interview, practical work and written tests (Rai and Richardson, 2003).

Direct observation is done as individual children carry out various activities. This is one of the most reliable methods of obtaining information about children's performance. It enables a teacher to determine how wiling, responsible, motivated and co-operative as

well as the extent to which scientific skills such as manipulation and simple experiments have or have not been achieved.

Oral questioning is a method where the teacher asks oral questions whose response helps the teacher to determine whether that particular child has understood the concept being taught at every stage. Oral questioning also helps a teacher to assess his or her effectiveness in teaching. Oral tests or interviews are useful. A teacher prepares questions which are put to the children one by one. Through this the teacher is able to determine a child's level of achievement. Practical work is a method in which children are given tasks or problems to solve. The teacher marks the work as children perform an experiment, or the finished product which could be an apparatus, a drawing, a model, a display or results obtained. Written tests are the most commonly used methods of assessment.

2.8 Theoretical Framework

The researcher based the study on the constructivist theoretical framework by Brunner (1966). This theoretical framework states that learning is an active process in which learners construct new ideas or concepts based upon their current/ past knowledge. The learner selects and transforms information, constructs hypotheses and makes decisions, relying on a cognitive structure to do so.

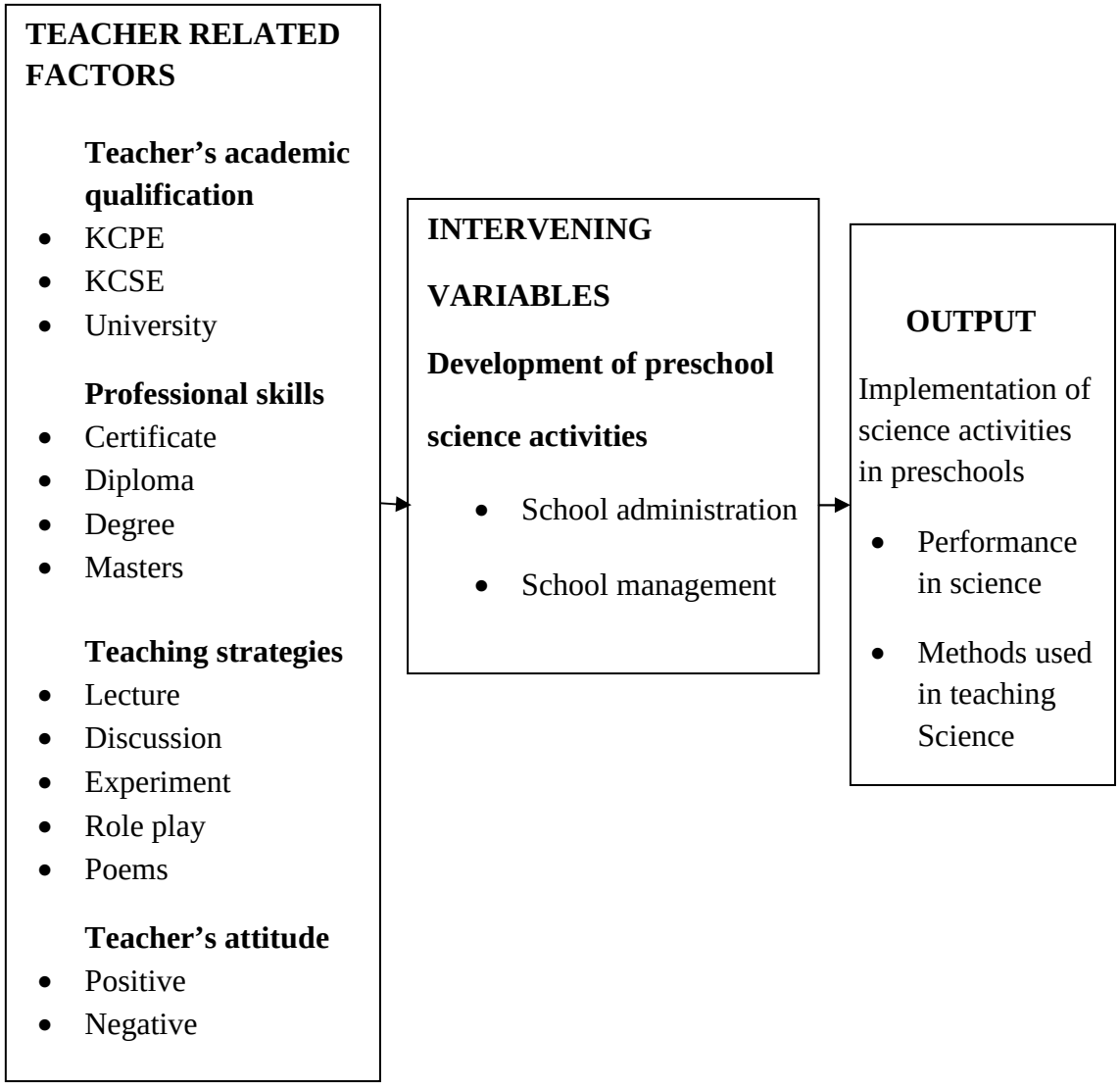
The more traditional formulation of this idea involves the terminology of the active learner stressing that the learner needs to do something; that learning is not the passive acceptance of knowledge which exists "out there" but learning involves the learner's engaging with the world. Physical actions, hands-on experience may be necessary for learning especially for children but it is not sufficient, we need to provide activities,

which engage the mind as well as the hands called reflective activity (Bodovski and Farkas, 2001). The teacher has to provide the activities as well as come up with teaching strategies to enhance these science activities.

Use of play and discovery as teaching methods in science preschools call for children's active participation and provision of different hands on activities engage the mind of a child such as role paying and pretending among others. Therefore, the content should be structured in such way that the child in a spiral manner can easily grasp it. Thus the study is based on this theoretical framework.

2.9 Conceptual Framework

Figure 2.1 Conceptual framework showing teacher related factors influencing the implementation of preschool science activities



The conceptual framework illustrates the independent variables that influence the implementation of science activities in preschools; they are teacher's academic qualification, professional qualification, teaching strategies and teacher's attitude towards science activities although other extraneous variables may influence.

Figure 2.1 shows the schematic presentation of the study. The study perceives science activities by learners as a function of teacher related factors. The preschool teacher will utilize his/her academic ability to understand, internalize and construct knowledge. She/he will use his/her training to come up with appropriate methodology for imparting science concepts. His/ her attitude towards science will affect the organization and interpretation of learning experiences. The process or the moderating variables subject to influencing the implementation of science activities and are controlled includes the government policies, pupils attitudes, level of parental involvement and availability of teaching and learning materials. Hence the dependent variable is the implementation of science activities.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section is organized under the following headings: research design, target population; sample size and sampling techniques; research instruments; instrument validity; instrument reliability; data collection procedures and data analysis technique.

3.2 Research Design

The researcher adopted a survey design employing a descriptive approach. According to Orodho (2005), a survey is a method of collecting information by interviewing or administering a questionnaire to a sample of individuals while Mugenda & Mugenda (2003) looks at survey as an attempt to collect data from members of a population in order to determine the current status of that population with respect to one or more variables. Therefore the study will adopted descriptive survey design to gather data on factors influencing science activity curriculum implementation in ECD centres in Nairobi County. According to Gay (1992) descriptive research survey is designed to allow a researcher to obtain information of a phenomenon at hand and where possible to draw valid general conclusion from the facts discovered. A survey design gathers information for a variety of education and social issues such as data on people's attitudes and opinions. It also targets specific individuals or group to be investigated. Through the descriptive survey the researcher was able to gather data in Nairobi County ECD centres. The study covered pre-school teachers. This helped the researcher to get more detailed findings on the teacher related factors influencing implementation of science activity curriculum in pre-schools in Nairobi County.

3.3 Target Population

Population is defined as any group of people, observation or test in which the researcher happens to be interested. According to Borg and Gall (1989), target population of a study is defined as all the members of real or hypothetical set of people, event or objects to which the investigator wishes to generalize the results of the study. This study target the 60 public preschools and 140 private preschools in Nairobi County. The study used Nairobi County 120 preschool teachers and 1300 learners from the 60 public preschools and 700 teachers and 2800 learners from the 140 private preschools to provide information on the teacher related factors influencing implementation of science activity curriculum in pre-schools in the zone. The study concentrated on pre-school teachers handling children from 3- 6 years old.

3.4 Sample Size and Sampling Procedure

Mugenda and Mugenda (1999) defines sample as a small group obtained from accessible population. Each member in a sample is referred to as a participant. Stratified random sampling was used since the population from which the sample size was drawn is public and private pre-schools. The stratified sampling process necessitated the production of typical representative sample of the entire stratified population which guaranteed representativeness reducing sample error.

A sample size of twenty percent from both public and private preschools was used for the study. According to Kothari (2004) a sample size of twenty percent is an adequate representative of the entire population. The sample for the study composed 20% of each stratum of teachers in public and private preschools which brought the number to 12 from 60 public preschools and 28 from 140 private preschools giving a total of 40

respondents. In order to accord each of the potential respondents in the population equal chances of inclusion, the researcher assigned each a number. The random sampling was done without replacement that is no unit could appear more than once on the sample. It involved writing names of each category on a piece of paper and folding it. The papers were put in different containers for public and private preschools. The researcher picked randomly the first 12 papers from public and 28 from private preschools stratum making a total of stratified sample size of 40 teacher respondents. Therefore, 40 preschool teachers and 820 preschool children (children from 40 preschool) constituted the sample population under investigation.

Table 3.1: Sample size

Category	**Sample**	**%**
Teachers	40	20
Learners	820	20
Total	**860**	

3.5 Research Instruments

The researcher self-administered questionnaires to the teachers to gather data for the study. Questionnaire is a fast way of obtaining data as compared to other instruments (Mugenda & Mugenda, 2003). Questionnaires give the researcher comprehensive data on a wide range of factors. Both open-ended and closed-ended items were used. Questionnaires allowed greater uniformity in the way questions are asked, ensuring greater compatibility in the responses. It is important to use this instrument to this group of people since they can read, understand and respond to the questions by writing their responses without undue influence. Close-ended questions was used largely because

they were easy to administer, analyse and time saving while the open-ended questions enabled the researcher to understand the respondents at depth for it gave them opportunity to express their feelings by giving more information freely.

The questionnaire had three sub-sections. Section A questions answered teacher's background information regarding the nature of their schools and ECD centers and gender. It also elicited information on teachers' level of education, training and teaching strategies. Section B had an attitude scale test intending to measure the attitude of the preschool teachers towards teaching science activities.

Section C of the questionnaire derived from past progressive records of work. According to MOE (2006) guidelines preschool children should not be subjected to tests for rating or placement and therefore information on the dependent variable formed section C. Preschool teachers used the progress records of work to respond to this section. The data was generated from two year level of achievement of preschool children in the county. They used category such as very good, good, fair and poor.

3.5.1 Validity

Validity of the instrument represents the degree to which a test measures accuracy and relevance of inference made based on research results (Mugenda & Mugenda, 2003). An instrument is valid when it actually measures what it claims to measure. Validity of research instrument was attained through being subjected to expert's judgment that is supervisors, who are experts in the field of educational research. Content validity was further attained through research instruments based on research questions of the study and professional advice from peers who had completed their masters' degree.

3.5.2 Reliability

The degree to which a research instrument yields consistent results or data after repeated trials is known as reliability (Borg & Gall, 1989). According to Mujis (2004) reliability has two main forms repeated measurements and internal consistency. Repeated measurement deals with the ability to measure the same things at different times. The instrument should come up with the same answer when used with the same respondents. In order to see whether the measures are reliable, the researcher simply uses them with the same respondents and finds out if the answer they give have not changed too much. This is called test retest method. The time factor is taken of when carrying out test retest, one or two weeks is the best time to take when using the test retest method. After carrying out the test retest, the researcher looks at the relationship between the scores from the instrument at the two points.

The study used a test-retest technique of assessing reliability of administering the same instrument twice to non-participating subject. This was to assess clarity and whether items were correctly coded to avoid any misinterpretation during the main study. As a result items found to be incorrect were discarded, wording changed and additional items included in the instrument.

3.6 Data Collection Procedures

The researcher obtained a research permit from National Council for Sciences and Technology and Innovation (NACOSTI). A copy of the permit and the introduction letter was presented to the County Director of Education (CDE) and County Commissioner Nairobi County, and heads of the pre-schools where the researcher intended to carry out the study. The researcher self-administered the questionnaires. All respondents were assured of confidentiality during the study.

3.7 Data Analysis Techniques

The researcher cross-examined the data after collection to ascertain accuracy, completeness and uniformity. The collected raw data was sorted, coded and arranged serially to make it easy to be identified. Quantitative data was analyzed through descriptive statistics using frequencies, mean, median and percentages. Qualitative data on the other hand was analyzed thematically. Cross tabulation was used to show the relationship between the variables. Data was analyzed and recorded using frequency distribution and percentages as Borg and Gall (1989) argue, the most used and understood standard proportion is the percentage.

3.7.1 Pre-Analysis of the Data

The researcher chose quantitative model of data analysis. This involved assigning numerical values measured at interval or ratio scales as it applied to the responses in the questionnaires since most of the items in the instrument were structured, this exercise of assigning numerals was easily accomplished. In the event where items provided many responses the researcher formulated categories of possible responses. For the open – ended questions the researcher categorized all responses given and assigned numerals to them.

3.7.2 Substantiation of Statistical Analysis

The first thing involved summarizing the data using descriptive statistics. For the data to make sense and for it to be easily interpreted the researcher presented it in a tabular form using frequency distributions. This entailed tallying the categories of responses, calculating frequencies and percentages. The researcher also calculated the mean as in the case of attitude test of the preschool teachers and the achievement level of preschool children. In order to measure relationships between independent variables and dependent variable for the purpose of generalizing the results the researcher used

descriptive statistics. Finally, since the analyzed data was discrete in nature the preferred cross-tabulation which helped the researcher to draw relationships between variables and make inferences.

3.8 Ethical Considerations

Researching is a human activity and being so it is guided by some basic principles. To start the study the researcher sought consent from the district education office and the school head teachers of the sampled preschools. The researcher clearly outlined the purpose of the study for the respondents to willingly participate in the research.

The researcher was keen to carry out the research and the situation where there was reference to other people's work the authors were acknowledged. The name of the respondents and their institutions were not disclosed.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter focuses on the findings and discussion of data on the relationship between teachers' academic qualification, teachers' professional qualification, teaching strategies, teaching attitude and their influence on the implementation of science activities in preschool in Nairobi County.

4.2 Questionnaire Return Rate

The study involved pre-schools in Nairobi County drawn from a target population in fourty pre-schools. The return rate information is shown in Table 4.1.

Table 4.1: Pre-school teachers' questionnaires return rate

Respondents	Target population	Returns	Percentage
Pre-school teachers	40	40	100
Total	40	40	100

From Table 4.1, it can be seen that 40 pre-school teachers returned all the questionnaires 100%. According to Mugenda and Mugenda (1999) a 50 percent response rate is adequate, 60 percent good and above 70 percent rated very good. This implies that basing on this assertion; the response rate in this case of 100 percent is very good.

4.3 Demographic Information

4.3.1 Teachers Demographic Information

In order to achieve the main aim of the study the researcher found it paramount to seek demographic information of the respondents. The background information included

teachers' gender, academic, professional qualification and tabulated in terms of frequency and percentages in Table 4.2.

Table 4.2: Background information on the pre-school teachers

Teachers' related factors		**Frequency**	**Percentage (%)**
Gender	Male	7	17.5
	Female	33	82.5
Level of education	Form IV	1	2.5
	Certificate	4	15
	Diploma	22	55
	Bachelors	12	30
Level of professional qualification	No training	1	2.5
	Certificate ECDE	5	12.5
	Diploma ECDE	22	55
	Degree ECDE	12	30
Total		**n=40**	**100**

Table 4.2 shows that majority 82.5% (n=33) of the pre-school teachers were female while 17.5% (n=7) were male. This revealed that there is gender imbalance and most boys do not have a role model of males in pre-schools. This is an alarming issue in Nairobi County pre-schools. Therefore head teachers and managers should consider employing more male teachers in this sector.

Majority 55% (n=40) of the preschool teachers had diploma level of education, 30% (n=40) attained bachelors level of education, 12.5% (n=40) attained certificate level of education, while 2.5% (n=40) had form four level of education. To some extent, teacher academic qualification is effective at identifying teachers who improve the achievement of children (Ferguson, 1996). Then if at all teacher qualifications are consistently associated with increased student achievement as indicated by Ferguson (1996) the same is expected of this study.

Table 4.2 also shows that 55% (n=40) of teachers attained diploma training in ECDE, 30% (n=40) attained bachelor's degree training in ECDE, 12.5% (n=40) attained certificate training in ECDE while 2.5% (n=40) had no formal training in ECDE. The high number of trained teachers (97.5%) could be due to the government effort to train preschool teachers through in service programs. Liberalization of education sector resulting to mushrooming of training institutions could also have attracted many to train. It could also be explained to be due to the government promise to employ preschool teachers under the devolved constitutional dispensation. This is a positive indication that majority of the teachers hold at least a minimum requirement for teaching at the preschool level. This places the schools in Nairobi County in a particularly good position in terms of capacity building (skills and knowledge acquisition) and creates a better basis for achievement of better results. This study reveals that most pre-school teachers are qualified to implement the science activity curriculum in ECD centers.

4.3.3 Grading of Children's Level of Achievement in Science Activities

The research graded the children's level of achievement as follows: very good, good, fair and poor. The results are shown in Table 4.3.

Table 4.3: Grading of children's level of achievement in Nairobi County

Performance	Frequency	Percentage
Very good	630	76.83
Good	130	15.85
Fair	46	5.49
Poor	14	1.83
Total	**n=820**	**100**

From Table 4.3, it can be found that 76.83% of the pre-schools scored very good, 15.85% scored good, 5.49% scored fair while 1.83% scored poor. This suggests that highly qualified teachers have an impact on children's performance in science. This reveals that children perform better when taught with trained teachers.

4.4 Relationship between Teachers' Academic Qualification and the Implementation of Science Activities in Preschool

The study investigated the relationship between teachers' academic qualification and the implementation of science activities in preschool by probing the teachers' level of education and if teachers qualification influences science subject implementation.

The researcher then sought to investigate the teachers' level of education and its influence on implementation of science activities. This was done by checking the performance in Science subject of the preschool children and relates it to the education level of the teachers. The results are shown in the Table 4.4.

Table 4.4: Teachers level of education

Level of education	Frequency	Percentage	Implementation of science activities
Form IV	1	2.5	Poor
Certificate	2	5	Poor
Diploma	25	62.5	Better
Bachelors	12	30	Best
Total	**n=40**	**100**	

Table 4.4 indicates that majority (62.5%) has diploma as their highest level of education. A few (30%) had bachelor's degree in ECDE while (5%) were holders of certificate in ECDE and finally (2.5 %) had form four certificate and without formal training in ECDE. The findings indicated that those with bachelors were the best in implementing the science activities while those with no formal training in ECDE were the poorest. The implementation of science activities was studied from the performance of the children in relation to the teachers' education level. These findings are supported by Xu, Jane and Colin (2011) who reported that there is no association between teachers holding masters degrees and fourth through eighth grade students' science test score gains. Teacher's certification as a signal of teacher quality has been investigated at various levels. Jacob (2007) established that full certification is either unrelated or positively related to student achievement.

The researcher then sought to investigate if the teachers' find that their qualification influences implementation of science activities. The results are shown in the Table 4.5.

Table 4.5: Teacher level of education influences implementation of science activities

Responses	Bachelor		Diploma	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Strongly agree	10	83%	12	48%
Agree	0	0%	7	28%
Undecided	2	17%	2	8%
Strongly disagree	0	0%	3	12%
Disagree	0	0%	1	4%
Total	**n=12**	**100%**	**n=25**	**100%**

Table 4.5 indicates that majority (83%) of the preschool teachers who had bachelors strongly agreed that teachers level of education influences implementation of science activities while a few (17%) were undecided to the statement. Many 48% with diploma strongly agreed while 12% strongly disagree. The findings indicated that teachers think that their education qualification influences implementation of the science activities in preschools. This finding is indicated by (Raymond, Fletcher and Huque 2001) studies that established that there exist a stronger correlation between the achievement of secondary school students and their teacher's subject area expertise than exist between the success of younger students and their teacher's subject knowledge.

The researcher then sought to investigate the relationship between teachers' professional qualification and the implementation of science activities in preschool.

4.5 Relationship between Teachers' Professional Qualification and the Implementation of Science Activities in Preschool

The researcher investigated the relationship between teachers' professional qualification and the implementation of science activities in preschool and cross-tabulation of preschool teachers' professional qualification and learners' achievement. The results are shown in the Table 4.6.

Table 4.6: Teachers level of professional qualification

Level of education	Frequency	Percentage	Implementation of science activities
Certificate in ECDE	5	12.5	Poor
Diploma in ECDE	22	55	Better
Degree in ECDE	12	30	Best
Masters in ECDE	1	2.5	Best
Total	**n=40**	**100**	

The data from Table 4.6 portrayed similarities concerning the variables under investigation. This was demonstrated by majority of the teachers with the highest professional qualification being diploma holders in ECDE at (55%) followed by those with bachelors degree in ECDE at (30%), holders of certificate in ECDE were (12.5 %) and finally 2.5 % (n=40) had masters in ECDE. The findings indicated that those with degrees and masters as their highest professional qualification were the best in implementation of science activities in preschools. The implementation was perceived as poor or best by relating to the performance of the Science activity performance to the teachers education level. The study finding concurs with Jacob, (2007) who established

that full certification is positively related to student achievement. Teachers' subject area of certification or authorization is one of the teacher qualifications most consistently and strongly associated with improved student achievement. The effects associated with a teacher's possession of an advanced degree are strikingly counterintuitive; especially given the salary incentives offered to encourage teachers pursue graduate degrees (Rowan, 2002). However, other studies as in Raymond (2001) have shown that teachers with higher licensure test scores have a marginal positive impact on middle school science achievement. In particular, it has been indicated that teacher's completion of an undergraduate or graduate majoring in science is associated with higher student achievement in high school and middle school.

This researcher then investigated the cross-tabulation of preschool teachers' professional qualification and learners' achievement as in Table 4.7.

Table 4.7: Cross-tabulation of preschool teachers' professional qualification and learners' achievement

Preschool teachers' professional qualification	**Learners' levels of achievement**							
			High		**Medium**		**Low**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Degree in ECDE	12	30	325	51.6	0	0	0	0
Diploma in ECDE	22	55	305	48.4	72	55.4	0	0
Certificate in EDCE	5	12.5	0	0	58	44.6	46	76.7
Form IV	1	2.5	0	0	0	0	14	23.3
Total	**40**	**100**	**630**	**100**	**130**	**100**	**60**	**100**

Table 4.7 shows that degree teachers taught 51.6% (n=630) and diploma teachers taught 48.4 % (n=630) of the high achieving preschool children while 55.4 % (n=130) and 44.6 % (n=130) of medium achievers were instructed by teachers with ECDE diploma and certificate respectively and the only form four certificate holder and without formal training registered high achievement of .0%. On the contrary, a whole class of 14 children (23.3%) taught by an untrained teacher achieved very low and 46 (76.7%) of the low achievers were under the care of teachers with certificate in ECDE. This implies that teachers who were more qualified academically and professionally were likely to influence pre-school children to highly achieve in science activity than less qualified teachers. The conclusion must be that there is a relationship between the preschool teachers' academic/ professional qualification and learners' level of achievement.

Karuga (1996) in Kenya in his study revealed that only 80% of science teachers were qualified and the problem of teachers can be improved by advancing in education. He says a well trained teacher feels motivated to teach. The teachers who are not motivated always feel that the syllabus is wide and difficult to finish in time. Kathuri (1986) also indicated that a professionally trained teacher contributes more positively to effective learning than untrained one. It is for the same reason that teacher training exists as a major part of education systems throughout the world. Hence the researcher can conclude that teacher professional qualification influences the implementation of science activities in preschools.

Darling-Hammond, (2001) shows that certain types of professional development contribute to teacher quality and student achievement. Sustained professional development that is aligned with the curriculum and focused on instruction has shown to positively influence on school level achievement in mathematics and science at both

elementary and high school. Results such as these have led to conclusions that higher-quality early childhood education programs are those where the lead teachers have Bachelor's degrees, specifically in majors of child development or similar areas (Whitebook & Ryan, 2011). However, some research demonstrates that teacher education or certification is not consistently related to higher quality classrooms or better pre-academic skills for children. In a study that examined teacher's level of education and classroom quality in six state-funded pre kindergartens, Early et al. (2006) found that teachers who had more than a Bachelor's degree received higher scores on the Teaching and Interaction subscales of the Early Childhood Environment Rating Scale (ECERS) than those teachers who had an Associate's degree. However, only a few studies have reported such results and are mostly based at the school level. We therefore conclude that the teachers' academic and professional qualification have a positive influence on the achievement of pre-school children in science activities.

4.6 Relationship between Teaching Strategies and the Implementation of Science Activities in Preschool

The study investigated the preschool teaching strategies of science activities, teachers' implementation of preschool teaching strategies in science activities and cross-tabulation of teachers teaching strategies and learners achievement.

This researcher investigated the preschool teaching strategies of science activities. the findings are presented in Table 4.8.

Table 4.8 Preschool teaching strategies of science activities

Teaching strategy	Very Good		Good		Inadequate	
	F	%	F	%	F	%
Discussions	15	37.5	22	55	3	7.5
Poem	18	45	18	45	4	10
Drama	17	42.5	15	37.5	8	20
Role play	30	75	6	15	4	10
Story telling	20	50	19	47.5	1	2.5
News telling	13	32.5	24	60	3	10
Painting	21	52.5	16	40	3	2.5
Modeling	32	80	8	20	0	7.5
Observation	25	62.5	14	35	1	7.5
Experiment	28	70	12	30	0	0
Field trip	19	47.5	19	47.5	2	2.5
Practical	29	50.75	11	27.5	0	0
Songs	23	57.5	16	40	1	2.5

Table 4.8 shows that ratings were very high in all the teaching strategies. Most preschool teachers rated the teaching strategies to be very good and good as compared to inadequate. The researcher further sought to find out whether the preschool teachers always, often or rarely involved learners in discussion, discovery, role play, modeling, observation and experiment during science activities. Modeling was the most preferred method in teaching of science activities. Harbeman (1991) also found out that good teaching is found in environments where children are actively engaged, enjoy what they are learning in the classroom, participate in real-world experiences and are asked to

make connections to their own experiences as well as in environments where children's sustained play is encouraged (Copple & Bredekamp, 2009). According to Nderitu, Kihara and Onguti (2005), they found out that theories of learning underscore the fact that children learn through doing that is investigating, viewing such as using lens, modeling and measuring.

This researcher investigated teachers' implementation of preschool teaching strategies in science activities. The findings are presented in Table 4.9.

Table 4.9 Teachers implementation of preschool teaching strategies in science activities

Performance	**Frequency**	**Percentage**
Always	28	70
Often	10	25
Rarely	2	5
Total	**n=40**	**100**

Table 4.9, indicates that majority (70%) of the preschool teachers always used modeling as a teaching strategy. Teachers who often used modeling represented (25%) while (5%) of the sampled population rarely used modeling. This demonstrates that Nairobi County preschool teachers teaching in preschool centers engages the learners in modeling during science activities and this could boost achievement of the pre-school learners in science activity. This is supported by the findings of K.I.E (1987) which found out that Learners learn best by carrying out activities related to what is being learnt. Teaching approaches included modeling, demonstration, practical activities, guided discussion,

projects and field trips to ensure that children acquire science process skills, enjoy learning and apply what is learnt to everyday life.

The study sought to determine the cross-tabulation of teachers teaching strategies and learners achievement. Tables 4.10 present the findings.

Table 4.10: Cross-tabulation of teachers teaching strategies and learners achievement

Teachers strategies	**Learners' levels of achievement**							
			High		Medium		Low	
	N	%	N	%	N	%	N	%
Always	28	70	402	63.8	130	100	60	100
Often	10	25	200	31.8	0	0	0	0
Rarely	2	5	28	4.4	0	0	0	0
Total	**40**	**100**	**630**	**100**	**130**	**100**	**60**	**100**

Table 4.10 shows that 63.8% (n=630) were the majority of children with high achievement taught by teachers always using teaching strategies towards the teaching of science activity. The same group of teachers always using the teaching strategies handled the largest group of children who had medium achievement (100.0%) n=130 and low achievement (100.0%) n=60. The teachers who often used teaching strategies also handled a group of children with high achievement (31.8) n=200 and those who rarely used teaching strategies too had high achievement (4.4) n=28. This brought an interesting scenario whereby the highest %age of children who had high achievement and low achievement consecutively came from teachers who always, often and rarely

used teaching strategies. This implies that the achievement of preschoolers' could not be pegged on teachers' teaching strategies alone. Other factors like teachers' experience and attitude of preschool children towards science activities could be an issue of concern. This can be interpreted to mean that teachers' teaching strategies has to be supported with other factors in order to influence the implementation of science activities. Research studies with high school students (Court,1993; Palmer, 1999) and undergraduate students (Bulunuz, in press 2012, 2012; Jarrett & Burnley, 2010; Palmer, 2002) also indicates that engagement with interesting hands-on science activities in a playful environment not only promotes students' learning science, but also helps them to recognize the value of making science exploratory, fun, interesting and motivational. However, other studies as in Perkins (1993) have shown that learning for understanding requires not just taking what you hear, it requires thinking in a number of ways with what you heard practicing and debugging your thinking until you can make the right connections flexibly. Therefore preschool teachers to facilitate learning science through play, understanding of both science and play are important. Perkins and Unger (1994) recommend that the instructor provide powerful representations that facilitate the learner's construction of understanding and that students be given time for thinking and reflecting. Also the teacher needs to prepare the practical in advance and if necessary try them out before the lesson (K.I.E, 1987). Learners too should be given clear instructions before the lesson.

4.7 Relationship between Preschool Teachers' Attitude and implementation of Science Activities in Preschool

Section B of the questionnaire had twenty questions. Teachers were required to give information about their attitudes and perceptions towards science activities. The responses were in a range of 1-5 using the Likert scale.

Their response to the 20 questions were used to determine their attitude towards science activity in table 4.11.

Table 4.11 Teachers attitudes and perceptions towards science activity

Attitude & perceptions towards science activity	N	SA	A	U	D	SD	Mean
I like science activities	40	22	17	0	1	0	4.5
I am always under strain when teaching Science activities	40	1	4	1	23	11	4.0
I enjoy teaching science activity	40	17	21	0	2	0	4.3
Science activity is such an interesting activity area.	40	22	17	0	1	0	4.5
Solving science work problems is boring & stressful.	40	0	0	2	17	21	4.4
Science activity courses & seminars are enjoyable	40	17	20	3	0	0	4.4
The Mere mention of science activities irritates me.	40	0	3	3	16	18	4.2
Science activities make me feel uncomfortable & impatient.	40	3	7	2	19	9	3.6

The very nature of science makes it fascinating to teach	40	8	23	3	4	2	3.8
Science activity gives me a feeling of security and self-assurance	40	10	26	4	0	0	4.2
The end of science activity lesson is always good riddance	40	7	9	1	15	8	3.2
I have a good feeling towards science activity.	40	24	16	0	0	0	4.6
I never choose science, I only found myself in it.	40	2	8	2	18	10	3.7
Teaching science is not a satisfying exercise.	40	1	3	0	26	10	4.0
If I would go back to my childhood I would still choose science	40	22	16	1	1	0	4.5
Having to carry out an experiment scares me & puts me off.	40	1	3	1	21	14	4.1
Given a chance I would train in another subject.	40	4	6	3	19	8	3.5
Of my teaching subjects science is my favorite	40	21	12	0	7	0	4.2
Furthermore I did not do well in science subject.	40	5	3	0	9	23	4.1
I would rather teach other subjects during science less	40	2	0	0	26	12	4.2

Table 4.11 shows that the scores were very high. This indicates the majority of the teachers had a positive attitude towards the Science subject and this might be influencing the implementation of the subject in preschools. All the preschool teachers had mean score above 3.2 in all the statements. In four (20.0%) of the 20 questions, the mean score was 4.5 and above. The preschool teachers like the science subject and enjoy teaching the science subject since the mean scores were above 4.0. This indicates that the teachers had positive attitude and perception towards the Science subject. Myers and Fouts (1992) found that positive attitudes toward science related to students participation, supportive social environment, positive relationship with classmates, and the use of a variety of teaching strategies and interesting science activities. They found out that teacher attitude had significant effect on pupils performance in science activities.

Research studies indicate that teachers with negative attitudes toward science spend less time teaching it and also use didactic approach rather than approaches that based on students active participation and explorations (Fulp, 2002; Goodrum, Hackling, and Rennie, 2001; Harlen & Holroyd 1997; Varelas, Plotnick, Wink, Fan, & Harris, 2008; Weiss, 1997). These researchers hinted that there is significant relationship between the attitude of the teacher and the achievement of the learners.

The study sought to determine the relationship between teachers' attitude and the achievement of preschool children in science activity. Tables 4.12 present the findings.

Table 4.12: Preschool teachers' attitude towards science activity

Attitude	**Frequency**	**Percentages**
Always	36	90
Sometimes	4	10
Total	**n=40**	**100**

According to Table 4.12, teachers whose attitudes were always influenced formed the largest portion (90.0%) of the preschool teachers. Teachers who were sometimes influenced with attitude represented 10% of the sampled population. There were no teachers who were rarely influenced in these categories. This demonstrates that Nairobi County teachers teaching in preschool centers have a good and positive attitude towards science activity and this could boost achievement of the pre-school learners in science activity.

The researcher then sought to investigate the cross-tabulation of teacher attitude and learners achievement. The results are shown in the Table 4.13.

Table 4.13: Cross-tabulation of teacher attitude and learners achievement

Teachers' attitude towards science activity			**Learners' levels of achievement**					
			High		**Medium**		**Low**	
	N	%	N	%	N	%	N	%
Always	36	90	428	67.94	130	100	60	100
Sometimes	4	10	202	32.06	0	0	0	0
Total	**40**	**100**	**630**	**100.0**	**130**	**100.0**	**60**	**1000**

Table 4.13 shows that 67.94% (n=630) were the majority of children with high achievement were taught by teachers with positive attitude towards the teaching of science activity. The same group of teachers handled the largest group of children who had medium achievement (100.0%) n=130 and low achievement (100.0%) n=60. This brought an interesting scenario whereby the highest %age of children who had high achievement and low achievement consecutively came from teachers who had positive

attitude. This implies that the achievement of preschoolers' could not be pegged on teachers' attitude alone. Interplay of other factors like teachers' experience and attitude of preschool children towards science activities could be an issue of concern. This can be interpreted to mean that teachers' attitude did not seem any influence on the achievement of the preschool learners in science activity. The researcher further sought to find out whether preschool teachers attitude had always, sometimes or rarely influenced the implementation of science activity. It can be concluded that the teachers' attitude did influence the achievement of preschool children in science activities in Nairobi County. This is supported by the findings of Aiken (1970) who studied the relationship between attitude and performance and concluded that the relationship between attitude and performance is certainly the congruence of reciprocal influence in that, attitude affects achievements and in turn affects attitude.

Eble, (1988) had similar findings when he found out that pleasure in teaching and learning is the common ground necessary to sustain great teaching. If teachers like and value their subjects, this positive attitude will show through and will have a powerful influence on motivation of students. What the teacher values students begin to value and on to motivation will have taken root. If the teacher therefore feels little enthusiasm or interest, this too shows through and the students slows down. Positive attitude to the teacher towards the subject plays a positive role in causing the student to learn the subject effectively and thus achieve good grades in the subject. The teacher's attitudes are believed to be an important factor in determining the teaching and the learning of science.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the study, conclusions, and recommendations by the researcher and areas of further research.

5.2 Summary

The purpose of the study was to investigate the influence of teacher related factors on the implementation preschool children's science activities in Nairobi County. Specifically, the study sought to determine the relationship between teacher's academic qualification and preschool children achievement in science activities, establish the relationship between teacher's teaching strategies and the achievement of preschool children in science activities, find out the relationship between teacher's professional qualification and the achievement of preschool children in science activities, and investigate the influence of teacher's attitude towards science activities on the achievement of preschool children in science activities. The researcher used descriptive research design. After conducting a stratified random sampling the sample population was forty preschools. Questionnaires for preschool teachers were used to collect data on the independent and dependent variables. Pilot study was carried out to assess the instruments' validity and for reliability, test re-test technique was used. The findings and discussions, conclusions and recommendations of this study were based on the data that was systematically collected and analyzed.

The study demonstrated that female teachers dominated the preschool teaching fraternity with a population of 82.5.0% (n=40). On teachers' qualification, teachers with

degree in ECDE registered the highest achievement of children of 51.6 % (n=630) followed by those who had diploma in ECDE with a high achievement of 48.4% (n=630). For the medium achievers teachers with diploma in ECDE and certificate in ECDE registered 55.4% (n=130) and 44.6 % (n=130) respectively. Teachers with certificate and without training (with a form four certificate) posted the lowest achievement of preschool children of 76.7 % (n=60) and 23.3% (n=60) respectively.

Regarding teaching strategies, the data showed that 63.8% (n=630) of preschool children highly achieved and were the majority of pupils taught by teachers always using various teaching methods. They were followed by 31.8% (n=630) taught by teachers who sometimes used various teaching methods. The medium achievers 100% (n=130) and low achievers 100% (n=60) were taught by teachers who sometimes used various teaching methods. Therefore it was concluded that there was significant relationship between preschool teachers' teaching strategies and the achievement of preschool children in science activity.

On establishing preschool teachers' attitude towards science activity, the largest group of children with high achievement of 67.82% (n=630), medium achievement of 100 % (n=130) and low achievement of 100.0 %(n=60) were taught by teachers with positive attitude. The high achievers had also a group of children 32.06 %(n=630) who were taught by teachers sometimes not with positive attitude.

5.3 Conclusions

This section presents the conclusion of the findings of the study according to the following research questions: what is the relationship between academic qualification and the implementation of science activities? What is the relationship between teacher

professional qualification and the implementation of science activities? What is the relationship between teaching strategies and the implementation of science activities? What is the relationship between the attitude of the teacher and implementation of science activities? The study came up with significant findings on teacher related factors influencing the implementation of Science activities preschools in Nairobi County.

Concerning the academic and professional qualification of the teacher, it was established that teachers were well qualified. Meeting the needs of pre-school children requires a more knowledgeable person (a preschool teacher for that matter) who has proper academic back ground and professionally trained in order to help children realize the optimal potential(zonal of optimal development) of their cognitive domain. This stress the need for teachers to advance in education, attain professional development and participate in mentoring or induction programs so as to improve their quality. .

On the role of teaching strategies, science is largely a doing subject and children know more of what they do than what they hear. They need to see, touch, smell and do as much as possible of their own investigations. They are unable to think through ideas and therefore hands on activities and first hand experiences make learning better for them. The teacher should give each child a chance to contribute to learning.

With the attitude of the teacher and the implementation of science activities it was established that positive attitude of the teacher towards the subject plays a positive role in causing the student to learn the subject effectively and thus achieve good grades in the subject. The teacher's attitudes are believed to be an important factor in determining the teaching and the learning of science.

5.4 Recommendations

Based on the study findings the following recommendations are hereby suggested:

The findings indicated that academic qualification and professional qualification of a teacher influenced the implementation of science activities in preschools. They were indicated as important ingredients towards the preschool children achievement and therefore it is important for the government and other educational stake holders to promote continuous teacher development through in service and pre service training programs. A preschool teacher is recommended to have a proper academic background and be professionally trained

The teaching strategies of science should be largely be based on a doing subject where children should know more of what they do than what they hear. They need to see, touch, smell and do as much as possible of their own investigations. The teachers should undergo frequent seminars and in-service courses to equip themselves with various teaching methods to enhance their teachings.

The teachers' attitude was found to influence implementation of science subject positively. Teachers' positive attitude had strong influence on learners' attitude and that the attitude towards science had strong bearing on achievement. Based on the findings it is recommended for the government and the stakeholders to motivate teachers through salary increment and other incentives that will have a positive attitude towards science teaching.

5.5 Recommendation for Further Research

The study found out there is need for further research in the following areas:

i. This study should be replicated to a wider population of pre-schools in Nairobi County and other parts of the country to establish factors influencing implementation of science activity and compare the findings.

ii. Further research should be done to find out whether factors that had not been attained at the time of study like participation of other stake holders and pre-school teachers' attitude influence implementation of science activity in ECD centres.

iii. Further research should be carried out to identify teaching methods that could be effective in improving science activity curriculum performance in ECD.

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APPENDICES

APPENDIX I: QUESTIONNAIRE FOR TEACHERS

This questionnaire is designed to gather data about yourself and your school to be used in the study on teachers' related factors on implementation of science activities in pres-school Nairobi County. Kindly do not write your name, indicate your answers and tick where appropriate. Your response will be absolutely treated confidentially**.**

Section A:

1. Which of the following services does your center offer?

   Nursery [ ] pre-unit [ ] kindergarten [ ]

   Playgroup [ ]

2. Type of the school

   Public [ ] Private [ ]

3. Indicate your gender

   Male [ ] Female [ ]

4. What is your highest level of education?

   Form IV[ ] Certificate[ ] Diploma [ ] Bachelors[ ]

5. What is your highest level of professional qualification?

   Certificate [ ] Diploma [ ] Bachelors Degree [ ]

   Masters [ ]

   Any other specify _____

6. (a) Do you sometimes encounter some children who dislike science activities

   Yes [ ] No [ ]

(b) If yes, how do you ensure that such pupils develop a liking for science activities?

……

……

……

7. (a) How many times are you forced to repeat certain science topics that children tend not to understand?

   Once [ ] Twice [ ] Thrice [ ]

   As many times as possible till the pupils capture the content [ ]

8. To what extent do you assess as per the content taught?

   Very often [ ] often [ ] rarely [ ] never at all [ ] never [ ]

9. How often do you achieve specific objectives that you intend to achieve at the end of the lesson?

   Very often [ ] often [ ] rarely [ ] never [ ]

10. When assessing preschool children what are your expectations?

    (a)Extremely high achievement [ ]

    (b) High achievement [ ]

    (c) Average achievement [ ]

    (d) Low achievement [ ]

    (e) Have no expectations [ ]

11. How regularly is your work being assessed by the administrators?

Once a week [ ] twice a month [ ] once a term [ ] not at all [ ]

12. How do you consider the following methods of teaching sciences?

Method	**Very good**	**Good**	**Inadequate**
Discussion			
Poems			
Drama			
Role play			
Story telling			
News telling			
Painting			
Modeling			
Songs			
Observation			
Experimentation			
Field trips			
Practical			

13. How often do you involve learners in these activities?

Method	**Always**	**Often**	**Rarely**
Discovery			
Discussion			
Poems			
Drama			
Role play			

Story telling			
News telling			
Painting			
Modeling			
Songs			
Observation			
Experiment			

14. What are your main challenges in teaching science using experimentation method in pre-school?

a) Lack of resources [ ]

b) Lack of materials [ ]

c) Lack of time for preparing [ ]

d) Lack of text books [ ]

e) Others ……

15. What are your general comments on teaching strategies in the implementation of science activities in pre-school?

Comments: ……

…….

…….

Section B

This section seeks information about the teaching of science in preschools. Kindly do not write your name, indicate your answers and tick where appropriate. Your response will be absolutely treated confidentially**.**

Take your time in order to pick the most appropriate.

Note

SA- means strongly agree

A- Means agree

U- Means undecided

D- Means Disagree

SD- Means strongly disagree

Attitude and perception towards science	**SA**	**A**	**U**	**D**	**SD**
1. I like science activities					
2. I am always under strain when teaching science activities					
3. I enjoy teaching science activities					
4. Science activities is such an interesting area activity					
5. Carrying out experiment is boring and stressful					
6. Science activity courses and seminar are enjoyable					
7. The mere mention of science activity irritates me					

8. Science activity makes me feel uncomfortable and impatient					
9. The very nature of science makes it fascinating to teach					
10. Science activity gives a feeling of security and self assurance					
11. The end of science activity lesson is always good riddance					
12. I have a good feeling towards science activity					
13. I never chose science, I only found myself in it					
14. Teaching science is not a satisfying exercise					
15. If I would go back to my childhood I would still choose science					
16. Having to carry out an experiment scores me and puts me off					
17. Given a chance would train in another subject					
18. Of my teaching subjects science is my favorite					
19. Furthermore I did do well in science subject					
20. I would rather teach other subjects during science					

In your own opinion how often does teacher attitude influence the implementation of science activities in preschool?

Always [ ] Sometimes [ ] Rarely [ ]

Section C

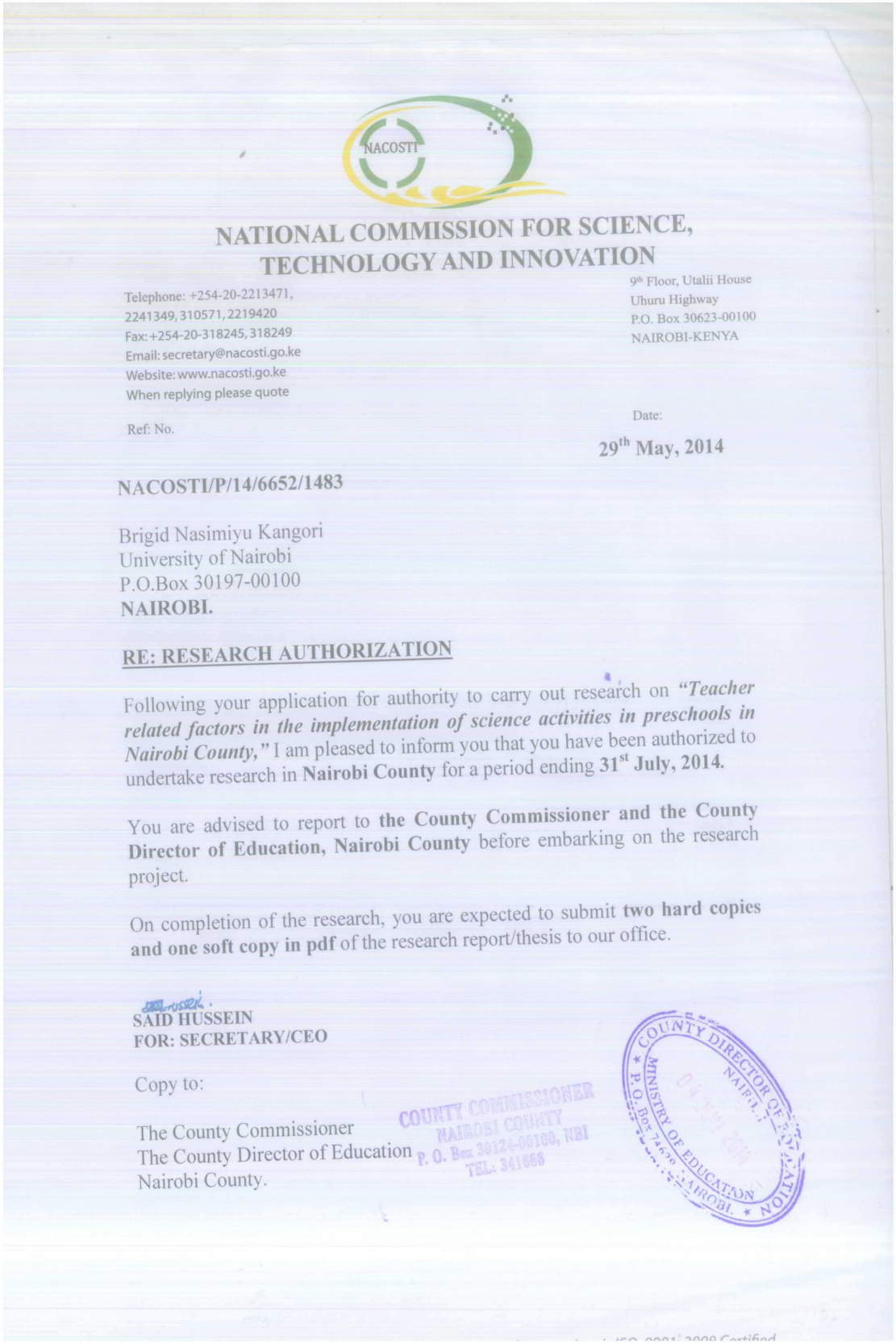
Science activity progressive record of work for preschool

This section is intended to track the progress of preschool children in science for the last two years. Please enter number of children under each level of achievement.

Achievement level	**Term 1II 2012**	**Term I 2013**	**Term II 2013**	**Term III 2013**	**Term I 2014**
Very good					
Good					
Fair					
Poor					

Thank you

APPENDIX II: RESEARCH AUTHORIZATION LETTER



NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349, 310571, 2219420
Fax: +254-20-318245, 318249
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:
29th May, 2014

NACOSTI/P/14/6652/1483

Brigid Nasimiyu Kangori
University of Nairobi
P.O.Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Teacher related factors in the implementation of science activities in preschools in Nairobi County,"*** I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for a period ending **31st July, 2014.**

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

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

SAID HUSSEIN
FOR: SECRETARY/CEO

Copy to:

The County Commissioner
The County Director of Education
Nairobi County.

COUNTY COMMISSIONER
NAIROBI COUNTY
P. O. Box 30124-00100, NBI
TEL: 341666

COUNTY DIRECTOR OF EDUCATION
NAIROBI
MINISTRY OF EDUCATION
P.O. Box 74926 NAIROBI

APPENDIX III: RESEARCH CLEARANCE PERMIT

THIS IS TO CERTIFY THAT:
MS. BRIGID NASIMIYU KANGORI
of UNIVERSITY OF NAIROBI, 0-100
Nairobi,has been permitted to conduct
research in *Nairobi County*

on the topic: *TEACHER RELATED FACTORS IN THE IMPLEMENTATION OF SCIENCE ACTIVITIES IN PRESCHOOLS IN NAIROBI COUNTY*

for the period ending:
31st July,2014

Applicant's Signature

Permit No : NACOSTI/P/14/6652/1483
Date Of Issue : 29th May,2014
Fee Recieved :Ksh 1,000

Secretary
National Commission for Science, Technology & Innovation

CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No. A 1813

CONDITIONS: see back page